

Abstracts of the Psychonomic Society

Volume 22 • November 2017

58TH ANNUAL MEETING

Vancouver Convention Centre West
Vancouver, British Columbia, Canada
Thursday, November 9-Sunday, November 12, 2017

REGISTRATION

Ballroom Lobby, Level 1, Vancouver Convention
Centre West (VCC West)

Wednesday, November 8 4:00 p.m.-8:00 p.m.
Thursday, November 9 7:30 a.m.-8:00 p.m.
Friday, November 10 7:30 a.m.-6:00 p.m.
Saturday, November 11 7:30 a.m.-5:00 p.m.
Sunday, November 12 7:30 a.m.-12:00 p.m.

OPENING SESSION/KEYNOTE ADDRESS

Ballroom A, VCC West
Thursday, November 9 8:00 p.m.-9:30 p.m.

- **Psychonomic Society 2017 Early Career Awards**
- **Psychonomic Society/Women in Cognitive Science Travel and Networking Award for Junior Scientists**
- **Working Memory Capacity and Intelligence**
Randall "Randy" W. Engle, *Georgia Institute of Technology*

OPENING RECEPTION

Ballroom BC, VCC West
Thursday, November 9 Immediately Following
Keynote Address

SYMPOSIA

Meeting Rooms 109-110, VCC West
Friday, November 10 10:00 a.m.-12:00 p.m.
Symposia I: Dual Process Theory 2.0

Friday, November 10 1:30 p.m.-3:30 p.m.
Symposia II: Improving Use of Statistical Inference in Science

Friday, November 10 3:50 p.m.-5:50 p.m.
Symposia III: Beyond the Lab: Using Big Data to Discover Principles of Cognition
From the Psychonomic Society's Leading Edge Workshop Initiative

SYMPOSIA - CONTINUED

Saturday, November 11 10:00 a.m.-12:00 p.m.
Symposia IV: When Man Bites Dog: What do Developmental Reversals Tell Us About Cognitive Development, Aging, and the Brain

Saturday, November 11 1:30 p.m.-3:30 p.m.
Symposia V: 50 Years of Implicit Learning Research: A Symposium in Honor of Arthur S. Reber

POSTER SESSIONS

Ballroom BCD, VCC West

Session I
Thursday, November 9 6:00 p.m.-7:30 p.m.

Session II
Friday, November 10 12:00 p.m.-1:30 p.m.

Session III
Friday, November 10 6:00 p.m.-7:30 p.m.

Session IV
Saturday, November 11 12:00 p.m.-1:30 p.m.

Session V
Saturday, November 11 6:00 p.m.-7:30 p.m.

BUSINESS MEETING

Meeting Room 114, VCC West
Saturday, November 11 5:10 p.m.-6:00 p.m.

- **Presentation of the Psychonomic Society 2017 Clifford T. Morgan Best Article Awards, Graduate Travel Awards, and J. Frank Yates Student Travel Awards**
- **Business of the Psychonomic Society**

FUTURE MEETINGS

2018 – IMPS – Amsterdam, NL – May 9-12
2018 – New Orleans, LA – November 15-18
2019 – Montréal, QC – November 14-17
2020 – Austin, TX – November 19-22
2021 – San Diego, CA – November 18-21
2022 – Washington, DC – November 17-20
2023 – San Francisco, CA – November 16-19
2024 – New York City, NY – November 21-24



A PSYCHONOMIC SOCIETY PUBLICATION
www.psychonomic.org

OPENING SESSION/KEYNOTE ADDRESS



Working Memory Capacity and Intelligence
 Randall "Randy" W. Engle, *Georgia Institute of Technology*
 Thursday, November 9, 8:00 p.m., Ballroom A, VCC West

2017 EARLY CAREER AWARDS

Candice Morey, *Cardiff University, United Kingdom*
 Evan Risko, *University of Waterloo, Canada*
 Darryl Schneider, *Purdue University, USA*
 Benjamin Storm, *University of California, Santa Cruz, USA*

OPENING RECEPTION

Thursday, November 9, immediately following the Keynote Address, in Ballroom BC
 Hosted by: Psychonomic Society Governing Board

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NOTICES

- *Designation of Psychonomic Society Early Career Award Winners: An asterisk (*) preceding an author's name indicates that he/she is a recipient of the Psychonomic Society's Early Career Award for 2017.*



VENUE/HOTELS

All sessions (spoken and poster) for the 2017 Psychonomic Society Annual Meeting will be held at the Vancouver Convention Centre West.

To maintain the Society’s practice of no registration fee for members, it is essential that all hotel rooms reserved for the Annual Meeting be identified as such at the time of booking. To ensure you receive the specially negotiated room rate, please contact one of the following hotels:

- Fairmont Waterfront Vancouver: \$189 CDN + tax (single/double) per night
- Marriott Vancouver Pinnacle Downtown: \$165 CDN + tax (single/double) per night
- Pinnacle Hotel Harbourfront: \$155 CDN + tax (single/double) per night (cityview)

Please make your reservations no later than October 16, 2017. There are a limited number of rooms available at each hotel, so please book early to secure your sleeping room reservations (rooms may be sold out well before this date). Visit the Psychonomic Society website (www.psychonomic.org/2017hotels) to make online reservations.

REGISTRATION

Registration is free to members of the Psychonomic Society and all members must register. Registration for non-members is \$75. There is no registration fee for undergraduate students. Membership in the Society is inexpensive and strongly encouraged.

Registration will be located in Ballroom Lobby on Level 1 (one floor up from the ground) of the Vancouver Convention Centre West (VCC West) during the following times:

- Wednesday, November 8 4:00 p.m.-8:00 p.m.
- Thursday, November 9 7:30 a.m.-8:00 p.m.
- Friday, November 10 7:30 a.m.-6:00 p.m.
- Saturday, November 11 7:30 a.m.-5:00 p.m.
- Sunday, November 12 7:30 a.m.-12:00 p.m.

To avoid lines onsite, you are strongly encouraged to preregister through the Psychonomic Society website (www.psychonomic.org/2017registration). All attendees must register.

ABSTRACT AND PROGRAM BOOK

Programs will be available in print at the registration desk and as a PDF at www.psychonomic.org/2017AnnualMeeting.

MOBILE APP

A free mobile app for this year’s meeting will be available for download in the Apple App Store and Google Play Store a few weeks prior to the Annual Meeting. All versions include the full program and abstracts.

It is recommended that you download the mobile app before you come to the Annual Meeting. Internet service will not be available in the meeting space at the Vancouver Convention Centre West.

MEETING ROOMS

All meeting rooms for spoken papers are located in the Vancouver Convention Centre West:

- West Ballroom A
- West Ballroom BC
- Meeting Room 109-110
- Meeting Room 111-112
- Meeting Room 114
- Meeting Room 118-120
- Meeting Room 202-204 (2nd floor)
- Meeting Room 205-207 (2nd floor)
- Meeting Room 208-209 (2nd floor)
- Meeting Room 211 (2nd floor)
- Meeting Room 212-214 (2nd floor)

Session chairs are encouraged to solicit papers from individuals in their sessions prior to the meeting and load presentations onto the laptop computer in the meeting room, 30 minutes in advance. This will save time during the session.

TRAVEL TO VANCOUVER

Airport

Vancouver International Airport (YVR) is located 25 minutes from downtown Vancouver.

Parking

For more information on parking at all of the venues, please visit the website for each facility.

Vancouver Convention Centre West:

Hourly: \$3.50 per 30 minutes (M-F); \$3.00 per 30 minutes (Sat-Sun)

Daily: \$24.00 max. (6:00 a.m.-6:00 p.m. M-F); \$32.00 (6:00 a.m.-6:00 a.m.)

Evening/Weekend: \$10.00 evening (6:00 p.m.-6:00 a.m.); \$13.00 weekend max. (6:00 a.m.-6:00 p.m.)

Other: Weekly rates available (unavailable during large local events)

Taxis

If you’re taking a taxi from the airport to your hotel after arriving at YVR, use one of the taxi stands located on Level 2. Taxis operating from the airport are licensed, and will use a zoned fare rate that will depend on your destination.



SkyTrain

Vancouver's SkyTrain is a completely automated light rapid transit system, offering fast, efficient service between downtown, the airport, and Metro Vancouver's suburbs.

The Canada Line runs from downtown Vancouver, before splitting with one extension going to Vancouver International Airport (YVR) and the other heading further south into Richmond. There are three downtown stations – Waterfront, Vancouver City Centre, and Yaletown. The Waterfront Station is a five-minute walk to the Fairmont Waterfront Vancouver and a 10-minute walk to the Marriott Vancouver Pinnacle Downtown and the Pinnacle Hotel Harbourfront.

Shared Ride Services

Vancouver does not offer Uber, Lyft, or Shared Shuttle services.

VISAS

Electronic Travel Authorizations (eTA) or Visitor Visa:

As of March 15, 2016, visa-exempt foreign nationals are expected to have an Electronic Travel Authorization (eTA) to fly to or transit through Canada. Exceptions include U.S. citizens and travelers with a valid Canadian visa. Canadian citizens, including dual citizens, and Canadian permanent residents are not eligible to apply for an eTA. U.S. Permanent Residents possessing a Green Card or valid permit to re-enter the United States require an eTA. You may need an eTA before you board your flight to Canada, even if you are just transiting through the country. Once the application process is complete, most applications are approved within minutes of submission. If you do not receive immediate approval, you will receive an email from the CIC with instructions for completing your application. The authorization is electronically linked to your passport and is valid for five years or until your passport expires, whichever comes first. To find out if you need an eTA to travel to Canada, please visit: <http://www.cic.gc.ca/english/visit/visas.asp>

eTA Application Process:

To apply for an eTA please visit: <http://www.cic.gc.ca/english/visit/eta-start.asp>. To apply you will need a valid passport from a visa-exempt country. You cannot apply using a Refugee Travel Document. U.S. permanent residents can apply with a valid Green Card, U.S. Refugee Travel Document or a valid permit to re-enter the United States. They will also require a passport from their country of nationality.

EXHIBITORS

Attendees are encouraged to visit our exhibitors located in Ballroom BCD at the Vancouver Convention Centre West. Exhibit hours are:

Thursday, November 9..... 5:30 p.m.-10:30 p.m.
 Friday, November 10..... 9:30 a.m.-6:00 p.m.
 Saturday, November 11 9:30 a.m.-4:00 p.m.

POSTER SESSIONS

All poster sessions will take place at the Vancouver Convention Centre West in Ballroom BCD.

The three evening sessions will be held in conjunction with a general reception. Authors of posters are asked to make their posters available for viewing on the following schedule:

| Session | Poster Setup Time | Viewing Time | Author Present | Poster Teardown |
|---------------------|---------------------------|--------------------------|--------------------------|-------------------------|
| I: Thursday Evening | 3:15 p.m.- 3:45 p.m. | 4:00 p.m.- 7:30 p.m. | 6:00 p.m.- 7:30 p.m. | 7:30 p.m.- 8:00 p.m. |
| II: Friday Noon | 10:15 a.m.- 10:45 a.m. | 11:00 a.m.- 1:30 p.m. | 12:00 p.m.- 1:30 p.m. | 1:30 p.m.- 2:00 p.m. |
| III: Friday Evening | 3:15 p.m.- 3:45 p.m. | 4:00 p.m.- 7:30 p.m. | 6:00 p.m.- 7:30 p.m. | 7:30 p.m.- 8:00 p.m. |
| IV: Saturday Noon | 10:15 a.m.- 10:45 a.m. | 11:00 a.m.- 1:30 p.m. | 12:00 p.m.- 1:30 p.m. | 1:30 p.m.- 2:00 p.m. |
| V: Saturday Evening | 3:15 p.m.- 3:45 p.m. | 4:00 p.m.- 7:30 p.m. | 6:00 p.m.- 7:30 p.m. | 7:30 p.m.- 8:00 p.m. |

NOTE: Each poster must fit on one side of a 4 feet high X 8 feet wide (with a 1-inch frame around the perimeter) poster board. Visit www.psychonomic.org/posters for suggestions on preparing your poster.

The extended viewing time will allow all interested persons to see posters of their choice and hopefully reduce the crowded conditions we have sometimes had at the poster sessions. All posters must be removed as soon as the poster session is concluded. Posters that are not removed will be discarded.

The numbering of posters this year uses the same system as last year. Abstract numbers assigned to posters are not in sequence with the numbers assigned to talks. Rather, each poster is assigned a six-digit abstract number. The first digit codes the session to which the poster has been assigned; the last three digits code the location of the poster within its session (i.e., 001-243).

RECEPTIONS

Opening Reception

Thursday, November 9 (Immediately following the Keynote Address): approximately 9:15 p.m.-10:30 p.m.
 Ballroom BC, VCC West

Diversity & Inclusion Reception

Friday, November 10: 4:30 p.m.-5:30 p.m.
 Level 1 Ocean Foyer, VCC West

Friday Reception & Poster Session

Friday, November 10: 5:30 p.m.-7:30 p.m. (Cash bar only)
 Ballroom BC, VCC West

Saturday Reception & Poster Session

Saturday, November 11: 5:30 p.m.-7:30 p.m. (Cash bar only)
 Ballroom BC, VCC West



COFFEE BREAKS

Complimentary coffee and tea will be available from 9:30 a.m. to 10:30 a.m. in Ballroom BC, VCC West on Friday and Saturday, and in Ballroom BC Foyer on Sunday.

NURSING MOTHER'S ROOM

The Vancouver Convention Centre has a dedicated Nursing Mother's Room on Level 1 near the Psychonomic Society Registration area. For more information or to receive access to this room, please visit the Psychonomic Society Registration Desk. The room is fitted with comfortable furniture, power outlets and a baby changing table. For safety reasons, the VCC does not provide cold storage in the room for milk but they can offer access to the refrigerator in the First Aid room by calling 7299 from a VCC house phone or by calling 1-604-647-7299.

JOGONOMICS

Join your fellow Psychonomes on a 5-mile or 5K fun run/walk. The group will meet in the lobby of the Fairmont Waterfront Hotel at 6:00 a.m. on Saturday, November 11, and the run will leave promptly at 6:15 a.m. Again, this year we have added a low-key route that will run lower mileage at a more relaxed rate. Organizers: Jeff Zacks and Marianne Lloyd. There is no fee, but you will be required to sign a waiver.

PSYCHONOMIC TIME

Persons chairing sessions this year will be asked to keep the spoken papers schedule on times standardized against a clock at the Psychonomic Society Registration Desk. All attendees are asked to synchronize their watches to Psychonomic time.

AUDIOVISUAL EQUIPMENT FOR TALKS

LCD projectors (e.g., for PowerPoint presentations) and laptop computers (PC) will be provided in all rooms where spoken sessions are scheduled. Please bring your presentation on a USB drive and load it onto the laptop computer in your session room 30 minutes prior to the beginning of that session. Bring two copies of your presentation in case of media failure. Presenters are strongly encouraged to visit the speaker ready room in the Meeting Room 104, well in advance of their talks to review their presentations.

PHOTOGRAPHIC RELEASE

As part of your registration for the 2017 Annual Meeting, the Psychonomic Society reserves the right to use photographs and video taken during the meeting for future marketing purposes. If you do not wish to have your photograph or video used for such purposes, please contact us at the Psychonomic Society Registration Desk.

2017 AFFILIATE MEETINGS

16th Annual Auditory Perception, Cognition, and Action Meeting (APCAM)

Thursday, November 9, 2017
8:30 a.m.-5:30 p.m.
Meeting Room 121, VCC West
Website: www.apcam.us

The Brunswick Society

25th Annual International Meeting: In memory of Kenneth R. Hammond

Thursday, November 9, 2017
9:00 a.m.-6:00 p.m.
Meeting Room 113, VCC West
Website: www.albany.edu/cpr/brunswick/

Comparative Cognition Society (CCS) Fall Meeting

Thursday, November 9, 2017
8:00 a.m.-5:00 p.m.
Meeting Room 118, VCC West
Website: www.comparativecognition.org

Configural Processing Consortium (CPC)

Wednesday, November 8
8:00 a.m.-4:00 p.m.
Meeting Rooms 107-108, VCC West
Website: configural.org

Object Perception, Attention, and Memory (OPAM) 25th Anniversary Workshop

Wednesday, November 8: 4:00 p.m.-8:00 p.m.
Thursday, November 9: 8:00 a.m.-5:00 p.m.
Meeting Room 109-110, VCC West
Website: www.opam.net

Society for Computers in Psychology (SCiP)

47th Annual Meeting: Big Data and Deep Learning

Thursday, November 9, 2017
7:30 a.m.-6:00 p.m.
Meeting Rooms 114-116, VCC West
Website: <http://scip.ws>

Society for Judgment and Decision-Making Annual Meeting (SJDM)

Friday, November 9 - Monday, November 13, 2017
Fairmont Waterfront Hotel
Website: www.sjdm.org

Society for Mathematical Psychology (SMP) Computational Approaches to Memory and Decision Making

Thursday, November 9, 2017
9:00 a.m.-5:00 p.m.
Meeting Room 112, VCC West
Website: www.mathpsych.org

Tactile Research Group (TRG) Annual Meeting

Thursday, November 9, 2017
9:00 a.m.-4:00 p.m.
Meeting Room 111, VCC West
Website: trg.objectis.net/

Women in Cognitive Science (WiCS)

17th Annual Meeting: Using Social Media to Promote Professional Visibility and Scientific Dissemination

Thursday, November 9, 2017
4:00 p.m.-7:00 p.m. (Reception at 6:00 p.m.)
Meeting Room 122, VCC West & Level 1 Ocean Foyer
Website: www.womenincogsci.org/



2017 PROGRAM

There were 1,506 total submissions and 1,438 valid submissions. Of the 1,438 papers that were placed on the program, 300 are spoken papers and 1,138 are posters. In addition, there were four invited symposia, and one symposium that resulted from the Psychonomic Society Leading Edge Workshop program.

PROGRAM HISTORY

| Year – Site | Valid Submissions |
|--------------------|-------------------|
| 2017 – Vancouver | 1,438 |
| 2016 – Boston | 1,514 |
| 2015 – Chicago | 1,306 |
| 2014 – Long Beach | 1,300 |
| 2013 – Toronto | 1,264 |
| 2012 – Minneapolis | 1,054 |
| 2011 – Seattle | 1,037 |
| 2010 – St. Louis | 928 |
| 2009 – Boston | 1,220 |
| 2008 – Chicago | 950 |
| 2007 – Long Beach | 928 |

PROGRAM AND CONFERENCE ORGANIZATION

The Secretary, R. Reed Hunt, has the responsibility for organizing the program and the Program Committee reviews the schedule. They do so with the indispensable help of Lou Shomette, Executive Director; Valerie Ickes, Meeting Planner; Brian Weaver, Communications & Marketing Manager; Nan Knuteson, Membership Coordinator and Registrar; Kathy Kuehn, Production Director; Cynthia Coates, Graphic Artist; Erica Koconis, Accountant; and Bill Stoeffler, Account Director.

2017 PROGRAM COMMITTEE

- Edward Awh, Chair, University of Chicago
- Teresa Bajo, University of Granada
- John Dunlosky, Kent State University
- Stephen Mitroff, George Washington University
- Kristi Multhaup, Davidson College
- R. Reed Hunt, University of Mississippi, *ex officio*

OFFICERS OF THE SOCIETY

| | |
|--------------------|---|
| Chair | Aaron Benjamin, University of Illinois |
| Past Chair | Cathleen Moore, University of Iowa |
| Chair-Elect | John Dunlosky, Kent State University |
| Secretary | R. Reed Hunt, University of Mississippi |
| Treasurer | Marianne Lloyd, Seton Hall University |
| Executive Director | Louis Shomette, Psychonomic Society |

2017 GOVERNING BOARD

- Aaron Benjamin, University of Illinois
- Cathleen Moore, University of Iowa
- John Dunlosky, Kent State University
- Edward Awh, University of Chicago
- Teresa Bajo, University of Granada
- Marc Brysbaert, Ghent University
- Laura Carlson, University of Notre Dame
- Fernanda Ferreira, University of California, Davis
- Robert Logie, University of Edinburgh
- Janet Metcalfe, Columbia University
- James Pomerantz, Rice University
- Patricia Reuter-Lorenz, University of Michigan
- Valerie Reyna, Cornell University
- R. Reed Hunt, University of Mississippi, *ex officio*
- Marianne Lloyd, Seton Hall University, *ex officio*
- Louis Shomette, Executive Director, *ex officio*

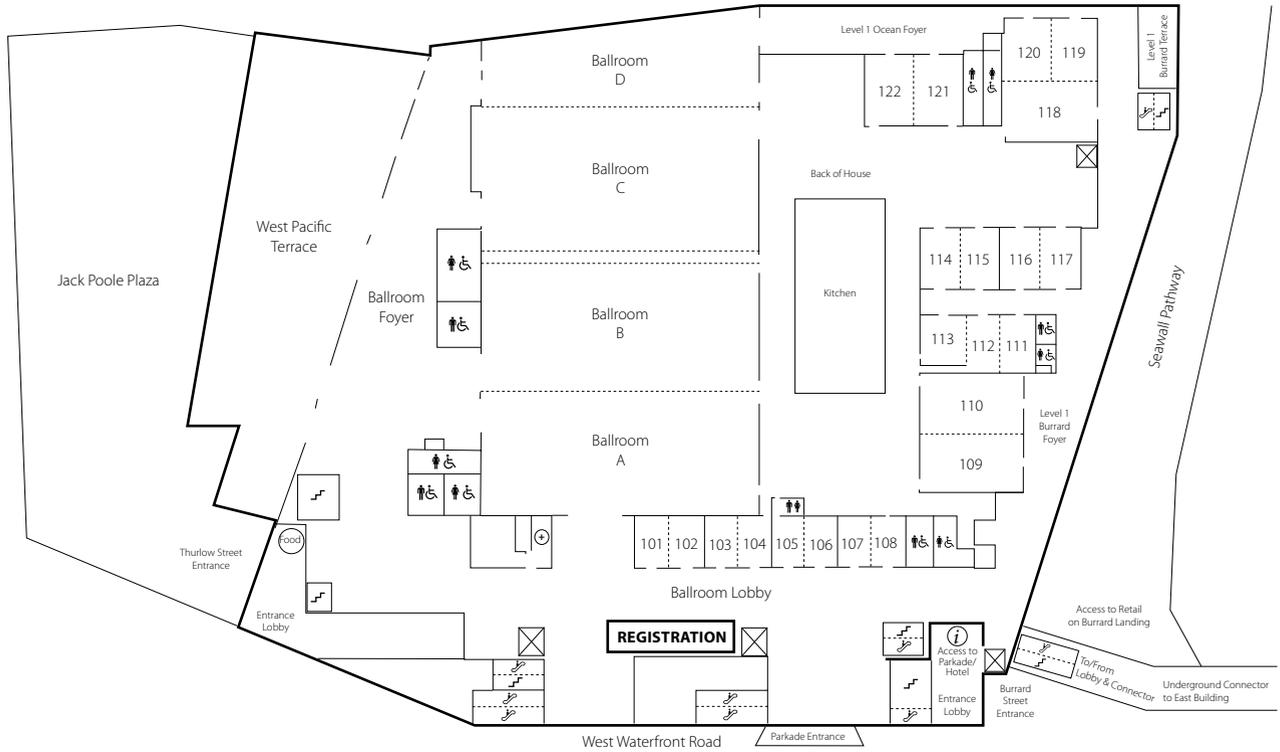
PSYCHONOMIC SOCIETY STATEMENT ON HARASSMENT

The Psychonomic Society is an inclusive and welcoming organization, and our meeting should reflect those values. Conference attendees and visitors should enjoy freedom of speech, freedom of thought, and freedom from harassment of all kinds. Recent events in the media remind us that academic settings are ones where we must be especially vigilant. As a scientific society, we do not want to police behavior, nor do we wish to dampen the professional and personal interactions that are so important to our meeting. But we do encourage members to take into account others' perspectives and consider how a question, comment, or invitation might be received when there is a power differential between parties. No attendee should feel vulnerable to harassment at our meetings, or feel that they are enduring a climate of fear or hostility. Let's all work together to ensure that our values of inclusion, respect, and professionalism are ones that are enjoyed by all of our members and attendees.

Respectfully submitted by R. Reed Hunt, Secretary
Adjunct Research Professor, University of Mississippi
reed@olemiss.edu

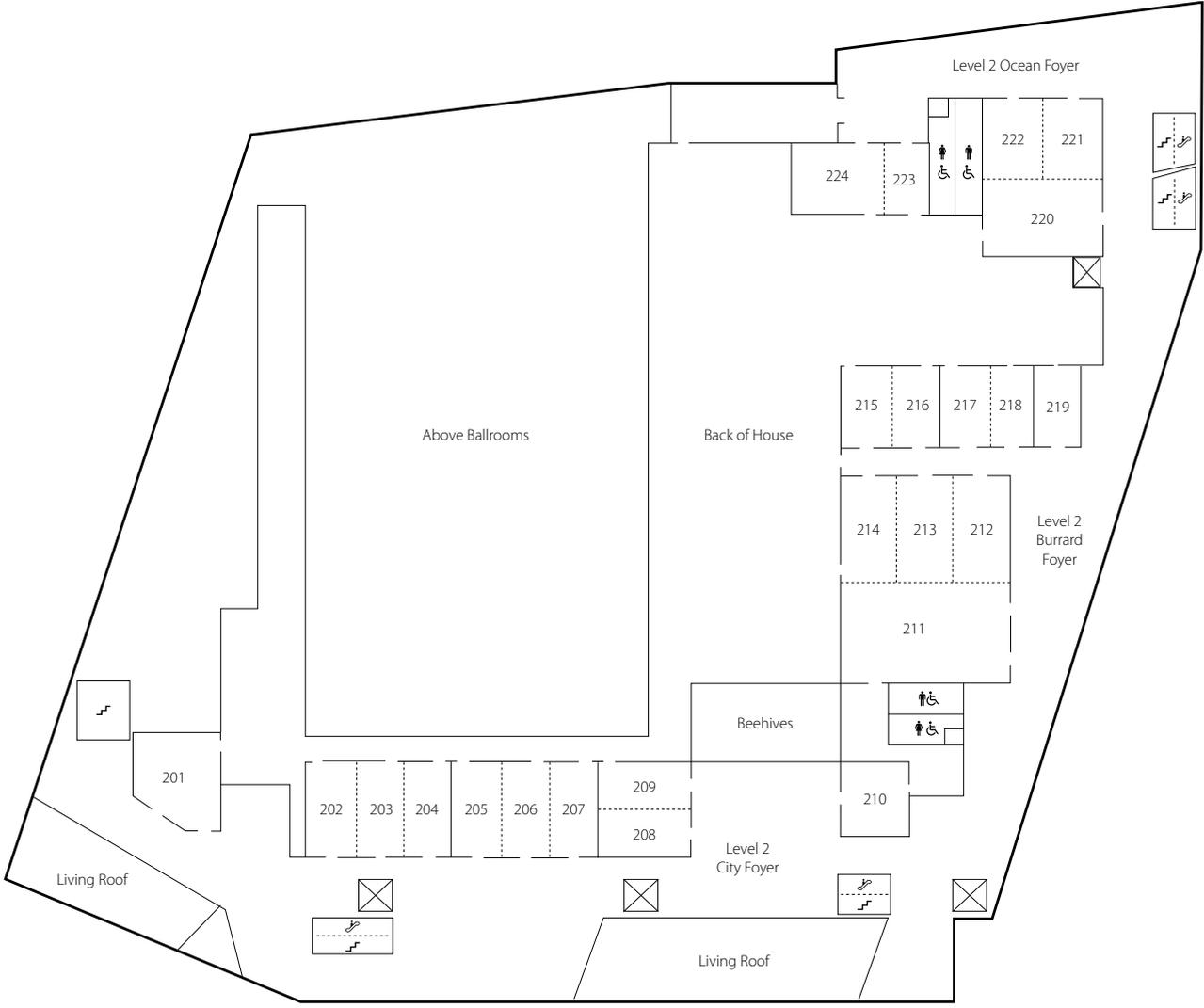


VANCOUVER CONVENTION CENTRE WEST - LEVEL ONE



POSTER SESSIONS WILL BE HELD IN BALLROOM BC OF THE VANCOUVER CONVENTION CENTRE - LEVEL ONE

VANCOUVER CONVENTION CENTRE WEST - LEVEL TWO



West Waterfront Road



The Psychonomic Society
Announces the Recipients of the

2017 EARLY CAREER AWARD

The Psychonomic Society Early Career Award recognizes exceptional research accomplishments among our members. Nominees must have completed their terminal degree (typically PhD) within the last 10 years and must be a Fellow or Member of the Society. Nominations are made by members of the Society, and each candidate must be endorsed by two members. Up to four awards can be made each year. One nominee, whose research is closest to the areas of perception and attention, will receive the Steven Yantis Early Career Award. Selection of the awards is made by a committee consisting of members of the Governing Board and other members of the Society. The 2017 committee consisted of Marc Brysbaert, chair; John Dunlosky, John Henderson, Tania Lombrozo, Patricia Reuter-Lorenz and Jessica Witt.



Candice Morey

Cardiff University, United Kingdom
Working Memory

Dr. Morey's research is in working memory, attention, and their development across the lifespan. Using eye movement and behavioral data, she has greatly extended our views of the structural aspects of working memory and has clarified the role of attention in working memory. Morey's work shows that working memory is more than a simple storage task and is heavily dependent on attention.



Evan Risko

University of Waterloo, Canada
Embodied and Embedded Cognition

Dr. Risko's research focuses on issues related to the embodied and embedded nature of cognition to develop a deeper understanding of how we use our body and physical environment to help us think and how it shapes our thinking. His research spans many areas including perception, attention, cognitive control, memory, human-computer interaction, and decision making.



Darryl Schneider

Purdue University, USA
Cognitive Control

2017 STEVEN YANTIS EARLY CAREER AWARD

Dr. Schneider's work addresses cognitive control focusing on task switching. His research seeks to understand cognitive control in terms of basic psychological processes. His models interpret task switching as a memory retrieval problem. Schneider implements the retrieval process as a random walk and shows how it can account for switch costs, reductions in switch costs as cue-to-target interval increases, and a variety of congruency effects. He is currently working on a theory that puts it all together.



Benjamin Storm

University of California, Santa Cruz, USA
Forgetting in Human Memory

Dr. Storm's main line of work has been on the topic of retrieval-induced forgetting. Storm has contributed to our understanding of how forgetting functions to eliminate competition during selective retrieval, which then facilitates thinking, problem solving, creativity, and the updating of autobiographical memory. His recent research shows that the inhibition underlying retrieval-induced forgetting plays a role in the positivity bias individuals show in autobiographical memory, the tendency for people to remember more positive events from their past than they do negative events.



The Psychonomic Society
Announces the Recipients of the

2017 MEMBER SELECT-SPEAKER AWARD

The Member Select-Speaker Awards are designed to showcase exceptional research by Members. Each award winner will be given the unique opportunity to present his or her research in a spoken session during the annual meeting and will be provided travel funds.

The Program Committee was responsible for the extremely difficult task of selecting the top abstracts submitted for a Member Select-Speaker Award. The main criteria for selection were overall quality of research, theoretical impact, and methodological rigor. This year's award winners more than satisfied these criteria and collectively represent an exciting and diverse range of research topics, including memory, learning, judgment and decision making, and language processing.

The Member Select-Speaker Awards is an annual award program. All Members are encouraged to apply for the award next year!



Halszka Bąk

Adam Mickiewicz University in Poznań,
Poland

*Abstract #218: Recognizing Emotions –
Beyond the Standard View and in Context*



Nathan Evans

Vanderbilt University

*Abstract #276: Comparing the Models of
Context Effects in Multi-Attribute Choice*



Brendan Johns

University at Buffalo

*Abstract #117: A Large Scale Analysis of
Individual Variability in Written Language*



Emmanouil Konstantinidis

University of New South Wales, Australia

*Abstract #206: Exploring the Decision
Dynamics of Risky Intertemporal Choice*



Christina Pfeuffer

Albert-Ludwigs-Universität Freiburg,
Germany

*Abstract #241: Working Memory
Re-processing in Instruction-Based Action
Control*



Christin Schulze

Max Planck Institute for Human
Development, Germany

*Abstract #13: Modeling Developmental
Differences in Instance-Based Inference*



Dirk Wulff

Max Planck Institute for Human
Development, Germany

*Abstract #245: A Meta Analytic Review
of Two Modes of Learning and the
Description-Experience Gap*



The Psychonomic Society
Announces the Recipients of the

2017 GRADUATE TRAVEL AWARD

The Psychonomic Society Program Committee selected 16 Graduate Travel Awards based on the quality of the abstracts submitted by Graduate Student Members of the Society for the 2017 Annual Meeting in Vancouver, British Columbia, Canada. Each recipient receives a travel stipend of \$1,000 and will be recognized at the Business Meeting on Saturday, November 11, 2017.

Please join the Program Committee in congratulating these recipients!

Visit www.psychonomic.org/awards for additional information.

Abigail Benecke

Villanova University

Abstract #3127: *Classification of English Stop Consonants: A Comparison of Multiple Models of Speech Perception*

Pablo Bernabeu

Radboud University Nijmegen

Abstract #1234: *Modality Switch Effects Emerge Early and Increase Throughout Conceptual Processing: Evidence From ERPs*

Weijia Chen

University of Connecticut, Storrs

Abstract #5155: *Optimising Perceptual Training for the Detection of Hip Fractures on Conventional Radiography*

Josh Dorsi

University of California, Riverside

Abstract #3128: *What You See Isn't Always What You Get, Or Is It?: Re-examining Semantic Priming From McGurk Stimuli*

Josh Fiechter

University of Illinois at Urbana-Champaign

Abstract #4162: *Implementing Adaptive Retrieval Practice With Flexible Cues: A Powerful Technique for Generalizing the Benefits of Testing*

Laura L. Heisick

Louisiana State University

Abstract #5088: *Implicit vs. Explicit Social Classification in Unfamiliar Face Perception*

Kyle Rhoads Kraemer

University of Alabama

Abstract #2113: *Understanding Metamemory: A General Ability or Separate Systems?*

Sarah Moneer

University of Texas at Austin

Abstract #1136: *Attentional Modulation of Processing Architecture: A Synthesis of Electroencephalographic and Response Time Modeling Approaches*

Chi Ngo

Temple University

Abstract #3180: *Tracking Relational Memory and Pattern Separation Across the Life Span*

Sharon M. Noh

University of Texas at Austin

Abstract #1012: *Blocked vs. Interleaved Study Sequences Differentially Impact the Retention of Generalized Knowledge and Specificity*

Steven C. Pan

University of California, San Diego

Abstract #3158: *Is it Preterite or Imperfect? Investigating the Interleaving Effect for Spanish Verb Conjugation Skills*

Benjamin Pitt

University of Chicago

Abstract #3087: *Spatializing Time and Number: How Culture Shapes Cognitive Universals*

Sander Roest

Erasmus University Rotterdam

Abstract #1188: *Getting a Handle on Object Based Alignment Effects*

Cameron Smith

University of South Carolina

Abstract #5112: *Space-Language Interactions in the Auditory Modality*

Jessica Siler

University of Illinois at Urbana-Champaign

Abstract #4164: *Long-Term Inference and Memory Following Retrieval Practice*

Jihyun Suh

Washington University in St. Louis

Abstract #3209: *Action-Planning Biases Size Representation in Visual Working Memory*



The Psychonomic Society
Announces the Recipients of the

2017

J. FRANK YATES STUDENT TRAVEL AWARD

SUPPORTING DIVERSITY & INCLUSION
IN COGNITIVE PSYCHOLOGY

The Psychonomic Society Diversity & Inclusion Committee selected four J. Frank Yates Student Travel Awards based on the quality of the abstracts submitted by Student Members of the Society for the 2017 Annual Meeting in Vancouver, British Columbia, Canada. Each recipient receives a travel stipend of \$1,000 and will be recognized at the Business Meeting on Saturday, November 11, 2017. The Diversity & Inclusion Committee members include: Valerie Reyna, Chair, Laura Carlson, Ivy Defoe, Jean Fox Tree, Alejandro Lleras, Janet Metcalfe, Travis Seymour, and Duane Watson.

Please join the Diversity & Inclusion Committee in congratulating these recipients!

Visit www.psychonomic.org/awards for additional information.



Tyler Ensor

Memorial University of Newfoundland,
Canada

Abstract #5182: Revisiting the List-Strength Effect in Recognition: An Output-Interference Account



Van Rynald Liceralde

University of North Carolina at Chapel Hill
Abstract #3226: Consequences of Power Transformations on Trial-Level Analyses of Chronometric Data



Kimele Persaud

Rutgers, The State University of New Jersey
Abstract #1039: Second Guesses: Assessing the Role of Prior Knowledge and Random Guessing in Long-Term Memory



Athula Pudhiyidath

University of Texas at Austin
Abstract #4127: Temporal Structure Learning Facilitates Inductive Generalization



PSYCHONOMIC SOCIETY
**2017 CLIFFORD T. MORGAN
BEST ARTICLE AWARDS**

Sponsored by Springer

The Psychonomic Society Clifford T. Morgan Best Article Award recognizes the best article published in each of the Psychonomic Society's journals in 2017. Selections are made by the editorial team of each journal. Award recipients (the lead author) will receive a certificate and honorarium of \$1,000 and will be recognized at the Business Meeting on Saturday, November 11, 2017.



Wood

Attention, Perception, & Psychophysics (Editor: Michael Dodd)

Katherine Wood, Daniel J. Simons

"Reconciling change blindness with long-term memory for objects"

DOI: 10.3758/s13414-016-1240-2



Hilliard

Behavior Research Methods (Editor: Michael Jones)

Caitlin Hilliard, Susan Wagner Cook

"A technique for continuous measurement of body movement from video"

DOI: 10.3758/s13428-015-0685-x



Stolicyn

Cognitive, Affective, & Behavioral Neuroscience (Editor: Marie Banich)

Aleks Stolicyn, J. Douglas Steele, Peggy Seriès

"Conditioned task-set competition: Neural mechanisms of emotional interference in depression"

DOI: 10.3758/s13415-016-0478-4



White

Cognitive Research: Principles & Implications (Editor: Jeremy Wolfe)

David White, Clare A. M. Sutherland, Amy L. Burton

"Choosing face: The curse of self in profile image selection"

DOI: 10.1186/s41235-017-0058-3



Williams

Learning & Behavior (Editor: Jonathon Crystal)

Douglas A. Williams, Travis P. Todd, Chrissy M. Chubala, Elliot A. Ludvig

"Intertrial unconditioned stimuli differentially impact trace conditioning"

DOI: 10.3758/s13420-016-0240-3



Golubickis

Memory & Cognition (Editor: Neil Mulligan)

Marius Golubickis, Johanna K. Falben, Arash Sahraie, Aleksandar Visokomogilski,

William A. Cunningham, Jie Sui, C. Neil Macrae

"Self-prioritization and perceptual matching: The effects of temporal construal"

DOI: 10.3758/s13421-017-0722-3



Fitch

Psychonomic Bulletin & Review (Editor: Gregory Hickok)

W. Tecumseh Fitch

"Empirical approaches to the study of language evolution"

DOI: 10.3758/s13423-017-1236-5

Visit www.psychonomic.org/clifford_t_morgan for more information and previous recipients.



PSYCHONOMIC SOCIETY

2017 SPECIAL EVENTS

Encouraging Future Scientists: Supporting Undergraduates at Psychonomics (UP)

Chaired by Kristi Multhaupt, Davidson College; Brooke Lea, Macalester College; John Neuhoff, The College of Wooster; Cathy Reed, Claremont McKenna; and Katherine White, Rhodes College

Friday, November 10, 12:00 p.m.-1:30 p.m. • West Meeting Room 111 & 112

This lunchtime workshop will welcome undergraduate scientists to Psychonomics and share with them information about conference navigation, networking, career planning, and funding. This session includes (a) “Psychonomics 101”, an overview of the conference with a focus on networking at coffee, drinks, dinners, and other opportunities; (b) featured speaker Roddy Roediger, a Washington & Lee graduate, who will discuss his own career development; (c) an “inside perspective” on the National Science Foundation Graduate Research Fund Program (NSF GRFP) given by Dr. Susan Brennan, NSF Program Director; and (d) networking time with recent NSF GRFP awardees, faculty who have served on NSF GRFP panels, and with one another and more senior scientists. This session was designed for undergraduates and for faculty who mentor undergraduates. In addition, recent NSF GRFP awardees willing to share their experiences with current undergraduates are invited to join us. Coffee service (coffee, decaf, and tea) will be available.

The Digital Psychonomic Society: From Social Media to Clever Apps

Chaired by: Stephan Lewandowsky, Digital Content Editor, Psychonomic Society

Friday, November 10, 12:00 p.m.-1:30 p.m. • West Meeting Room 114

The Psychonomic Society has been committed to enhancing its online digital profile through social media, in particular Twitter and the Society’s Featured Content blog (featuredcontent.psychonomic.org). Although those initiatives have resulted in considerable scholarly discussion, for example through the series of “digital events” (<http://featuredcontent.psychonomic.org/digital-events/>), the power of social media is perhaps underappreciated by the membership. The purpose of this workshop is to expand the Society’s social-media engagement and to acquaint the membership with web-based or app-based applications that can facilitate public engagement, scholarly presentations, and teaching. Most of the workshop will involve hands-on exposure to a number of smart online apps and websites that provide productivity tools and opportunities for audience engagement. The workshop should broaden attendees’ understanding of the many free (or at least affordable) tools that are offered by the Internet for scholars, teachers, and communicators.

Diversity & Inclusion Reception

Friday, November 10, 4:30 p.m.-5:30 p.m. • Gardner Room

Please join the Governing Board and Diversity & Inclusion Committee at the reception celebrating diversity & inclusion with the Society and field. This annual networking event is an opportunity for scientists (from graduate students through senior researchers) to discuss their experiences regarding diversity in the field. If you identify as a member of an underrepresented group, join us for wine and cheese! The reception is open to all.

Graduate Student Social

Supported by the Psychonomic Society

Friday, November 10, 9:00 p.m.-12:00 midnight • Steamworks Brew Pub and Brewery

Kick back and relax as you meet other graduate students at Steamworks Brew Pub and Brewery, 375 Water Street, Vancouver, British Columbia, Canada, www.steamworks.com/brew-pub, +1 604-689-2739. Light hors d’oeuvres and one drink ticket good for beer, wine, soda, or water will be handed out per person (limited availability). Bring appropriate ID and PS name badge.

Practical Open Science for the Busy Researcher

Chaired by Richard Morey, Cardiff University and Candice Morey, Cardiff University

Saturday, November 11, 12:00 p.m.-1:30 p.m. • West Meeting Room 111-112

Although there are great benefits of open science to the research community at large, psychological science has been generally slow to adopt open practices. Scientists endorse openness at high rates, and so it is likely that the speed of adoption is related to pragmatic issues, such as a lack of training, rather than opposition. In this workshop, we will give a practical introduction to the open practices that will not just benefit other scientists but will also benefit the open researcher. We will discuss challenges and benefits of planning and organizing open research and give hands-on guidance for planning open science from the beginning. The result will be more transparent, organized, robust science. Use of R and the Open Science Framework will be emphasized.

The European Research Council: Funding Excellence

Chaired by Pascal Dissard, European Research Council, Head of Sector; Avishai Henik, Ben-Gurion University of The Negev, ERC grantee; Robert Logie, University of Edinburgh, former Chair of evaluation panel

Saturday, November 11, 12:00 p.m.-1:30 p.m. • West Meeting Room 114

The European Research Council (<http://erc.europa.eu/>) supports investigator-driven frontier research across all fields. Grants are up to 2 million Euros (ca. \$2.3 million) for early career researchers, up to 2.75 million Euros (ca. \$3.2 million) for mid-career researchers, and up to 3.5 million Euros (ca. \$4 million) for more experienced researchers. Funding for groups of Principal Investigators is also available (grants of up to 14 million Euros; ca. \$16 million). Applicants can be from anywhere in the world, and collaborators on the grant can be based anywhere. The project must be hosted by a European Institution but it is not obligatory to spend 100% of your time in Europe whilst carrying out the ERC-funded research.



IN MEMORIAM

*Psychonomic Society Members
July 2016-August 2017*

2016

Richard W. Held
(1920-2016)

Janellen Huttenlocher
(1932-2016)

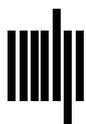
2017

William “Bill” Uttal
(1934-2017)

To read the obituaries of the members above, please visit our website at www.psychonomic.org/obituaries.

The Psychonomic Society would like to honor members by listing obituaries on our website.

If you know a member of our community who has recently passed away,
please contact Colin MacLeod at cmacleod@uwaterloo.ca with the information.

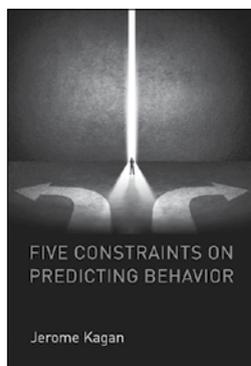


The MIT Press



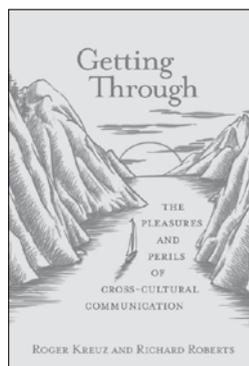
Invisible Mind
Flexible Social Cognition and Dehumanization
Lasana T. Harris
An interdisciplinary view of the evolution and consequences of flexible social cognition—the capacity to withhold the inference of mental states to other people.
\$40 | £32.95 | cloth

Ageism
SECOND EDITION
Stereotyping and Prejudice against Older Persons
Edited by Todd D. Nelson
Current research and theory from a range of disciplines on ageism, discussing issues from elder abuse to age discrimination against workers, revised and updated.
\$40 | £32.95 | paperback



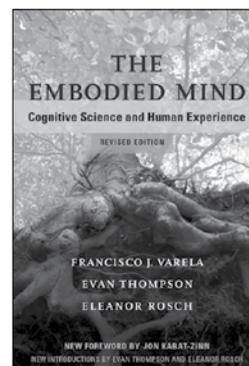
Five Constraints on Predicting Behavior
Jerome Kagan
A distinguished psychologist considers five conditions that constrain inferences about the relation between brain activity and psychological processes.
\$30 | £24.95 | cloth

The Geometry of Meaning
Semantics Based on Conceptual Spaces
Peter Gärdenfors
A novel cognitive theory of semantics that proposes that the meanings of words can be described in terms of geometric structures.
\$25 | £19.95 | paperback



Getting Through
The Pleasures and Perils of Cross-Cultural Communication
Roger Kreuz and Richard Roberts
Understanding how culture affects the ways we communicate—how we tell jokes, greet, ask questions, hedge, apologize, compliment, and so much more.
\$27.95 | £22.95 | cloth

Now in Paperback
The Moral Brain
A Multidisciplinary Perspective
edited by Jean Decety and Thalia Wheatley
An overview of the latest interdisciplinary research on human morality, capturing moral sensibility as a sophisticated integration of cognitive, emotional, and motivational mechanisms.
\$25 | £19.95 | paperback



The Embodied Mind
REVISED EDITION
Cognitive Science and Human Experience
Francisco J. Varela, Evan Thompson and Eleanor Rosch
A new edition of a classic work that originated the “embodied cognition” movement and was one of the first to link science and Buddhist practices.
\$30 | £24.95 | paperback

Minding the Weather
How Expert Forecasters Think
Robert R. Hoffman, Daphne S. LaDue, H. Michael Mogil, Paul J. Roebber, J. Gregory Trafton
This book argues that the human cognition system is the least understood, yet probably most important, component of forecasting accuracy.
\$55 | £45.95 | cloth



mitpress.mit.edu



www.comparativecognition.org

Fall Meeting of the Comparative Cognition Society

November 9 – Vancouver Convention Centre West

All are Welcome – Registration is Free

West Meeting Room 118

Program Summary

- 8:00** Coffee Hour
- 9:00** Social Cognition
- 10:20** Learning & Choice
- 11:20** Invited Talk – R. Miller & C. Polack
- 1:40** Perception & Discrimination
- 2:50** Comparative Questions
- 4:00** Keynote Address – Liisa Galea



***25th Annual International Conference
on Comparative Cognition***
Melbourne, FL April 4 - 7, 2018

Call for Papers Posted on the CCS Web Site

**COMPARATIVE
COGNITION
& BEHAVIOR
REVIEWS**

**The online journal of the
Comparative Cognition Society**

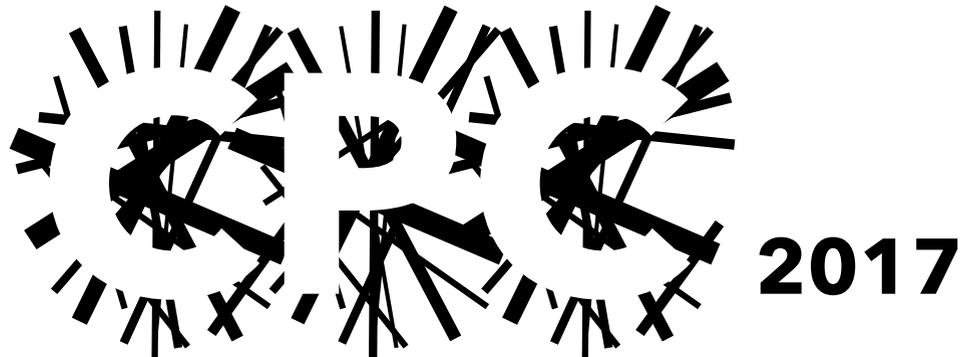
Check out these resources on the CCS website

- **Job Postings and Student Opportunities in comparative cognition (check them out and/or fill out the web form to post yours)**
- **CCS YouTube Channel: videos from laboratories, documentary footage, etc gathered by category. Post videos from your lab and let us know to be included**

**Support the Activities of the Comparative Cognition Society
Please Consider Joining the Society – See the CCS Website for Details**



VANCOUVER CONVENTION CENTRE WEST
Vancouver, British Columbia, Canada



Configural Processing Consortium

www.configural.org

West Meeting Rooms 107-108
Wednesday, November 8, 2017
8:30 a.m. - 5:30 p.m.

The Configural Processing Consortium (CPC) is an annual workshop bringing together researchers in configural processing. We aim to tackle deep issues underpinning perceptual organization, cognition, and action, as well as the most cutting edge theoretical and experimental research on configural topics. Although vision typically dominates, our interests include all modalities.

Each year, we seek to both define the major problems underlying the field of configural processing and to develop more unified ways of approaching these problems.

President

Mary A. Peterson

Organizing Committee

Jim Enns (local host), Ami Eidels, Joseph Houpt
Mary Peterson, Ruth Kimchi, Jim Pomerantz,
Jim Townsend, Leslie Blaha, Karen Schloss

Funding and Support



PSYCHONOMIC
SOCIETY®



THE UNIVERSITY
OF BRITISH COLUMBIA



APCAM 2017

The 16th Annual Auditory Perception,
Cognition, and Action Meeting

**Vancouver Convention Centre West • West Meeting Room 121
Vancouver, British Columbia-November 9, 2017
8:30 am – 5:30 pm (8:00 am on-site registration)
Abstract Submission Deadline: September 24**

APCAM brings together researchers from various theoretical perspectives to present focused research on auditory cognition, perception, and aurally guided action. APCAM is a unique meeting in its exclusive focus on the perceptual, cognitive, and behavioral aspects of audition. This will be the sixteenth annual APCAM, and we look forward to an excellent program. We hope you can join us!

Details also will be provided at the meeting about the anticipated launch of an APCAM-themed journal.

Organizers:

Michael Hall (chair)

Michael Russell (co-chair)

Peter Pfordresher

Devin McAuley

John Neuhoff

Kristopher Patten

For more information, including a call for abstracts, see www.apcam.us



The Brunswik Society

25th International Meeting of the Brunswik Society, In Memory of Kenneth R. Hammond

Thursday 9th November 2017 • Meeting Room 113

Vancouver, British Columbia, at the Vancouver Convention Centre West.

The Brunswik Society will hold an international meeting this year dedicated to the memory of the late Kenneth R. Hammond, on the occasion of his 100th birthday.

We invite papers and/or panel discussion proposals on any theoretical or empirical/applied topic directly related to Egon Brunswik's theoretical lens model framework and method of representative design, including approaches based on Brunswikian principles. Proposals focusing on Ken Hammond's contributions to the Brunswikian tradition are especially encouraged.

Please send a brief abstract (125 words), and indicate whether the paper/discussion is theoretical or empirical, to Mandeep Dhami (email: m.dhami@mdx.ac.uk) by 4th September 2017.

We also invite audience participation at the meeting.

The meeting is held concurrently with the Psychonomic Society Annual Meeting and just before the Judgment and Decision Society meeting. The program will begin at 9:00 am and end at 6:00 pm. Lunch is included. Registration is \$60 for non-students and \$30 for students.

For more details, including registration instructions, please contact the meeting organizers:

Mandeep Dhami (m.dhami@mdx.ac.uk)

Jeryl Mumpower (jmumpower@tamu.edu).



COMPUTATIONAL APPROACHES TO MEMORY AND DECISION MAKING

A symposium organized by the Society for Mathematical Psychology

Hosts: Clinton Davis-Stober, Pernille Hemmer

Thursday, November 9, 2017 • VCC, West Meeting Room 112

The Society for Mathematical Psychology promotes the advancement and communication of research in mathematical psychology and related disciplines. Mathematical psychology is broadly defined to include work of a theoretical character that uses mathematical methods, formal logic, or computer simulation.

The topic of this year’s symposium is “Computational Approaches to Memory and Decision Making.” The invited speakers will be presenting their work on this theme from a variety of quantitative modeling perspectives. This symposium will also feature a poster session.

SYMPOSIUM SCHEDULE

8:55 *Opening remarks*

Session I: Computational Brain & Behavior

9:00

10:20 *Break until 10:35*

Session II: Modeling episodic memory

| | | |
|-------|---------------|----------------------------------|
| 10:35 | Mark Steyvers | University of California Irvine |
| 10:55 | Chris R. Sims | Rensselaer Polytechnic Institute |
| 11:15 | Amy Criss | Syracuse University |
| 11:35 | Candice Morey | Cardiff University |

11:55 *Lunch until 13:00*

13:00 *Poster session until 14:15*

Session III: Modeling decision making

| | | |
|-------|-------------------------|--|
| 14:15 | Sudeep Bahtia | University of Pennsylvania |
| 14:35 | Timothy J. Pleskac | Max Planck Institute for Human Development |
| 14:55 | David Kellen | Syracuse University |
| 15:15 | Clinton P. Davis-Stober | University of Missouri |



The 47th Annual Meeting of the Society for Computers in Psychology

2017 Theme: Big Data and Deep Learning
Thursday, November 9, 2017 • 8:00 a.m.-6:00 p.m.
Vancouver Convention Centre West • Vancouver
Meeting Rooms 114-116

Keynote:



Dr. Ping Li
Professor of Psychology, Linguistics,
& Information Sciences & Technology
Co-Director, Center for Brain, Behavior, and Cognition
Associate Director, Institute for CyberScience
Pennsylvania State University

Understanding the Language-Learning Brain with Cyber-Enabled and Computational Methods

President's symposium:



Dr. Kalina Christoff
Professor of Psychology
University of British Columbia, Vancouver



Dr. Michael C. Mozer
Professor
Institute of Cognitive Science and
Department of Computer Science
University of Colorado, Boulder



Dr. Xiaowei Zhao
President, Society for Computers in Psychology
Associate Professor of Psychology
Emmanuel College, Boston

For more information, visit: www.scip.ws



The 17th Annual Meeting of Women in Cognitive Science

Thursday, November 9, 2017

Meeting: 4-6 pm; Social Hour: 6-7 pm

Vancouver Convention Centre West, Meeting Room 122

ALL ARE WELCOME!!!

Using Social Media to Promote Professional Visibility and Scientific Dissemination

Panelists:

Lorenza Colzato, University of Leiden, The Netherlands

Stephan Lewandowsky, University of Bristol, United Kingdom

Nora Newcombe, Temple University, USA

Yana Weinstein, University of Massachusetts Lowell, USA

Moderator:

Suparna Rajaram, Stony Brook University

Followed by:

WiCS Speed Mentoring Session

Psychonomics WiCS 2017 co-organizers:

Teresa Bajo, Universidad de Granada

Laurie Feldman, University at Albany

Judith Kroll, University of California, Riverside

Suparna Rajaram, Stony Brook University

Natasha Tokowicz, University of Pittsburgh

Find us on:

Website: <http://www.womenincogsci.org/>

Twitter: @WomenInCogSci

Facebook: <https://www.facebook.com/WomenInCognitiveScience/>

**Women in Cognitive Science is affiliated with the Psychonomic Society
and its activities are funded by the Perception Action and Cognition
program and the Office of International Science and Engineering at the
National Science Foundation.**

THURSDAY EVENING, NOVEMBER 9, 2017

POSTER SESSION I 4:00 PM-7:30 PM West Ballroom BCD
(Author present between 6:00 PM-7:30 PM)

| | |
|---|---|
| Human Learning and Instruction I (1001-1017) | Feature/Object Processing (1130-1145) |
| Learning: Reward, Motivation, and Emotion (1018-1031) | Decision Making I (1146-1165) |
| Recall I (1032-1044) | Reasoning and Problem Solving I (1166-1180) |
| Test Effects I (1045-1056) | Perception and Action (1181-1192) |
| False Memory I (1057-1068) | Multi-Sensory Integration (1193-1203) |
| Cognitive Aging I (1069-1080) | Letter/Word Processing I (1204-1215) |
| Emotion and Cognition I (1081-1097) | Language (1216-1225) |
| Working Memory I (1098-1114) | Psycholinguistics I (1226-1239) |
| Attentional Control (1115-1129) | |

FRIDAY MORNING, NOVEMBER 10, 2017

| | |
|--|---|
| Automatic Processing (1-5)..... | 8:00 AM-9:40 AM West Meeting Room 118-120 |
| Cognitive Processes in Non-Human Animals (6-10)..... | 8:00 AM-9:40 AM West Meeting Room 208-209 |
| Judgment I (11-16)..... | 8:00 AM-10:00 AM West Meeting Room 211 |
| Discourse Processes (17-23)..... | 8:00 AM-10:20 AM West Meeting Room 205-207 |
| Recognition Memory (24-29)..... | 8:00 AM-10:00 AM West Meeting Room 212-214 |
| Embodied Cognition (30-34)..... | 8:00 AM-9:40 AM West Meeting Room 202-204 |
| SYMPOSIUM I: Dual Process Theory 2.0 (35-38)..... | 10:00 AM-12:00 PM West Meeting Room 109-110 |
| Bilingualism I (39-43)..... | 10:20 AM-12:00 PM West Meeting Room 211 |
| Associative Learning (44-49)..... | 10:00 AM-12:00 PM West Meeting Room 118-120 |
| Working Memory Structure (50-54)..... | 10:20 AM-12:00 PM West Meeting Room 212-214 |
| Concepts and Categories (55-60)..... | 10:00 AM-12:00 PM West Meeting Room 202-204 |
| Increasing Transparency and Replicability (61-64)..... | 10:40 AM-12:00 PM West Meeting Room 205-207 |

FRIDAY NOON, NOVEMBER 10, 2017

POSTER SESSION II 11:00 AM-1:30 PM West Ballroom BCD
(Author present between 12:00 PM-1:30 PM)

| | |
|--|--|
| Neural Mechanisms of Cognition (2001-2019) | Application of Network Science to Human Learning (2122-2126) |
| Cognitive Control (2020-2035) | Skill Acquisition and Performance (2127-2142) |
| Attention Capture I (2036-2048) | Speech Perception I (2143-2156) |
| Attention (2049-2062) | Discourse Processes (2157-2170) |
| Cognitive Aging II (2063-2079) | Bilingualism I (2171-2189) |
| Music Cognition (2080-2088) | Emotion and Cognition II (2190-2205) |
| Autobiographical Memory (2089-2101) | Reasoning and Problem Solving II (2206-2220) |
| Metamemory (2102-2121) | |

FRIDAY NOON, NOVEMBER 10, 2017

Lunchtime Workshop: Encouraging Future Scientists:
Supporting Undergraduates at Psychonomics (UP)..... 12:00 PM-1:30 PM West Meeting Room 111-112
Lunchtime Workshop: The Digital Psychonomic Society:
From Social Media to Clever Apps 12:00 PM-1:30 PM West Meeting Room 114

FRIDAY AFTERNOON, NOVEMBER 10, 2017

| | |
|--|---|
| SYMPOSIUM II: Improving Use of Statistical Inference in Science (65-71)..... | 1:30 PM-3:30 PM West Meeting Room 109-110 |
| Test Effects on Learning and Memory (72-77)..... | 1:30 PM-3:30 PM West Meeting Room 211 |
| Motor Control and Performance (78-82)..... | 1:30 PM-3:10 PM West Meeting Room 212-214 |
| Beliefs and Reasoning (83-87)..... | 1:30 PM-3:10 PM West Meeting Room 202-204 |
| Speech Perception (88-94)..... | 1:30 PM-3:50 PM West Meeting Room 205-207 |
| Working Memory: Attentional Processes (95-99)..... | 1:30 PM-3:10 PM West Meeting Room 118-120 |



SYMPOSIUM III: Leading Edge Workshop:

| | |
|---|---|
| Using Big Data to Discover Principles of Cognition (100-104)..... | 3:50 PM-5:50 PM West Meeting Room 109-110 |
| Autobiographical Memory (105-108)..... | 4:10 PM-5:30 PM West Meeting Room 205-207 |
| Attention: Features & Objects (109-114) | 3:30 PM-5:30 PM West Meeting Room 118-120 |
| Semantics (115-120)..... | 3:30 PM-5:30 PM West Meeting Room 212-214 |
| Reading (121-126)..... | 3:30 PM-5:30 PM West Meeting Room 202-204 |
| Numerical Cognition (127-131)..... | 3:50 PM-5:30 PM West Meeting Room 208-209 |

FRIDAY EVENING, NOVEMBER 10, 2017

POSTER SESSION III..... 4:00 PM-7:30 PM West Ballroom BCD
(Author present between 6:00 PM-7:30 PM)

| | |
|---------------------------------------|---|
| Automatic Processing (3001-3011) | Speech Perception II (3118-3131) |
| Controlled Processing I (3012-3027) | Reading (3132-3149) |
| Concepts and Categories I (3028-3040) | Human Learning and Instruction II (3150-3167) |
| Decision Making II (3041-3060) | Recognition Memory (3168-3183) |
| Event Cognition (3061-3076) | Working Memory II (3184-3199) |
| Numerical Cognition (3077-3089) | Sensation and Perception (3200-3212) |
| Bilingualism II (3090-3108) | Statistics and Methodology (3213-3233) |
| Language Production (3109-3117) | |

SATURDAY MORNING, NOVEMBER 11, 2017

| | |
|---|---|
| Human Learning and Instruction (132-137)..... | 8:00 AM-10:00 AM West Meeting Room 211 |
| Attention Capture (138-143) | 8:00 AM-10:00 AM West Meeting Room 118-120 |
| Decision Making I (144-149)..... | 8:00 AM-10:00 AM West Meeting Room 202-204 |
| Statistics and Design (150-154)..... | 8:00 AM-9:40 AM West Meeting Room 205-207 |
| Cognitive Aging (155-159)..... | 8:00 AM-9:40 AM West Meeting Room 208-209 |
| Spatial Cognition (160-164)..... | 8:00 AM-9:40 AM West Meeting Room 212-214 |
| SYMPOSIUM IV: When Man Bites Dog: What do Developmental Reversals Tell Us | |
| About Cognitive Development, Aging, and the Brain (165-168) | 10:00 AM-12:00 PM West Meeting Room 109-110 |
| Metacognition I (169-173) | 10:20 AM-12:00 PM West Meeting Room 211 |
| Working Memory: Storage (174-178)..... | 10:20 AM-12:00 PM West Meeting Room 118-120 |
| Attention: Visual Search (179-184)..... | 10:00 AM-12:00 PM West Meeting Room 212-214 |
| Judgment II (185-190) | 10:00 AM-12:00 PM West Meeting Room 205-207 |
| Psycholinguistics (191-195) | 10:20 AM-12:00 PM West Meeting Room 208-209 |

SATURDAY NOON, NOVEMBER 11, 2017

POSTER SESSION IV..... 11:00 AM-1:30 PM West Ballroom BCD
(Author present between 12:00 PM-1:30 PM)

| | |
|--|--|
| Attention Capture II (4001-4012) | Eyewitness Identification (4137-4152) |
| Scene Processing and Visual Search (4013-4025) | Test Effects II (4153-4168) |
| Reward, Motivation and Decision Making (4026-4046) | Recall II (4169-4180) |
| Embodied Cognition (4047-4066) | Metacognition (4181-4199) |
| Spatial Cognition I (4067-4079) | Working Memory III (4200-4215) |
| Judgment (4080-4097) | Concepts and Categories II (4216-4227) |
| Semantics (4098-4116) | |
| Associative Learning (4117-4136) | |

SATURDAY NOON, NOVEMBER 11, 2017

| | |
|--|--|
| Lunchtime Workshop: Practical Open Science for the Busy Researcher..... | 12:00 PM-1:30 PM West Meeting Room 111-112 |
| Lunchtime Workshop: The European Research Council: Funding Excellence..... | 12:00 PM-1:30 PM West Meeting Room 114 |

SATURDAY AFTERNOON, NOVEMBER 11, 2017

SYMPOSIUM V: 50 Years of Implicit Research:

| | |
|---|---|
| A Symposium in Honor of Arthur S. Reber (196-199) | 1:30 PM-3:30 PM West Meeting Room 109-110 |
| Recall (200-205)..... | 1:30 PM-3:30 PM West Meeting Room 211 |
| Decision Making II (206-210) | 1:30 PM-3:10 PM West Meeting Room 212-214 |
| Attention: Control (211-215)..... | 1:30 PM-3:10 PM West Meeting Room 118-120 |
| Cognition: Emotion and Consciousness (216-220)..... | 1:30 PM-3:10 PM West Meeting Room 208-209 |
| Sensation and Perception (221-226)..... | 1:30 PM-3:30 PM West Meeting Room 202-204 |
| Eyewitness Identification (227-232)..... | 3:30 PM-5:30 PM West Meeting Room 118-120 |
| Reasoning and Problem Solving (233-238) | 3:30 PM-5:30 PM West Meeting Room 212-214 |
| Working Memory (239-243)..... | 3:50 PM-5:30 PM West Meeting Room 211 |
| Reward and Motivation in Decision Making and Memory (244-248) | 3:30 PM-5:10 PM West Meeting Room 208-209 |
| Letter/Word Processing (249-254)..... | 3:30 PM-5:30 PM West Meeting Room 205-207 |
| Metacognition II (255-259)..... | 3:50 PM-5:30 PM West Meeting Room 202-204 |

SATURDAY EVENING, NOVEMBER 11, 2017

POSTER SESSION V 4:00 PM-7:30 PM West Ballroom BCD
(Author present between 6:00 PM-7:30 PM)

| | |
|--------------------------------------|--|
| Consciousness (5001-5010) | Letter/Word Processing I (5114-5126) |
| Divided Attention (5011-5020) | False Memory II (5127-5138) |
| Visual Search (5021-5037) | Human Learning and Instruction III (5139-5157) |
| Controlled Processing II (5038-5052) | Prospective Memory (5158-5171) |
| Reasoning and Judgment (5053-5070) | Recall and Recognition (5172-5187) |
| Cognitive Processes (5071-5089) | Audition (5188-5195) |
| Bilingualism III (5090-5099) | Vision (5196-5210) |
| Psycholinguistics II (5100-5113) | Spatial Cognition II (5211-5222) |

SATURDAY EVENING, NOVEMBER 11, 2017

Business Meeting..... 5:10 PM-6:00 PM West Meeting Room 114

SUNDAY MORNING, NOVEMBER 12, 2017

| | |
|--|---|
| Attention (260-265)..... | 8:00 AM-10:00 AM West Meeting Room 118-120 |
| Bilingualism II (266-271) | 8:00 AM-10:00 AM West Meeting Room 208-209 |
| Enhancing STEM Learning Using Spatial Thinking (272-277) | 8:00 AM-10:00 AM West Meeting Room 211 |
| Learning and Memory (278-283)..... | 8:00 AM-10:00 AM West Meeting Room 212-214 |
| Sensation and Perception (284-288)..... | 8:00 AM-9:40 AM West Meeting Room 205-207 |
| Statistics and Methodology (289-293)..... | 8:00 AM-9:40 AM West Meeting Room 202-204 |
| Cognitive Control (294-298) | 10:20 AM-12:00 PM West Meeting Room 118-120 |
| Decision Making (299-303) | 10:20 AM-12:00 PM West Meeting Room 211 |
| Cognition (304-309) | 10:00 AM-12:00 PM West Meeting Room 205-207 |
| Language Comprehension and Production (310-314)..... | 10:20 AM-12:00 PM West Meeting Room 208-209 |
| Human Learning and Instruction III (315-319) | 10:00 AM-11:40 AM West Meeting Room 202-204 |
| Event Cognition (320-323) | 10:20 AM-11:40 AM West Meeting Room 212-214 |



Condensed Schedule B

| West Meeting Room 109-110 | West Meeting Room 111-112 | West Meeting Room 114 | West Meeting Room 118-120 | West Meeting Room 202-204 |
|---|---|---|---|--|
| Thursday, November 9, 2017 | | | | |
| <div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 80%;"> <p style="text-align: center;">West Ballroom A</p> <p style="text-align: center;"><i>Keynote Address:</i> Working Memory Capacity and Intelligence, Randall “Randy” Engle, Georgia Institute of Technology 8:00 p.m.</p> </div> | | | | |
| Friday, November 10, 2017 | | | | |
| <p>SYMPOSIUM I: Dual Process Theory 2.0 10:00 a.m.-12:00 p.m.</p> <p>SYMPOSIUM II: Improving the Use of Statistical Inference in Science 1:30 p.m.-3:30 p.m.</p> <p>SYMPOSIUM III: Beyond the Lab: Using Big Data to Discover Principles of Cognition 3:50 p.m.-5:50 p.m.</p> | <p>Lunchtime Workshop: Encouraging Future Scientists: Supporting Undergraduates at Psychonomics (UP) 12:00 p.m.-1:45 p.m.</p> | <p>Lunchtime Workshop: The Digital Psychonomic Society: From Social Media to Clever Apps 12:00 p.m.-1:45 p.m.</p> | <p>Automatic Processing 8:00 a.m.-9:40 a.m.</p> <p>Associative Learning 10:00 a.m.-12:00 p.m.</p> <p>Working Memory: Attentional Processes 1:30 p.m.-3:10 p.m.</p> <p>Attention: Features & Objects 3:30 p.m.-5:30 p.m.</p> | <p>Embodied Cognition 8:00 a.m.-9:40 a.m.</p> <p>Concepts and Categories 10:00 a.m.-12:00 p.m.</p> <p>Beliefs and Reasoning 1:30 p.m.-3:10 p.m.</p> <p>Reading 3:30 p.m.-5:30 p.m.</p> |
| Saturday, November 11, 2017 | | | | |
| <p>SYMPOSIUM IV: When Man Bites Dog: What do Developmental Reversals Tell Us About Cognitive Development, Aging, and Brain? 10:00 a.m.-12:00 p.m.</p> <p>SYMPOSIUM V: 50 Years of Implicit Research: A Symposium in Honor of Arthur S. Reber 1:30 p.m.-3:30 p.m.</p> | <p>Lunchtime Workshop: Practical Open Science for the Busy Researcher 12:00 p.m.-1:45 p.m.</p> | <p>Lunchtime Workshop: The European Research Council: Funding Excellence 12:00 p.m.-1:45 p.m.</p> <p>Psychonomic Society Business Meeting 5:10 p.m.-6:00 p.m.</p> | <p>Attention Capture 8:00 a.m.- 10:00 a.m.</p> <p>Working Memory: Storage 10:20 a.m.-12:00 p.m.</p> <p>Attention: Control 1:30 p.m.-3:10 p.m.</p> <p>Eyewitness Identification 3:30 p.m.-5:30 p.m.</p> | <p>Decision Making I 8:00 a.m.-10:00 a.m.</p> <p>Sensation and Perception 1:30 p.m.-3:30 p.m.</p> <p>Metacognition II 3:50 p.m.-5:30 p.m.</p> |
| Sunday, November 12, 2017 | | | | |
| | | | <p>Attention 8:00 a.m.-10:00 a.m.</p> <p>Cognitive Control 10:20 a.m.-12:00 p.m.</p> | <p>Statistics and Methodology 8:00 a.m.-9:40 a.m.</p> <p>Human Learning and Instruction III 10:00 a.m.-11:40 a.m.</p> |

| West Meeting Room 205-207 | West Meeting Room 208-209 | West Meeting Room 211 | West Meeting Room 212-214 | West Ballroom BCD |
|--|---|---|--|--|
| Thursday, November 9, 2017 | | | | |
| | | | | Poster Session I Viewing 4:00 p.m.-7:30 p.m. Hospitality 5:30 p.m.-7:30 p.m. Author Present 6:00 p.m.-7:30 p.m. Opening Reception Immediately Following Keynote |
| Friday, November 10, 2017 | | | | |
| Discourse Processes 8:00 a.m.-10:20 a.m. Increasing Transparency and Replicability 10:40 a.m.-12:00 p.m. Speech Perception 1:30 p.m.-3:50 p.m. Autobiographical Memory 4:10 p.m.-5:30 p.m. | Cognitive Processes in Non- Human Animals 8:00 a.m.-9:40 a.m. Numerical Cognition 3:50 p.m.-5:30 p.m. | Judgment I 8:00 a.m.-10:00 a.m. Bilingualism I 10:20 a.m.-12:00 p.m. Test Effects on Learning and Memory 1:30 p.m.-3:30 p.m. | Recognition Memory 8:00 a.m.-10:00 a.m. Working Memory Structure 10:20 a.m.-12:00 p.m. Motor Control and Performance 1:30 p.m.-3:10 p.m. Semantics 3:30 p.m.-5:30 p.m. | Poster Session II Viewing 11:00 a.m.-1:30 p.m. Author Present 12:00 p.m.-1:30 p.m. Poster Session III Viewing 4:00 p.m.-7:30 p.m. Hospitality 5:30 p.m.-7:30 p.m. Author Present 6:00 p.m.-7:30 p.m. |
| Saturday, November 11, 2017 | | | | |
| Statistics and Design 8:00 a.m.-9:40 a.m. Judgment II 10:00 a.m.-12:00 p.m. Letter/Word Processing 3:30 p.m.- 5:30 p.m. | Cognitive Aging 8:00 a.m.-9:40 a.m. Psycholinguistics 10:20 a.m.-12:00 p.m. Cognition: Emotion and Consciousness 1:30 p.m.-3:10 p.m. Reward and Motivation in Decision Making and Memory 3:30 p.m.-5:10 p.m. | Human Learning and Instruction 8:00 a.m.-10:00 a.m. Metacognition I 10:20 a.m.-12:00 p.m. Recall 1:30 p.m.-3:30 p.m. Working Memory 3:50 p.m.-5:30 p.m. | Spatial Cognition 8:00 a.m.-9:40 a.m. Attention: Visual Search 10:00 a.m.-12:00 p.m. Decision Making II 1:30 p.m.-3:10 p.m. Reasoning & Problem Solving 3:30 p.m.-5:30 p.m. | Poster Session IV Viewing 11:00 a.m.-1:30 p.m. Author Present 12:00 p.m.-1:30 p.m. Poster Session V Viewing 4:00 p.m.-7:30 p.m. Hospitality 5:30 p.m.-7:30 p.m. Author Present 6:00 p.m.-7:30 p.m. |
| Sunday, November 12, 2017 | | | | |
| Sensation and Perception 8:00 a.m.-9:40 a.m. Cognition 10:00 a.m.-12:00 p.m. | Language Comprehension and Production 10:20 a.m.-12:00 p.m. | Enhancing STEM Learning Using Spatial Thinking 8:00 a.m.-10:00 a.m. Decision Making 10:20 a.m.-12:00 p.m. | Learning and Memory 8:00 a.m.-10:00 a.m. Event Cognition 10:20 a.m.-11:40 a.m. | |



THURSDAY EVENING, NOVEMBER 9, 2017

4:00 PM-7:30 PM

POSTER SESSION I (1001-1239)

WEST BALLROOM BCD

Human Learning and Instruction I (1001-1017)

- (1001) Fiorella; Pilegard
- (1002) Johnson; Bailey; Marraffino; Schroeder
- (1003) Shipley; Jaeger; Marzano
- (1004) Clark; Bjork E; Bjork R
- (1005) Kazanas; Altarriba; O'Brien
- (1006) Miranda; Koob; Boucher; Collins
- (1007) England; Sylvara; Drake; Ortegren
- (1008) Ortegren
- (1009) Bjork; Sparck
- (1010) Alabi; Hatala; Fisher
- (1011) Lau; Pashler
- (1012) Noh; Preston
- (1013) Pirozzolo; Foss
- (1014) Runge; Sommers; Barcroft
- (1015) Morehead; Dunlosky; Rawson
- (1016) Parong; Mayer
- (1017) Mack; Preston; Love

Learning: Reward, Motivation, and Emotion (1018-1031)

- (1018) Fujita; Kato
- (1019) Bowen; Kensinger
- (1020) Brubaker; Moreno
- (1021) Holm; Wadenholt-Ådén; Schrater
- (1022) Carvalho; Koedinger
- (1023) Roark; Holt
- (1024) Halpern; Rodriguez
- (1025) Cushing; Drumme; Kan
- (1026) Hennessee; Castel; Knowlton
- (1027) Elliott; McClure; Brewer
- (1028) Allcoat; von Mühlén
- (1029) Solinger; Dobbins
- (1030) Pachai; Yaseen; Legere; Kim
- (1031) Boden; Kuo; Nokes-Malach; Wallace; Menekse

Recall I (1032-1044)

- (1032) Aguirre; Gómez-Ariza; Bajo
- (1033) Khaw
- (1034) Broitman; Kahana
- (1035) Atalay; Kimlikoğlu
- (1036) Sanchez
- (1037) Jonker; Oztekin; Ranganath
- (1038) Kazanas; Wilck; Altarriba
- (1039) Lohnas; Davachi
- (1040) Persaud; Hemmer
- (1041) Loehr; Fazio
- (1042) Runge; Frings; Tempel
- (1043) Silliman; Wilson; Houghton; Snoddy
- (1044) Wulff; Jalbert; Hyman

Test Effects I (1045-1056)

- (1045) Hills; Roberts; Dickinson; Boobyer
- (1046) Wissman; Peterson
- (1047) Ariel; Nunes; Karpicke

- (1048) Aue; Karpicke
- (1049) Manley; Chan
- (1050) Jonker; Ritchey; Dimsdale-Zucker; Ranganath
- (1051) Tse C; Chan; Tse W; Wong
- (1052) Smith; Davis; Romero; Thomas
- (1053) Antony; Norman
- (1054) Buchin; Mulligan
- (1055) Crisostomo; Kimball
- (1056) Lovelett; Rickard

False Memory I (1057-1068)

- (1057) Spiller; Hefer; Creegan; Brathwaite
- (1058) Zaragoza; Lindsay
- (1059) Bennion; Cheney; Jackson; Michaels; Ordanza; Pivetti
- (1060) Okubo
- (1061) Chrobak; Bowe; Braun; Piette; Ribley
- (1062) Hart; Meade
- (1063) Crozier; Strange
- (1064) Newbury; Monaghan
- (1065) Bookbinder; Brainerd
- (1066) Ecker; Lewandowsky; Berinsky
- (1067) Burnell; Garry; Nash
- (1068) Curl; Sloane; White

Cognitive Aging I (1069-1080)

- (1069) Coane; Umanath; Lester; Rosenthal
- (1070) Farooqui; Manly
- (1071) Barber; Seliger; Yeh
- (1072) Mazerolle; Régner; Hugué; Rigalleau
- (1073) Erickson; Naveh-Benjamin
- (1074) Rhodes; Jaroslawska; Doherty; Camos; Barrouillet; Belletier; Cowan; Naveh-Benjamin; Logie
- (1075) Kraemer; Black
- (1076) Hahn; Kim; Kwon; Lee
- (1077) Nicosia; Balota
- (1078) Castro; Vitevitch
- (1079) Elshiekh; Rajagopal; Pasvanis; Ankudowich; Rajah
- (1080) Mitchell

Emotion and Cognition I (1081-1097)

- (1081) Karuza; Bassett; Bershady; Thompson-Schill
- (1082) Kozlik; Neumann; Fischer
- (1083) Eagleson; de Ribaupierre; Pylyshyn
- (1084) Ishikawa; Oyama; Suzuki; Okubo
- (1085) Beatty; Metcalfe
- (1086) Moeck; Takarangi; Thomas
- (1087) Megías; Gutiérrez-Cobo; Gómez-Leal; Cabello; Fernández-Berrocal
- (1088) Holmes; Johnsrude
- (1089) Sutton; Herbert; Clark
- (1090) Hart; Bicchieri; Mellers
- (1091) Rheem; Verma; Becker
- (1092) Sklenar; Leshikar; McCurdy; Frankenstein
- (1093) Hill; Patel; Guidubaldi; Neider; Bohil

- (1094) Pizzie; Kraemer
- (1095) Jamal Orozco; Russo; Nokes-Malach; Galla
- (1096) Cataldo; Cohen
- (1097) Hardin; Emery

Working Memory I (1098-1114)

- (1098) Peterson; Naveh-Benjamin
- (1099) Shepherdson; Oberauer
- (1100) Shipstead; Nespodzany
- (1101) Otsuka
- (1102) Robison; Unsworth
- (1103) Langerock; Wisniewski; Brass; Vergauwe
- (1104) Morrison; Witkin; Jha
- (1105) John; Scurich
- (1106) Stephens; Hayes; Dunn
- (1107) Rajsic; Hilchey; Pratt
- (1108) Miller; Unsworth
- (1109) Wills; Schroder; Moser; Ravizza
- (1110) Siegel; Castel
- (1111) Baranski; Was
- (1112) Howlett; Loaiza
- (1113) Aldugom; Wagner Cook
- (1114) Fitamen; Blaye; Camos

Attentional Control (1115-1129)

- (1115) Gade; Koch
- (1116) Wiebke; Griswold; Lien; Ruthruff
- (1117) Yonehiro; Duran
- (1118) Lim; Cho
- (1119) Osth; Farrell
- (1120) Misirlisoy; Atalay
- (1121) Mitchel; Patel
- (1122) Yildirim; Dark
- (1123) Sams; Colburn; Butkevitz; Osment; Colvett; Friedman; Jennings
- (1124) Brosowsky; Crump
- (1125) Pereira; Ristic
- (1126) Tsukahara; Harrison; Hicks; Draheim; Martin; Engle
- (1127) Chistopolskaya; Vladimirov; Mayorova; Securtceva
- (1128) Hatherley; Minda
- (1129) Varao-Sousa; Kuk; Smilek; Kingstone

Feature/Object Processing (1130-1145)

- (1130) Morein-Zamir
- (1131) Kuzmak
- (1132) Marshall; Donato
- (1133) Couperus; Hu
- (1134) Cochran; Milliken
- (1135) Nguyen; Williams
- (1136) Overkott; Souza
- (1137) Trevino; Breitmeyer; Raghobar
- (1138) Moneer; Little
- (1139) Jaeger; Levin
- (1140) Patel; Ercolino; Neider; Schmidt; Bohil
- (1141) Winter; Wright; Chubb
- (1142) Shi; Wright
- (1143) Bond; Kleider-Offutt
- (1144) Schertz; Sachdeva; Kardan; Kotabe; Wolf; Berman
- (1145) Arabaci; Parris

Decision Making I (1146-1165)

- (1146) Hornburg; McNeil; Wang
- (1147) Cohen; Freda
- (1148) Hunter; Pisoni
- (1149) Petrova; Cokely; Garcia-Retamero
- (1150) Bratzke; Ulrich
- (1151) Kellen; Skovgaard-Olsen
- (1152) Josephson; Baranova; Kusev
- (1153) Casteel
- (1154) Friel; Thuku; Howell
- (1155) Ambrus; Heilman; Kusev
- (1156) Kvam; Heathcote
- (1157) Burgeno; Joslyn
- (1158) Fific; Goralski; Roth
- (1159) Szollosi; Liang; Konstantinidis; Donkin; Newell
- (1160) Nguyen; John
- (1161) (WITHDRAWN)
- (1162) Labonté; Lamirande; Lévesque-Dion; Vachon
- (1163) Sumner; Stokes; Mistry; Jaeggi; Sarnecka
- (1164) Wispinski; Ho; Chapman
- (1165) Jeon; Rothschild; Kim

Reasoning and Problem Solving I (1166-1180)

- (1166) Vladimirov; Markevitch
- (1167) Drake; England; Cronk
- (1168) Holyoak; Gray
- (1169) Korovkin; Gerasimovskaya
- (1170) Hannon; Pontiff
- (1171) Geye; Faulkenberry
- (1172) Gagnon; Amato; Blanchette
- (1173) Lazareva; Vladimirov
- (1174) Kary; Newell; Hayes
- (1175) Thomas; Didierjean; Kuhn
- (1176) Ellis; Brewer
- (1177) Wang; Thompson; Ackerman
- (1178) Bago; De Neys
- (1179) Laukkonen; Tangen
- (1180) Prike; Arnold; Williamson

Perception and Action (1181-1192)

- (1181) Frings; Rothermund
- (1182) Monson; Rosenbaum
- (1183) Schmidtke; Gagné; Kuperman; Spalding; Tucker
- (1184) Miles; Tesoro
- (1185) Gill; Pointon; Creem-Regehr; Stefanucci
- (1186) Sutter; Sack
- (1187) Litovsky; McCloskey
- (1188) Mark-Tavger; Eitam
- (1189) Laflamme; Mioni; Grassi; Grondin
- (1190) Chauvel; Maquestiaux; Mazerolle; Didierjean
- (1191) Roest; Zeelenberg; Pecher
- (1192) Ruess; Thomaschke; Haering; Wenke; Kiesel

Multi-Sensory Integration (1193-1203)

- (1193) Pandi; Khosla; Townsend; Mohrenschildt; Shedden
- (1194) Paxton; Griffiths
- (1195) Adamo; Ericson; Nah; Brem; Mitroff
- (1196) Appleton-Knapp; Eichen; Manzano; Strong; Boutelle
- (1197) Sim; Wu
- (1198) Hirose



- (1199) Pierce; Green
- (1201) Liu; Medina
- (1202) Lavoie; Valevicius; Boser; Pilarski; Vette; Hebert; Chapman
- (1203) Lelo de Larrea-Mancera; Seitz; Dempsey-Jones; Makin

Letter/Word Processing I (1204-1215)

- (1204) Ivanova
- (1205) Bye; Chuang; Cheng
- (1206) Bryne; Porter
- (1207) Zemla; Austerweil
- (1208) Ransley; Andrews; Holcombe
- (1209) Warrington; Li L; Xie; Li S; Wang; McGowan; White; Paterson
- (1210) Pan; Lupker
- (1211) Marcet; Perea
- (1212) Li; Rapp
- (1213) Pambuccian; Raney
- (1214) Abraham; Eskenazi; Folk
- (1215) Vasilev; Liversedge; Rowan; Kirkby; Angele

Language (1216-1225)

- (1216) Kirkby; Laishley

- (1217) Coleman
- (1218) Cameron E; Fouladirad; Cameron C
- (1219) Ashby; Agauas
- (1220) Wolters; Nicodemus; Cohen
- (1221) Fukuda
- (1223) Mizrahi; Creel
- (1224) Terrazas; Tokowicz
- (1225) Sidhu; Deschamps; Bourdage; Pexman

Psycholinguistics I (1226-1239)

- (1226) Lee; Lund; Wood
- (1227) Moss; Berg
- (1228) Plummer; Gordon
- (1229) New
- (1230) Anderson; Grundy; Barker; Bialystok
- (1231) Babel; McAuliffe; Norton; Senior; Vaughn
- (1232) Law; Yum; Petrova
- (1233) Babb
- (1234) Oliver; Humphreys
- (1235) Li L; Li S; Wang; Xie; Chang; Paterson
- (1236) Wang; Li L; Li S; Chang; Xie; Paterson
- (1237) Bernabeu; Willems; Louwerse
- (1238) Saryazdi; Grewal; Chambers
- (1239) Carney; Knoph; Baumann

FRIDAY MORNING, NOVEMBER 10, 2017

8:00 AM-9:40 AM

Spoken Sessions (1-64)

Automatic Processing (1-5) West Meeting Room 118-120

- 8:00-8:15 AM Shomstein; Collegio; Nah
- 8:20-8:35 AM Yamaguchi
- 8:40-8:55 AM Logan
- 9:00-9:15 AM Ristic; Birmingham; Pereira
- 9:20-9:35 AM Weeks; Hasher

Cognitive Processes in Non-Human Animals (6-10) West Meeting Room 208-209

- 8:00-8:15 AM Smith; Beran
- 8:20-8:35 AM Muszynski; Couvillon
- 8:40-8:55 AM Cole
- 9:00-9:15 AM Gallup
- 9:20-9:35 AM Pepperberg; Pailian

Judgment I (11-16) West Meeting Room 211

- 8:00-8:15 AM Harding; Goulet; Cousineau
- 8:20-8:35 AM Cataldo; Cohen
- 8:40-8:55 AM Schulze; Pachur; Hertwig
- 9:00-9:15 AM Leuter; Pleskac; Pachur; Hertwig
- 9:20-9:35 AM Corbin; Russo; Reyna
- 9:40-9:55 AM Nakamura

Discourse Processes (17-23) West Meeting Room 205-207

- 8:00-8:15 AM Boland; Pasquinelli; Sabri; Smith; Kendro; Brickman
- 8:20-8:35 AM Dahan
- 8:40-8:55 AM Pardo; Urmanche; Gash; Wiener; Mason; Wilman; Francis; Decker
- 9:00-9:15 AM Galati; Duran; Dale
- 9:20-9:35 AM Craycraft; Brown-Schmidt

- 9:40-9:55 AM Andrews; Veldre
- 10:00-10:15 AM Singer; Spear

Recognition Memory (24-29) West Meeting Room 212-214

- 8:00-8:15 AM Dobbins; Kantner
- 8:20-8:35 AM Loft; Humphreys
- 8:40-8:55 AM Kuhlmann; Bröder; Pfeiffer
- 9:00-9:15 AM Maxcey
- 9:20-9:35 AM Weidemann; Kahana
- 9:40-9:55 AM McDermott; Anderson; Gilmore

Embodied Cognition (30-34) West Meeting Room 202-204

- 8:00-8:15 AM Witt
- 8:20-8:35 AM Zeelenberg; Thomas; Pecher
- 8:40-8:55 AM Rieger; Dahm
- 9:00-9:15 AM Tversky; Bradley-Zrada; Liu

SYMPOSIUM I: Dual Process Theory 2.0 (35-38) West Meeting Room 109-110

- 10:00-10:20 AM Pennycook; Fugelsang; Koehler
- 10:30-10:50 AM Trippas; Handley
- 11:00-11:20 AM De Neys
- 11:30-11:50 AM Thompson

Bilingualism I (39-43) West Meeting Room 211

- 10:20-10:35 AM Paap; Anders; Mikulinsky; Mason; Alvarado
- 10:40-10:55 AM Nkrumah; Neumann
- 11:00-11:15 AM Brysbaert; Vander Beken
- 11:20-11:35 AM Golonka; Tare; Kim; Linck
- 11:40-11:55 AM Kroll; Beatty-Martinez; Bice; Takahesu
- Tabori; Zhang; Mech; Eshugbohunge; Bruni; Dussias

Associative Learning (44-49) West Meeting Room 118-120

10:00-10:15 AM MacLeod; Forrin
 10:20-10:35 AM Kusev; Van Schaik; Love
 10:40-10:55 AM Vickery; Zhong; Beck
 11:00-11:15 AM Stahl
 11:20-11:35 AM Kelley; Komsky; Jacoby
 11:40-11:55 AM Evans; Brown; Mewhort; Heathcote

Working Memory Structure (50-54) West Meeting Room 212-214

10:20-10:35 AM Martin; Shea; Campana; Rapp
 10:40-10:55 AM Fukuda; Woodman
 11:00-11:15 AM Awh; Sutterer; Foster; Adam; Vogel
 11:20-11:35 AM Rose
 11:40-11:55 AM Peterson; Kelly; Blumberg

Concepts and Categories (55-60) West Meeting Room 202-204

10:00-10:15 AM Lupyan; Wendorf; Paul
 10:20-10:35 AM Davis; Ireland
 10:40-10:55 AM Patterson; Snoddy; Kurtz
 11:00-11:15 AM Marsh; Ferguson; Hamilton
 11:20-11:35 AM Hemmer; Persaud; McMahan; Alikhani; Pei; Stone
 11:40-11:55 AM Tangen; Corbett; Matthews; Searston; Thompson

Increasing Transparency and Replicability (61-64) West Meeting Room 205-207

10:40-10:55 AM Rouder; Haaf
 11:00-11:15 AM Gernsbacher
 11:20-11:35 AM Vandekerckhove; Etz; Guan
 11:40-11:55 AM Lindsay

FRIDAY NOON, NOVEMBER 10, 2017

11:00 AM-1:30 PM

POSTER SESSION II (2001-2220)

WEST BALLROOM BCD

Neural Mechanisms of Cognition (2001-2019)

(2001) Hughes; Houston; Lien; Vorster; Luciano; Loth; Allen
 (2002) Miller; Logan; Palmeri; Schall
 (2003) Urakawa; Nagano; Araki
 (2004) Lim; Johnson
 (2005) Cameron; Smith
 (2006) Kleider-Offutt; Grant; Burnet; Turner
 (2007) Marks; Gregg
 (2008) Morett; Landi; Irwin; McPartland
 (2009) Stillesjö; Nyberg; Karlsson Wirebring
 (2010) Bailey; McCartt; Shultz
 (2011) Sali; Bejjani; Egner
 (2012) Emerson; Conway
 (2013) Canada; Geng; Riggins
 (2014) Nguyen; Sand; Dougherty; Bolger
 (2015) Bertrand; Wispinski; Mathewson; Chapman
 (2016) Al-Azary; McRae
 (2017) Kelley; Serra; England; Davis
 (2018) Diaz; Vogel; Awh
 (2019) Johnson; Wittenberg; Thompson-Schill

Cognitive Control (2020-2035)

(2020) Vasilev; Slattery; Kirkby; Angele
 (2021) Hazeltine; Schumacher
 (2022) Meier; Lyons
 (2023) Sohn; Kwak; Weldon; Lee
 (2024) Dixon; Agyemang; Liddle
 (2025) Nishimura; Kuratomi
 (2026) Ashitaka; Shimada
 (2027) Ueda; Saiki
 (2028) Frischkorn; Schubert; Rummel; Hagemann
 (2029) Griffin-Oliver; Proctor
 (2030) Aday; Carlson
 (2031) Diede; Seals; Shi; Bugg
 (2032) Spinelli; Perry; Lupker
 (2033) Moss; Kikumoto; Mayr

(2034) Snyder; Rafferty; Haaf; Rouder
 (2035) Seibold; Nolden; Oberem; Fels; Koch

Attention Capture I (2036-2048)

(2036) Vachon; Lévesque-Dion; Marois; Desmarais; Marsh
 (2037) Kuo; Yeh
 (2038) Chao
 (2039) Martín-Arévalo; Marino; Lupiáñez; Chica
 (2040) Murphy; Dalton
 (2041) Burnham
 (2042) Cohen
 (2043) Kim; Anderson
 (2044) Tay; McDonald
 (2045) Pearson; Le Pelley
 (2046) Williams; Pratt; Ferber
 (2047) Park; Noh; Kim; Cho
 (2048) Groulx; Tran; Wright

Attention (2049-2062)

(2049) Leyland; Godwin; Benson; Liversedge
 (2050) Hilchey; Rajsic; Huffman; Klein; Pratt
 (2051) Truong; Handy; Todd
 (2052) Twyman; Holden; Newcombe
 (2053) White; Palmer; Boynton
 (2054) Foucart; Santamaría-García; Hartsuiker
 (2055) Cavallero; Riontino
 (2056) Trick; Terry
 (2057) Kulomäki; Oksama; Hyönä
 (2058) Ptok; Cohen; Humphreys; Watter
 (2059) Tuft; McLennan
 (2060) Marois; Szolosi; Watson
 (2061) Jenkins; Noe; Fischer-Baum
 (2062) Feldmann-Wüstefeld; Awh

Cognitive Aging II (2063-2079)

(2063) Thapar; Osman



- (2064) Chen; Hirsch; Gallo
- (2065) Koneva
- (2066) Mashburn; Mutter; Luna; Lawrence
- (2067) Hosokawa
- (2068) Isingrini; Guerrero; Tacconat; Angel; Fay; Bouazzaoui
- (2069) Thumma; Costello; Almonacy; Shershow
- (2070) Richmond; Sargent; Zacks
- (2071) Witherby; Tauber
- (2072) Huff; Aschenbrenner
- (2073) Jantz; Zhou; Lustig
- (2074) Sparrow; Giessing; Spaniol
- (2075) Featherston; Myerson; Flores; Bui; Hale
- (2076) Milchgrub; Magen
- (2077) Enam; Kraemer; Gallo; McDonough
- (2078) Decker; Naveh-Benjamin
- (2079) Pishdadian; Ziegler; Moscovitch; Rosenbaum

Music Cognition (2080-2088)

- (2080) Okada; Slevc
- (2081) Schaal; Pollok; Banissy
- (2082) Mungan; Karan
- (2083) Raman; Wallmark; Dowling
- (2084) Boltz
- (2085) Gordon; Suwangbutra; Lucila; Roque
- (2086) Brigante; Hubbard; Dowling; Rypma
- (2087) Barker; Schotter; Leinenger
- (2088) Ventura; Elliott; Baker; Shanahan

Autobiographical Memory (2089-2101)

- (2089) Zator; Katz
- (2090) Mert; Tekcan
- (2091) Boduroglu; Tekcan; Bilge; Topcu; Ikizoglu; Sozer
- (2092) Putnam; Ross; Soter; Roediger
- (2093) Reynolds; Lyday; Laurienti; Dagenbach
- (2094) Kaastra
- (2095) Devitt; Schacter
- (2096) Emery; Knight
- (2097) Küçüktaş; Tekcan
- (2098) Woy; Conway; Loveday
- (2099) Shrikanth; Szpunar P; Szpunar K
- (2100) Tanriverdi Ozkan; Ozen; Cetin; Alic; Gulgoz
- (2101) Taylor; Garry; Zajac; Takarangi

Metamemory (2102-2121)

- (2102) McGillivray; Page; Badali; Kendall; Sahleen; Paucarpura
- (2103) Peynircioglu; Tatz
- (2104) Risko; Gaspar; McLean; Dunn; Koehler
- (2105) Mitchell; Gualtieri; Stillely
- (2106) Holden; Hampson
- (2107) Blais; Cohen; Brewer
- (2108) Wilford; Weinstein; Davis; Khairalla
- (2109) Foster; Baroncinni; Jimenez
- (2110) Fulton; Corry; Kelemen
- (2111) Selmeczy; Hembacher; Johal; Ghatti
- (2112) Kirk; Fraundorf; Galla
- (2113) Kraemer; Enam; Eakin; McDonough
- (2114) Hargis; Castel
- (2115) Janes; Rivers; Dunlosky
- (2116) Tekin; Roediger

- (2117) Flurry; Eakin
- (2118) James; French; Kelly V; Moss; Kelly A; Parrish; Beran
- (2119) Green; Gorrall; Oh; Serra
- (2120) DeCaro; Thomas
- (2121) Doyle; Hockley

Application of Network Science to Human Learning (2122-2126)

- (2122) Undorf; Zimdahl
- (2123) Brunsdon; Bradford; Ferguson
- (2124) Yan; Oyserman
- (2125) Colunga
- (2126) Austerweil; Zemla

Skill Acquisition and Performance (2127-2142)

- (2127) Bissett; Eisenberg; Poldrack
- (2128) Kang
- (2129) Laidlaw; Cooper; Goodale; Culham
- (2130) Slifkin; Eder
- (2131) Proctor; Xiong
- (2132) Weinstein; Tilton; Smith
- (2133) Strobach; Orscheschek; Schubert; Rickard
- (2134) Hamm; Medina; Cox; Kelley; Papa
- (2135) Frank; Macnamara
- (2136) Yakushijin
- (2137) Rand; Tarampi; Whitaker; Pointon
- (2138) Gunalp; Hegarty
- (2139) Bart; Koch; Rieger
- (2140) Rabipour; Vidjen; Rемаud; Davidson; Tremblay
- (2141) Weller; Kunde; Pfister
- (2142) Cohen Hoffing; Karvelis; Ruppelchter; Series; Seitz

Speech Perception I (2143-2156)

- (2143) Bobb; Mello; Turco; Lemes; Fernandez; Rothermich
- (2144) Hayes; Weiner; Ingvalson
- (2145) Smith; Russo; Araya
- (2146) van Heugten
- (2147) Abrahamyan; Luce
- (2148) Kovacs; Conway
- (2149) Chan; Siew
- (2150) Cooper; Fecher; Johnson
- (2151) Fecher; Johnson
- (2152) Biro; Viswanathan; Toscano
- (2153) Lewandowski; Nygaard
- (2154) Falandays; Brown-Schmidt; Toscano
- (2155) Failes; Sommers
- (2156) Kato; Baese-Berk; Vaughn; Kendall

Discourse Processes (2157-2170)

- (2157) Vibert; Skov; De Pereyra; Le Bigot; Rouet
- (2158) Tao; Healy
- (2159) Rotem; Hoffman
- (2160) Shears; Jerome; Leavy; Amirazizi; Lee
- (2161) Levine; McCully
- (2162) Hammond; D'Arcey; Larson; Fox Tree
- (2163) Katz; Reid
- (2164) Trevors; Kendeou
- (2165) Blaum; Rupp; Bonilla-Weir; Gallagher; Durik; Britt
- (2166) McCarthy; Hinze; McNamara
- (2167) D'Arcey; Fox Tree

- (2168) Harman; Gerrig
 (2169) Steciuch; Millis
 (2170) Miller; Raney

Bilingualism I (2171-2189)

- (2171) Jarvstad
 (2172) Leshinskaya; Thompson-Schill
 (2173) Bruni; Zirnstein; Dussias
 (2174) Sarkis; Montag; Kroll
 (2175) Segal; Stasenko; Gollan
 (2176) Sorman; Ljungberg
 (2177) Higgins
 (2178) Rimzhim; Johri; Kelty-Stephen; Fowler
 (2179) Higby; Kroll; Burke
 (2180) Mech; Montag; Kroll
 (2181) Bice; Kroll
 (2182) Takahesu Tabori; Kroll
 (2183) Martin; Altarriba
 (2184) Beatty-Martínez; Navarro-Torres; Dussias
 (2185) Tsuboi; Melendez Lujan; Guedea; Negron; Francis
 (2186) Ahn; Gollan; Ferreira
 (2187) Rice; Ekves; Tokowicz
 (2188) Brice; Mencl; Frost S; Rueckl; Pugh; Frost R
 (2189) Brown; Bangert; Schwartz

Emotion and Cognition II (2190-2205)

- (2190) Perron; Foglia; Roy-Charland; Pelot
 (2191) Purcell; Stewart
 (2192) Matsuda; Mitsuiishi; Miura; Kusumi
 (2193) Cupo; Mithlo; Sherman

- (2194) Yeh; Lu
 (2195) Hensley; Otani; Knoll
 (2196) Iricinski; Armstrong
 (2197) Roy-Charland; Dénonmée; Perron; Labonté
 (2198) Macias; O'Donnell; Kim; Koshino
 (2199) Clancy; Fenske
 (2200) Takeno; Kitagami; Suzuki
 (2201) De Saedeleer; De Schryver; Pourtois
 (2203) Stepanova; Quesnel; Kitson; Prpa; Riecke
 (2204) Imbault; Warriner; Titone; Kuperman
 (2205) Campbell; Abrams

Reasoning and Problem Solving II (2206-2220)

- (2206) Yu; Goldstone; Landy
 (2207) Derksen; Aßfalg; Coburn; Bernstein
 (2208) Hebert; Goldinger
 (2209) Ditta; Storm
 (2210) George; Wiley
 (2211) Grunewald; Saporta; Beeman
 (2212) Godfroid; Ahn; Rebuschat; Dienes
 (2213) Majima
 (2214) Prichard; Christman
 (2215) Newman; Handley; Thompson
 (2216) Cox; Criss
 (2217) Coder; Fournier; Keng; Rosenbaum; Haflich; Gray; Westmoreland; Petrucci
 (2218) LoGiudice; Norman; Watter
 (2219) McGill; Calamia; Elliott; Hill
 (2220) Valle; Gómez-Ariza; Bajo

FRIDAY NOON, NOVEMBER 10, 2017

12:00 PM-1:30 PM

Lunchtime Workshop: Encouraging Future Scientists: Supporting Undergraduates at Psychonomics (UP), West Meeting Room 111-112
 12:00-1:30 PM Multhaup; Lea; Neuhoff; Reed; White

Lunchtime Workshop: The Digital Psychonomic Society: From Social Media to Clever Apps, West Meeting Room 114
 12:00-1:30 PM Lewandowsky

FRIDAY AFTERNOON, NOVEMBER 10, 2017

1:30 PM-3:30 PM

Spoken Sessions (65-131)

SYMPOSIUM II: Improving Use of Statistical Inference in Science (65-71) West Meeting Room 109-110

- 1:30-1:45 PM van Ravenzwaaij; Ioannidis
 1:45-2:00 PM Lewandowsky; Oberauer
 2:15-2:30 PM Matzke; Curley; Heathcote
 2:30-2:45 PM Rouder; Haaf
 2:45-3:00 PM Etz; Vandekerckhove
 3:00-3:15 PM Vandekerckhove; Baribault; Donkin; Little; Trueblood; Oravecz; van Ravenzwaaij; White
 3:15-3:30 PM Hoekstra; Tendeiro-Monden; van Ravenzwaaij; Wagenmakers

- 2:10-2:25 PM Yeo; Fazio
 2:30-2:45 PM Camp; Rozendal; Surma; Vanhoywegen; Kirschner
 2:50-3:05 PM Wallner; Bäuml
 3:10-3:25 PM Tempel; Frings

Motor Control and Performance (78-82) West Meeting Room 212-214

- 1:30-1:45 PM Canal-Bruland
 1:50-2:05 PM Wright; Marino; Chubb; Mann
 2:10-2:25 PM Herbort; Kunde
 2:30-2:45 PM Janczyk
 2:50-3:05 PM Mordkoff; Xu

Test Effects on Learning and Memory (72-77) West Meeting Room 211

- 1:30-1:45 PM Balota; Maddox; Millar; Churchill
 1:50-2:05 PM Racsmány; Szöllósi; Bencze; Pajkossy

Beliefs and Reasoning (83-87) West Meeting Room 202-204

- 1:30-1:45 PM Bilalic
 1:50-2:05 PM Powell; Horne; Hummel



2:10-2:25 PM Arnold; Prike; Christian
2:30-2:45 PM Singmann; Hartmann; Gronau
2:50-3:05 PM Coenen; Nelson; Gureckis

4:30-4:45 PM Loveday; Woy; Conway
4:50-5:05 PM Butler; Rubin
5:10-5:25 PM Scoboria; Korcsog

Speech Perception (88-94) West Meeting Room 205-207

1:30-1:45 PM Creel; Frye
1:50-2:05 PM Gow; Hanbury
2:10-2:25 PM Borrie; Lansford
2:30-2:45 PM McLennan; Incera
2:50-3:05 PM Samuel; Marin-Garcia
3:10-3:25 PM Sommers; Barcroft; Kida
3:30-3:45 PM Remez; Beltrone; Willmetz

Attention: Features & Objects (109-114) West Meeting Room 118-120

3:30-3:45 PM Matsukura
3:50-4:05 PM Ludowici; Holcombe
4:10-4:25 PM Gronau; Benoni; Izoutcheev
4:30-4:45 PM Chen; Cave
4:50-5:05 PM Chapman; Flynn; Noe; Tian; Pomerantz
5:10-5:25 PM Curby; Moerel

Working Memory: Attentional Processes (95-99) West Meeting Room 118-120

1:30-1:45 PM Logie; Doherty; Jaroslawska; Rhodes; Cowan; Naveh-Benjamin; Belletier; Barrouillet; Camos
1:50-2:05 PM McGill; Elliott
2:10-2:25 PM Souza; Vergauwe; Oberauer
2:30-2:45 PM Vergauwe; Langerock
2:50-3:05 PM Cowan

Semantics (115-120) West Meeting Room 212-214

3:30-3:45 PM Miller; Burgess
3:50-4:05 PM Adelman; Cossu; Estes
4:10-4:25 PM Johns; Jamieson
4:30-4:45 PM De Deyne; Collell; Navarro
4:50-5:05 PM Heyman; Hutchison; Storms
5:10-5:25 PM Baltaretu; Chambers

SYMPOSIUM III: Using Big Data to Discover Principles of Cognition (100-104) West Meeting Room 109-110

3:50-3:55 PM Lupyan
3:55-4:15 PM De Deyne
4:15-4:35 PM Dale
4:35-4:55 PM Greene
4:55-5:15 PM Warlaumont
5:15-5:35 PM Yurovsky
5:35-5:50 PM Goldstone

Reading (121-126) West Meeting Room 202-204

3:30-3:45 PM Schotter
3:50-4:05 PM Juhasz; Sheridan
4:10-4:25 PM Slattery; Parker
4:30-4:45 PM Rueckl; Li; Brown
4:50-5:05 PM Rastle; Taylor; Lally; Davis
5:10-5:25 PM Schroeder; Mousikou

Autobiographical Memory (105-108) West Meeting Room 205-207

4:10-4:25 PM Chiew; LaBar; Adcock

Numerical Cognition (127-131) West Meeting Room 208-209

3:50-4:05 PM Cate; Cooper; Devulapalli; Flynn; Hiles; Quinn
4:10-4:25 PM Tillman; Logan
4:30-4:45 PM Faulkenberry
4:50-5:05 PM Campbell; Chen
5:10-5:25 PM Kellman; Bufford; Mettler

FRIDAY EVENING, NOVEMBER 10, 2017

4:00 PM-7:30 PM

POSTER SESSION III (3001-3233)

WEST BALLROOM BCD

Automatic Processing (3001-3011)

(3001) Zosky; Johnson; Dodd
(3002) Cole; Vacaityte; D'Souza; Kuhn
(3003) Maquestiaux; Ruthruff; Chauvel
(3004) Schulz; Lien; Ruthruff
(3005) Barnhart; Ehlert; Goldinger; Mackey
(3006) Pecchinenda; Monachesi; Schievano
(3007) Fisk
(3008) Sinnett; Gearhart; Wahn
(3009) Fu; Dodd
(3010) Xiong; Proctor
(3011) Tomko; Proctor

(3015) Möller; Mayr; Buchner
(3016) Dey; Kalish; Bugg
(3017) Novick; Hsu; Milligan; Bell-Souder
(3018) Gargya; Brubaker; Maddox; Naveh-Benjamin
(3019) Plass; Choi; Suzuki; Grabowecy
(3020) Faust; Gowan; Neson; Anderson; Multhaup
(3021) Webster; Ro
(3022) Whitehead; Egner
(3023) Cuccolo; Ferraro
(3024) Hoffmann; Pieczykolan; Huestegge
(3025) Colvett; Sams; Blumenthal; Gallitano; Jennings
(3026) Ruiz Pardo
(3027) Smith; Banich; Friedman

Controlled Processing I (3012-3027)

(3012) Stevanovski; Stevenson
(3013) Li
(3014) Scholz; von Helversen

Concepts and Categories I (3028-3040)

(3028) Church; Jackson; Smith
(3029) Bulkes; Christianson; Tanner



- (3030) Wahn; Keshava; Sinnett; Kingstone; König
 (3031) Chin-Parker
 (3032) Choi; Yoon
 (3033) Beaman; Hanczakowski; Jones
 (3034) Neal; Wiemer
 (3035) Solomon; Medaglia; Thompson-Schill
 (3036) Silliman; Kurtz
 (3037) Graham; Was
 (3038) Sanders; Nosofsky
 (3039) Davis; Joergensen; Yee
 (3040) Shum; Tse

Decision Making II (3041-3060)

- (3041) Stothart; Bixler; Brockmole; D'Mello
 (3042) Scherr; Normile
 (3043) Tauber; Navarro; Newell
 (3044) Xing; Zax; Paul; Barth; Patalano
 (3045) Yamagishi; Nishida
 (3046) Meek; Phillips-Meek; McCoy
 (3047) Leistad; Reimers
 (3048) Mason; Brown; Ward; Hurlstone; Farrell
 (3049) Dickerson; Bradford; Fouts; Gaston
 (3050) Gardony
 (3051) Bradford; Brunsdon; Ferguson
 (3052) Kurinec; Weaver
 (3053) Ribeiro; Tangen; McKimmie
 (3054) Vangness; Young
 (3055) Palada; Neal; Strayer; Ballard; Heathcote
 (3056) McColeman; Blair
 (3057) Fuller; Schneider
 (3058) Lee; Holyoak
 (3059) Tardiff; Graves; Thompson-Schill
 (3060) Fastrich; Suzuki; Christakou; Murayama

Event Cognition (3061-3076)

- (3061) Wahlheim; Zacks
 (3062) Bezdek; Schumacher
 (3063) Puig; Özbek; Szpunar
 (3064) Richmond; Zacks
 (3065) Feller; Magliano; Ferretti; Eerland
 (3066) Huff; Lausch; Oberbeck
 (3067) Kersten; Earles; Vernon; McRostie; Riso
 (3068) Sato; Motoyoshi
 (3069) Sargent; Zacks; Hambrick; Lin
 (3070) Niven; Pauley; Logie
 (3071) Stubblefield; Fournier; Grant; Van Dongen
 (3072) Fisher; Carlos; Mobly; Radvansky; Reimer
 (3073) Smith; Hutson; Magliano; Loschky
 (3074) Newberry; Bailey
 (3075) Kopatich; Feller; Kurby; Magliano
 (3076) Heffner; Newman; Idsardi

Numerical Cognition (3077-3089)

- (3077) Chesney; Obrecht; Brunswick; Salim; Guo; Mahida; Shoab
 (3078) Ampofo; Dougherty
 (3079) Kamekona; Ashcraft
 (3080) Ford; McCoy-Bullock
 (3081) Marghetis; Penticuff; Kirsh; Goldstone; Landy
 (3082) Doan; Friedman; Denison

- (3083) Bowman; Faulkenberry
 (3084) Huebner; LeFevre
 (3085) Agostino; Claessens; Balci; Zana
 (3086) Talboy; Schneider
 (3087) Pitt; Casasanto
 (3088) Garcia; Vaid
 (3089) Shevlin

Bilingualism II (3090-3108)

- (3090) Philipp; Koch; Schaeffner
 (3091) Tse; Altarriba
 (3092) Bangert; Barrera; Rodriguez; Tellez; Bencomo
 (3093) López; Mendez; Antolovic; Ramirez
 (3094) López; Kim
 (3095) Friesen; Haigh
 (3096) Rickard Liow; Lee
 (3097) de Bruin; Samuel; Duñabeitia
 (3098) Monahan; Soo
 (3099) Ong; Sewell; McKague; Weekes
 (3100) Wilson; Nadeu; van Hell
 (3101) Zheng; Roelofs; Lemhöfer
 (3102) Exton; Sandberg; van Hell
 (3103) Kim
 (3104) White; Storms; Verheyen; Malt
 (3105) Tomoschuk; Duyck; Ferreira; Hartsuiker; Gollan
 (3106) Ning; Martin
 (3107) Buffington; Morgan-Short
 (3108) Guediche; Baart; Samuel

Language Production (3109-3117)

- (3109) White; Hsi; Watkins; Abrams
 (3110) Alderete
 (3111) Swets; Petrone; Fuchs; Krivokapić
 (3112) Denby; Cibelli; Eapen; Madigan; Goldrick
 (3113) Hotaling; Newell; Jarvstad; Donkin
 (3114) Holbrook; Kawamoto; Liu
 (3115) Shuster; Miozzo
 (3116) Zhai; Fischer-Baum
 (3117) Yoshihara; Nakayama; Rinus; Hino

Speech Perception II (3118-3131)

- (3118) Strori; Bradlow; Souza
 (3119) Palmer; Mattys
 (3120) Williams; Viswanathan
 (3121) Carros; Connine
 (3122) Laubrock; Hohenstein; Richter
 (3123) Greenspon; DeHart; Nelson; Buck
 (3124) Getz; Toscano
 (3125) Siew; Vitevitch
 (3126) Parker; Borrie
 (3127) Benecke; Toscano
 (3128) Dorsi; Ostrand; Rosenblum; Dias
 (3129) Shilowich; Biederman
 (3130) Chee; Dorsi; Rosenblum; Dias
 (3131) Kleinman; Federmeier

Reading (3132-3149)

- (3132) Walenchok; Reichle; Goldinger
 (3133) Ritchey; Olson; Smith; Grimes
 (3134) Jones; Kaschak



- (3135) Gallant; Hendle
- (3136) Martin; Chappé; Sackur
- (3137) Grundy; Pavlenko; Bialystok
- (3138) Eskenazi; Swischuk; Campbell; Kemp; Abraham; Folk
- (3139) Luke; Jensen
- (3140) Higgs; Magliano; Britt
- (3141) Budd; Zielinski
- (3142) Pescuma; Ktori; Cevoli; Franzon; Crepaldi
- (3143) Yu; Zhang; Priest; Sheridan; Reichle
- (3144) Ratiu; Murnion; Fissel; Azuma
- (3145) Parker; Kirkby; Slattery
- (3146) Martín-Arnal; León; Olmos; Igoa; Botella
- (3147) Allen; Likens; Perret; McNamara
- (3148) Stoerkenius; Yan; Bjork R; Bjork E
- (3149) Daley; Rawson

Human Learning and Instruction II (3150-3167)

- (3150) Schneider; Healy; Carlson; Buck-Gengler; Barshi
- (3151) Crutcher; Wright
- (3152) Miyatsu; McDaniel
- (3153) Wokke; Ro
- (3154) McCollum; Kimball
- (3155) Stull; Fiorella; Mayer
- (3156) Clark; Imperial; Blendermann; Little
- (3158) Pan; Tajran; Lovelett; Osuna; Rickard
- (3159) Bernstein; Cooper; Odegard
- (3160) Fries; Ramirez; DeCaro
- (3161) Hausman; Rhodes
- (3162) Xu; Metcalfe
- (3163) Toftness; Carpenter; Tauber; Northern
- (3164) Ghilic; Avarino; Rozycki; Shore
- (3165) Swaffer; Luce; Kole
- (3166) Kiley; Parks
- (3167) Oshio

Recognition Memory (3168-3183)

- (3168) Miyoshi; Ashida; Kawaguchi
- (3169) Reggev; Maril
- (3170) Taylor; Etienne; Francis
- (3171) Macbeth; Chiarello
- (3172) Nolden; Koch
- (3173) McAdoo; Gronlund
- (3174) Kantner; Dobbins
- (3175) Vaughn; Kornell
- (3176) Seo; Kalish
- (3177) Sloane; Curl; White
- (3178) McAdoo; Key; Gronlund
- (3179) Wynn; Hendriks; Daselaar; Schutter
- (3180) Ngo; Lin; Olson; Newcombe
- (3181) Geller; Still; Dark
- (3182) Cha; Dobbins
- (3183) Fallow; Lindsay

Working Memory II (3184-3199)

- (3184) Gokce; Harma
- (3185) Machizawa; Puts; Watanabe; Yamawaki
- (3186) Ralph; Gibson; Gondoli; Szttybel; Pauszek; Miller; Litzow
- (3187) Michael
- (3188) Marsh; Barker; Hughes; Richardson

- (3189) Chalmers; Burt; Freeman
- (3190) Wirth; Kunde; Pfister
- (3191) Zhang; Xie
- (3192) Echon; Turley-Ames; Parker
- (3193) Allan; Ghazal; Feltz; Pope; Garcia-Retamero; Cokely
- (3194) Fan; Yotsumoto
- (3195) Catan; Roodenrys; Miller
- (3196) Lalchandani; Healy
- (3197) Blume; Cowan
- (3198) Hakim; Vogel
- (3199) Mohammed; Flores; Deveau; Hoffing; Phung; Parlett; Sheehan; Lee; Au; Buschkuehl; Zordon; Jaeggi; Seitz

Sensation and Perception (3200-3212)

- (3200) Macuga; Burgess
- (3201) Jertberg; Levitan; Sherman
- (3202) Leboe-McGowan L; Alards-Tomalin; Fortier; Leboe-McGowan J
- (3203) Alards-Tomalin; Leboe-McGowan L; Leboe-McGowan J
- (3204) Oates; Hassan; Al-Hor; Darwiche
- (3205) Wang; Sun; Weidler; Abrams
- (3206) Zamm; Palmer; Bauer; Bleichner; Demos; Debener
- (3207) Wagman; Cialdella; Smith
- (3208) Toi; Ishiguchi
- (3209) Suh; Abrams
- (3210) Scheurich; Zamm; Brown--Notargiacomo; Palmer
- (3211) Pointon; Creem-Regehr; Stefanucci
- (3212) Tokita; Yang; Ishiguchi

Statistics and Methodology (3213-3233)

- (3213) Bishara; Conley; McSween; Li
- (3214) Buchanan; Scofield; Marshall
- (3215) Lin Y; Lin P
- (3216) Henninger; Mertens; Shevchenko; Hilbig
- (3217) Struk; Mugon; Scholer; Danckert
- (3218) Sevcikova Sehyr; Fisher; Emmorey
- (3219) Annis; Evans; Miller; Palmeri
- (3220) Peterson; Griffiths
- (3221) Dale; Vinson
- (3222) Munion; Berg; Butner; Wiebe
- (3223) Heck; Erdfelder
- (3224) Kieslich; Henninger; Wulff; Haslbeck; Schulte-Mecklenbeck
- (3225) Cheng; McCarthy; Wang; Palmeri; Little
- (3226) Haaf; Rouder
- (3227) Liceralde; Gordon
- (3228) Ludowici; Holcombe
- (3229) Kupitz; Buschkuehl; Jaeggi; Vandekerckhove
- (3230) Vuorre; Bolger
- (3231) Rabe; Kliegl; Lindsay
- (3232) Magaldino; Cabe; Steele
- (3233) Paxton; Suchow; Morgan; Griffiths

SATURDAY MORNING, NOVEMBER 11, 2017

8:00 AM-10:00 AM
Spoken Sessions (132-195)

Human Learning and Instruction (132-137) West Meeting Room 211

8:00-8:15 AM Giebl; Bjork E; Bjork R
 8:20-8:35 AM Tullis; Goldstone
 8:40-8:55 AM Was; Graham; Indahl; Woltz
 9:00-9:15 AM Finn; Hebert
 9:20-9:35 AM Pashler; Lovelett
 9:40-9:55 AM Nosofsky; Sanders

Attention Capture (138-143) West Meeting Room 118-120

8:00-8:15 AM Weissman; Drake; Colella; Samuel
 8:20-8:35 AM Golob; Mock
 8:40-8:55 AM Gaspelin; Lien; Ruthruff
 9:00-9:15 AM Habibnezhad; Lawrence; Klein
 9:20-9:35 AM Theeuwes; Wang
 9:40-9:55 AM Anderson; Kim

Decision Making I (144-149) West Meeting Room 202-204

8:00-8:15 AM Le Pelley; Pearson; Mathew; Newell
 8:20-8:35 AM Hawkins; Mittner; Heathcote; Forstmann
 8:40-8:55 AM Kareev; Avrahami; Le Mens
 9:00-9:15 AM Olschewski; Rieskamp; Scheibehenne
 9:20-9:35 AM Mueller-Trede; Sher; McKenzie
 9:40-9:55 AM Wolfe; Reyna; Smith

Statistics and Design (150-154) West Meeting Room 205-207

8:00-8:15 AM Dyre; Hollands
 8:20-8:35 AM Houpt; Fific
 8:40-8:55 AM Aczel; Szasz; Palfi
 9:00-9:15 AM Chechile
 9:20-9:35 AM Schweickert; Zheng

Cognitive Aging (155-159) West Meeting Room 208-209

8:00-8:15 AM Oberauer; Lewandowsky
 8:20-8:35 AM Bruine de Bruin; van Putten; van Emden; Strough
 8:40-8:55 AM Gutchess; Rasmussen
 9:00-9:15 AM Barnhoorn; van Asseldonk; Verwey
 9:20-9:35 AM Basak; Qin; O'Connell

Spatial Cognition (160-164) West Meeting Room 212-214

8:00-8:15 AM McBeath; Khalil
 8:20-8:35 AM Chrastil; Nicora; Shafer
 8:40-8:55 AM Du; Mou
 9:00-9:15 AM Kitson; Nguyen-Vo; Hashemian; Stepanova; Riecke
 9:20-9:35 AM McNamara

SYMPOSIUM IV: When Man Bites Dog: What do Developmental Reversals Tell Us About Cognitive Development, Aging, and the Brain (165-168) West Meeting Room 109-110

10:00-10:05 AM Sloutsky
 10:05-10:25 AM Sloutsky
 10:25-10:45 AM Brainerd; Reyna
 10:45-11:05 AM Hasher
 11:05-11:25 AM Thompson-Schill
 11:25-11:55 AM Newcombe

Metacognition I (169-173) West Meeting Room 211

10:20-10:35 AM Hertzog; Curley; Dunlosky
 10:40-10:55 AM Metcalfe; Bloom; Schwartz
 11:00-11:15 AM Susser; Mulligan; Buchin
 11:20-11:35 AM Cleary; Claxton
 11:40-11:55 AM Paller

Working Memory: Storage (174-178) West Meeting Room 118-120

10:20-10:35 AM Redick; Brewer; Unsworth
 10:40-10:55 AM Abadie; Camos
 11:00-11:15 AM Saito; Nishiyama
 11:20-11:35 AM Barrouillet; Uittenhove; Chaabi; Camos
 11:40-11:55 AM Ward; Grenfell-Essam; Tan

Attention: Visual Search (179-184) West Meeting Room 212-214

10:00-10:15 AM Wolfe; Schill; Alaoui Soce
 10:20-10:35 AM Mitroff; Adamo; Kramer; Sharpe; Kravitz
 10:40-10:55 AM Drew; Vaskevich; Luria
 11:00-11:15 AM Horowitz
 11:20-11:35 AM Tellinghuisen; McGahan; Moes
 11:40-11:55 AM McDonald; Michalik; Smit; Livingstone; Mistlberger

Judgment II (185-190) West Meeting Room 205-207

10:00-10:15 AM Treat; Viken
 10:20-10:35 AM Leise; Mozer; Schloss
 10:40-10:55 AM Evans; Holmes; Trueblood
 11:00-11:15 AM Bhatia
 11:20-11:35 AM Wang; Busemeyer
 11:40-11:55 AM Albrecht; Hoffmann; Rieskamp; Pleskac; von Helversen

Psycholinguistics (191-195) West Meeting Room 208-209

10:20-10:35 AM Westbury; Hollis
 10:40-10:55 AM Prior; Shahar Yames; Eviatar
 11:00-11:15 AM Prasad; Morris; Feinstein
 11:20-11:35 AM Bogaerts; Siegelman; Frost
 11:40-11:55 AM Weissman; Tanner



SATURDAY NOON, NOVEMBER 11, 2017

11:00 AM-1:30 PM

POSTER SESSION IV (4001-4222)

WEST BALLROOM BCD

Attention Capture II (4001-4012)

- (4001) Ghirardelli; Goffi; Goldrich; Engelke; Monthie; Werkheiser
- (4002) Schubö; Feldmann-Wüstefeld
- (4003) Töllner; Rangelov; Sauseng; Müller
- (4004) Smith; Abrams
- (4005) Kennedy; Huang; Mather
- (4006) Kim S; Kim M; Song
- (4007) Hopman; Scott; Castro; Weissinger; Strayer
- (4008) Chang; Cunningham; Egeth
- (4009) Callahan-Flintoft; Wyble
- (4010) Cho S; Cho Y
- (4011) Hoelter; Nickel; Hannula
- (4012) Ivaz; Duñabeitia

Scene Processing and Visual Search (4013-4025)

- (4013) Andre; McCullar
- (4014) Kasai; Makinae; Kitajo
- (4015) Meitz; Huff; Papenmeier; Ort; Fahr
- (4016) Wright; Shi
- (4017) Pereira; Folk
- (4018) Jaeger; Shipley; Lombardi; Davatzes
- (4019) Rey-Mermet; Gade; Souza; von Bastian; Oberauer
- (4020) Mills; Hilchey; Pratt
- (4021) Miyazaki
- (4022) Rosen; Mills; Dalmaijer; van der Stigchel; Dodd
- (4023) Zhang; Houpt
- (4024) O'Donoghue; Castelhana
- (4025) Abagis; Jonides

Reward, Motivation and Decision Making (4026-4046)

- (4026) Gearhart; Kury
- (4027) Balter; Raymond
- (4028) Choi; Park; Cho
- (4029) Cantu; Cho
- (4030) Galotti; Schneekloth; Smith; Bou Mansour; Nixon
- (4031) Struk; Sokolowski; Scholer; Danckert
- (4032) Campbell; Karuzis; Saner
- (4033) Weatherford; Erickson; Thomas; Walker
- (4034) Filipović Đurđević; Feldman
- (4035) Mieth; Bell; Buchner
- (4036) Cornwall; Worthy
- (4037) Carter; Vogelsang; Emerick; Vanderkolk; Busey
- (4038) Krönke; Wolff; Mohr; Kräplin; Smolka; Bühringer; Goschke
- (4039) Byrne; Worthy
- (4040) Wise; Atchley; Salehinejad
- (4041) Zilker; Pachur
- (4042) Hill; Harris; Diana
- (4043) Capodanno; Salamanca; Kleider-Ofutt; Washburn
- (4044) Ballard; Sewell; Neal
- (4045) Schlegelmilch; von Helversen
- (4046) Ranieri; Schneider

Embodied Cognition (4047-4066)

- (4047) McManus; Thomas
- (4048) Green; Harris; Young; Reed
- (4049) Nguyen; Amazeen; Glenberg
- (4050) Lu; Jia
- (4051) Bueno; Seigneuric; Megherbi
- (4052) Heard; Madan; Pexman
- (4053) Oakes; Onyper
- (4054) Houle; Lalone; Bloesch; Davoli
- (4055) Matheson; Familiar; Thompson-Schill
- (4056) Dhaim; Mcgee; Davis; Sheya
- (4057) Nguyen-Vo; Riecke
- (4058) Gann; Shears
- (4059) Clement; Radvansky; Brockmole
- (4060) Teskey; Bub; Masson
- (4061) Carranza; Kaschak
- (4062) Yamauchi; Xiao
- (4063) Makinae; Kasai
- (4064) Sahar; Makovski
- (4065) Dianiska; Meissner
- (4066) Onder; Tosun

Spatial Cognition I (4067-4079)

- (4067) Meyehoff; Papenmeier; Huff
- (4068) Towse
- (4069) Wang; Shu
- (4070) Hegarty; Boone; Gunalp
- (4071) Gardony; Brunyé; Taylor
- (4072) Chang; Yeboah; Doucette; Clifton; Nitsche; Welsh; Mazalek
- (4073) Engelbertson; Sampaio
- (4074) Zhu; Yuen; Risko
- (4075) Ruginski; Creem-Regehr; Liu; House; Thompson
- (4076) Barhorst-Cates; Wright; Creem-Regehr; Stefanucci; Cashdan
- (4077) Nelligan; Shelton
- (4078) Fu; Roskos-Ewoldsen
- (4079) Subramaniapillai; Titone; Pasvanis; Ankudowich; Rajagopal; Rajah

Judgment (4080-4097)

- (4080) Cameron; Fouladirad; Shrestha; Lo; Gerhardt
- (4081) Jaroslawska; Burns; Fitzpatrick; Caruso; McCormack
- (4082) Mulatti; Treccani
- (4083) Davis
- (4084) Michael; Tseng; Golonka; Pandža; Linck
- (4085) Geller; Stigler
- (4086) Laurent; Noiret; Poecker; Claudon
- (4087) Newman; Schwarz
- (4088) Sagi
- (4089) Ito; Yamauchi; Kawahara
- (4090) Zhao; Bhatia; Davis-Stober
- (4091) Caple; Shah
- (4092) Gross; Dobbins

- (4093) Leong; Müller-Trede; McKenzie
- (4094) Konovalova; Le Mens
- (4095) Robbins; Hemmer
- (4096) Arnold; Anderson
- (4097) Slane; Dodson

Semantics (4098-4116)

- (4098) Dudschig; Mackenzie; Strozyk; Leuthold; Kaup
- (4099) Christofalos; Raney
- (4100) Hollis
- (4101) Atit; Carr; Power; Sorby; Veurink; Uttal; Wong
- (4102) Matsuki E; Hino; Matsuki K; McRae
- (4103) Fraser; Duffels; Pexman; Siakaluk
- (4104) Balass
- (4105) Riordan
- (4106) Wear; Gorfein
- (4107) Medeiros; Armstrong
- (4108) Malhi; Buchanan
- (4109) Holloway; Nández, Sr.; McBeath
- (4110) Kumar; Balota; Habbert; Scaltritti; Maddox
- (4111) Park; Sana; Gagne; Spalding
- (4112) Zhou; Christianson
- (4113) Kolesari; Carlson
- (4114) Graves; Thompson-Schill
- (4115) Taikh; Jouravlev; Jared
- (4116) Young; Smith

Associative Learning (4117-4136)

- (4117) Robin; Olsen
- (4118) Handy; Avcu; Ko; Ortiz; Doria; Servatius
- (4119) Lilienthal
- (4120) Gordon; Thomas
- (4121) Liu; Zhang; Chen
- (4122) (WITHDRAWN)
- (4123) Thomaschke; Koch; Ruess; Kiesel
- (4124) Kole; Schneider; Healy; Barshi
- (4125) O'Shea; Madden; Spencer; Doolittle
- (4126) Kapatsinski; Idemaru; Harmon
- (4127) Park; Rogers; Vickery
- (4128) Popov; Reder
- (4129) Pudhiyidath; Schapiro; Preston
- (4130) Leggett; Burt
- (4131) McCurdy; Leach; Leshikar
- (4132) Scully; Packer; Hupbach
- (4133) Huhn III; Goodman; Richardson; Babu; Overman; Dennis
- (4134) Gray; Kelley
- (4135) Lindsey; Logan
- (4136) Martin; Kusev

Eyewitness Identification (4137-4152)

- (4137) Goodsell; Lockamyeir; Carlson; Weatherford
- (4138) Terrell; Nesbitt; Kurinec; Malavanti; Weaver, III
- (4139) Toglia; Rumschik; Todorovic; Berman; Glover
- (4140) Gasper; Roy; Flowe
- (4141) Seale-Carlisle; Banai Tizkar; Donnelly; Toms; Velikova; Morgan; Wetmore; Mickes
- (4142) Bartek; Gordon; Lloyd
- (4143) Keller; Briere; Marche
- (4144) Ensor; Frankin

- (4145) Lin; Roediger
- (4146) Baldassari; Tansey; Lindsay
- (4147) McKinley; Benjamin; Gronlund
- (4148) Hopkins; Pinkston; Lyle
- (4149) Wilson; Wixted
- (4150) Morgan; Tamminen; Mickes
- (4151) Günal; Ganesan; Abdi; Bartlett
- (4152) DeFranco; Zaragoza

Test Effects II (4153-4168)

- (4153) Overoye; Storm
- (4154) Bedwell; Karpicke
- (4155) Hughes; Thomas; Gordon; Bulevich
- (4156) Machluf; Nairne; Bjorklund
- (4157) St. Hilaire; Jennings
- (4158) Arnold; Drew; McDaniel; Marsh
- (4159) Barideaux Jr; Pavlik Jr
- (4160) Thompson; Tangen; Chan; French; Searston
- (4161) Saito; Niikuni; Sugawara; Sato; Horita; Muramoto
- (4162) Hong; Polyn; Fazio
- (4163) Blendermann; Little
- (4164) Shaffer; Gilmore; DeSoto; McDermott
- (4165) Fiechter; Benjamin
- (4166) James; Stone; Storm
- (4167) Siler; Benjamin
- (4168) Robey

Recall II (4169-4180)

- (4169) Wilson; Criss
- (4170) Fogler; Chusid; Giordano; Roberts; Daniel
- (4171) Kroeger; Hueng; Curry; Kelley
- (4172) Krogulska; Niedźwieńska
- (4173) Paton; Henkel
- (4174) Abel; Bäuml
- (4175) Baker; Erlikhman; Lu; Kellman
- (4176) Soares; Storm
- (4177) Uner; Roediger
- (4178) Millar; Balota
- (4179) Stafford
- (4180) Young; Healy; Jones; Curran

Metacognition (4181-4199)

- (4181) Potts; Carlson
- (4182) Jordano; Touron
- (4183) Myers; Godwin; Rowse; Erwin; Reyer; Henson; Price
- (4184) Mielicki; Wiley
- (4185) Thiede; Redford; Wiley; Griffin
- (4186) Bae; Son; Choi; Kim J; Hong; Cho; Kim K
- (4187) Chen; Multhaup; Munger
- (4188) Besken; Solmaz
- (4189) DeYoung; Serra
- (4190) Wierzchoń; Skóra; Hobot; Paulewicz; Timmermans; Siedlecka
- (4191) Sarmiento; Griffin; Wiley
- (4192) Jalbert; Newman; Schwarz
- (4193) Brashier; Drew; Marsh
- (4194) Blake; Castel
- (4195) Knoph; Buchanan; Hellman; Carney
- (4196) Kuhns; Touron
- (4197) Rivers; Dunlosky; Joynes



- (4198) Erwin; Kelley; Matsuyama; Lenahan; Jones; Huber; Price
- (4199) Zepeda; Nokes-Malach

- (4212) Kim; Kang
- (4213) Lilburn; Smith; Sewell
- (4214) Parker; Turley-Ames
- (4215) Bletsogianni; Tsiatsos; Masoura

Working Memory III (4200-4215)

- (4200) Belletier; Doherty; Jaroslawska; Rhodes; Cowan; Naveh-Benjamin; Logie; Barrouillet; Camos
- (4201) Krasich; Faber; Brockmole; Radvansky
- (4202) Röer; Bell; Körner; Buchner
- (4203) Doherty; Belletier; Rhodes; Jaroslawska; Camos; Barrouillet; Cowan; Naveh-Benjamin; Logie
- (4204) Uittenhove; Chaabi; Camos; Barrouillet
- (4205) Barrington; Miller; Roodenrys
- (4206) Josifovski; Miller; Roodenrys
- (4207) Doherty; Loaiza
- (4208) De Schrijver; Barrouillet
- (4209) Tian; Fischer-Baum; Beier
- (4210) Durbin; Huber
- (4211) Bartsch; Oberauer

Concepts and Categories II (4216-4227)

- (4216) Rich; Gureckis
- (4217) Corral; Jones
- (4218) Leffers; Coats; Govan; Kim; Pitt; Coley
- (4219) Asiala; Neal; Wiemer
- (4220) Djalal; Hampton; Storms; Heyman
- (4221) Clapper; Covarrubias-Paniagua; De Kock
- (4222) Borbely; Rago; Varga
- (4223) Searston; Zhen; Tangen; Thompson
- (4224) Yang
- (4225) Barbour
- (4226) Corbin; Crawford; Landy
- (4227) Smith; Helie; Ell

SATURDAY NOON, NOVEMBER 11, 2017

12:00 PM-1:30 PM

Lunchtime Workshop: Practical Open Science for the Busy Researcher, West Meeting Room 111-112
 12:00-1:30 PM Morey; Morey

Lunchtime Workshop: The European Research Council: Funding Excellence, West Meeting Room 114
 12:00-1:30 PM Dissard; Henik; Logie

SATURDAY AFTERNOON, NOVEMBER 11, 2017

1:30 PM-3:30 PM

Spoken Sessions (196-259)

Symposium V: 50 Years of Implicit Learning Research: A Symposium in Honor of Arthur S. Reber (196-199) West Meeting Room 109-110

- 1:30-1:55 PM Cleeremans
- 1:55-2:20 PM Howard, Jr.; Howard
- 2:20-2:45 PM Knowlton
- 2:45-3:10 PM Reber
- 3:10-3:30 PM Reber

- 2:30-2:45 PM Kahan; Slowiaczek; Altschuler
- 2:50-3:05 PM Schneider

Cognition: Emotion and Consciousness (216-220) West Meeting Room 208-209

- 1:30-1:45 PM Dulany
- 1:50-2:05 PM Schober; Spiro
- 2:10-2:25 PM Bąk; Altarriba
- 2:30-2:45 PM Most; Jin; Onie; Zhao; Curby
- 2:50-3:05 PM Colzato

Recall (200-205) West Meeting Room 211

- 1:30-1:45 PM Erdfelder; Kuepper-Tetzl; Quevedo Puetter
- 1:50-2:05 PM Schmitz; Ferreira; Anderson
- 2:10-2:25 PM Brainerd; Reyna; Nakamura
- 2:30-2:45 PM Uitvlugt; Healey
- 2:50-3:05 PM Caplan; Liu
- 3:10-3:25 PM Garcia-Marques; Marques; Lapa; Nunes

Sensation and Perception (221-226) West Meeting Room 202-204

- 1:30-1:45 PM Coutanche
- 1:50-2:05 PM Crawford; Corbin; Landy
- 2:10-2:25 PM Makovski
- 2:30-2:45 PM Peterson; Salvagio
- 2:50-3:05 PM Palmer; Langlois; Peterson; Whiteford; Helwig; Schloss
- 3:10-3:25 PM Ziat; Johannessen; Snell; Raisamo

Decision Making II (206-210) West Meeting Room 212-214

- 1:30-1:45 PM Konstantinidis; Taylor; Newell
- 1:50-2:05 PM Fific
- 2:10-2:25 PM Konstantinidis; van Ravenzwaaij; Newell
- 2:30-2:45 PM Stevens; Duque
- 2:50-3:05 PM Thibodeau; Hendricks; Boroditsky; Flusberg; Matlock

Eyewitness Identification (227-232) West Meeting Room 118-120

- 3:30-3:45 PM Hyman; Wulff; Kemp; Tyler
- 3:50-4:05 PM Miller; Wasserman; Polack; Casado; Brunel; El Haj
- 4:10-4:25 PM Dodson; Dobolyi
- 4:30-4:45 PM Mickes; Clark; Gronlund
- 4:50-5:05 PM Finley; Sungkhasettee; Wixted; Roediger, III
- 5:10-5:25 PM Wixted; Vul; Mickes; Wilson

Attention: Control (211-215) West Meeting Room 118-120

- 1:30-1:45 PM White; Curl
- 1:50-2:05 PM Arrington
- 2:10-2:25 PM Green

Reasoning and Problem Solving (233-238) West Meeting Room 212-214

3:30-3:45 PM Danek; Wiley
 3:50-4:05 PM Smith; Beda
 4:10-4:25 PM Hayes; Banner; Navarro
 4:30-4:45 PM Mueller; Nelson
 4:50-5:05 PM Schneider; Talboy
 5:10-5:25 PM Novick; Fuselier

Working Memory (239-243) West Meeting Room 211

3:50-4:05 PM Reder; Popov
 4:10-4:25 PM Dumitru
 4:30-4:45 PM Pfeuffer; Moutsopoulou; Waszak; Kiesel
 4:50-5:05 PM Ricker; Vergauwe
 5:10-5:25 PM Donkin; Le Pelley; Taylor

Reward and Motivation in Decision Making and Memory (244-248) West Meeting Room 208-209

3:30-3:45 PM West; Budde; Malley
 3:50-4:05 PM Wulff; Mergenthaler-Canseco; Hertwig

4:10-4:25 PM Reyna; Helm; Weldon; Shah; Turpin; Govindgari
 4:30-4:45 PM Bell; Mieth; Buchner
 4:50-5:05 PM Halamish; Madmon

Letter/Word Processing (249-254) West Meeting Room 205-207

3:30-3:45 PM Chetail
 3:50-4:05 PM Drieghe; Hyönä; Li; Yan; Bai; Liversedge
 4:10-4:25 PM Content; Ranzini; Wens; de Tiège; Chetail
 4:30-4:45 PM Forster; Qiao
 4:50-5:05 PM Gomez; Marcet; Vergara-Martínez; Perea
 5:10-5:25 PM Kinoshita; Mills; Norris

Metacognition II (255-259) West Meeting Room 202-204

3:50-4:05 PM Takarangi; Swain
 4:10-4:25 PM Weinstein; Michael
 4:30-4:45 PM Beran; James; Guild; Kelly V; Camden; Love; Whitham; Kelly A; Parrish
 4:50-5:05 PM de Bruin; van de Pol; van Loon; van Gog
 5:10-5:25 PM Magen; Emmanouil

SATURDAY EVENING, NOVEMBER 11, 2017

4:00 PM-7:30 PM

POSTER SESSION V (5001-5222)

WEST BALLROOM BCD

Consciousness (5001-5010)

(5001) Siena; Raykov; Kraus; Morcom
 (5002) Fisk; Haase
 (5003) Mitsuda
 (5004) Welhaf; Smeekens; Meier; Silvia; Kwapil; Kane
 (5005) Chapman; Wispinski
 (5006) Mills; Smith; Christoff
 (5007) Seli; Smilek; Ralph; Schacter
 (5008) Sekiguchi; Negishi
 (5009) Barlas; Kopp
 (5010) Koenig; Ro

(5028) Prince; Antoniou; McCarley
 (5029) Ramey; Yonelinas; Henderson
 (5030) Cronin; Irwin
 (5031) Stilwell; Vecera
 (5032) Guevara Pinto; Papesh
 (5033) Williams; Drew; Jones
 (5034) Madrid; Hout
 (5035) Peltier; Becker
 (5036) Canas-Bajo; Deas; Smith; Nuthmann
 (5037) Datta; Hock

Divided Attention (5011-5020)

(5011) Alexander; Irons
 (5012) Oksama; Leino; Hyönä
 (5013) Huestegge; Pieczykolan; Janczyk
 (5014) Turan; Öner; Gülgöz
 (5015) Klein; Stolz
 (5016) Castro; Strayer; Heathcote
 (5017) Lagroix; Di Lollo; Spalek
 (5018) Dai; Hyman; Taylor; Thomas
 (5019) Rann; Almor
 (5020) Schacherer; Hazeltine

Controlled Processing II (5038-5052)

(5038) Beckage; Stella
 (5039) Botezatu; Kroll
 (5040) Tran; Harris J; Harris I; Livesey
 (5041) Meissner
 (5042) Hood; Hickey; Brancaleone; Banks
 (5043) Liu; Umanath; Hasher
 (5044) Leontyev; Sun; Wolfe; Yamauchi
 (5045) Wilson; Hinson; Whitney
 (5046) Bejjani; Egnér
 (5047) Miller; Fournier
 (5048) Fintor; Poljac; Stephan; Koch
 (5049) Riechelmann; Böckler; Raettig; Huestegge
 (5050) Foerster; Wirth; Herbort; Kunde; Pfister
 (5051) Stepan; Fenn; Altmann
 (5052) Draheim; Engle

Visual Search (5021-5037)

(5021) Ulicheva; Aronoff; Rastle
 (5022) Reimer; Schubert
 (5023) Ruan; Austen
 (5024) Livesey; McAlpin; Tran
 (5025) Solman; Kingstone
 (5026) Reppa; McDougall
 (5027) Junker; Park; Shin; Cho

Reasoning and Judgment (5053-5070)

(5053) Capozzi; Ristic
 (5054) Tanabe
 (5055) (WITHDRAWN)



- (5056) Craig; Jarosz
- (5057) Koop; Johnson; Denlinger
- (5058) Kiyokawa
- (5059) Lazareva; Dikkers; Balboa; Kalender; Soni; Claydon; Nordman
- (5060) Steele; Sablan; Mitchell; Novachek; Retarides; Stowe; Kunkel
- (5061) Neiworth; Chen
- (5062) Rich; Chang
- (5063) Salomon-Amend
- (5064) Hagmann; Loewenstein
- (5065) LaCour; Serra
- (5066) Cooke; Kusev; Van Schaik
- (5067) Xu; Penta; Dowd; Coley
- (5068) Zak; Kareev; Avrahami
- (5069) Mannering; Vogelsang; Busey
- (5070) Ybarra; Ramasubramanian; Allan; Cokely

Cognitive Processes (5071-5089)

- (5071) Kaszowska; Burte; Hutton; Taylor
- (5072) Ruginski; Barhorst-Cates; Cashdan; Creem-Regehr; Stefanucci
- (5073) Vaid; Garcia; Faghihi Renani
- (5074) Hattori; Watanabe; Suzuki
- (5075) Martín-Luengo; Shtyrov; Myachykov
- (5076) Koch; Hobert
- (5077) Plude
- (5078) Kim; Park
- (5079) Pagorek; Patel; Fenn
- (5080) Taylor; Abshire
- (5081) Langston; Fehrman; D'Archangel; Anderson; Hubbard
- (5082) Williams; Sarno; Lewis; Patel; Shoss; Neider; Bohil
- (5083) Bucknoff; Metcalfe
- (5084) Eisenberg; Zacks; Rodebaugh
- (5085) Plater; Infante; Al-Aidroos
- (5086) Siegelman; Bogaerts; Frost
- (5087) Jang; Byeun; Cao; Feinberg; Fruchter; Plotnikov; Wang; Son
- (5088) Heisick; Acklin; Guevara Pinto; Papesh
- (5089) Orscheschek; Rickard; Schubert; Strobach

Bilingualism III (5090-5099)

- (5090) Desroches; Friesen; Teles; Korade
- (5091) Matsuki; Hino; Jared
- (5092) Morini; Newman
- (5093) Wang; Zevin; Trueswell; Mintz
- (5095) Hill; Dietrich; Zwahr; Mireles; Salgado
- (5096) Penalver; Sapien Soto; Gurrola; Bejarano Chacon; Martinez; Francis
- (5097) Ida; Nakayama; Lupker
- (5098) Sullivan; Grundy; Bialystok
- (5099) Schleicher; Schwartz

Psycholinguistics II (5100-5113)

- (5100) Grossi; Olmstead; Chabria; Chason; Paskoff
- (5101) Maxwell; Kostic; Buchanan
- (5102) Grey; Fernandez; van Hell
- (5103) Willits; Huebner
- (5104) VanArsdall
- (5105) Satel; Eng; Lim; Janssen

- (5106) Christianson; Kim; Deshaies
- (5107) Kapnoula; Samuel
- (5108) Harvey; Adelman
- (5109) Ljung; MacCutcheon; Pausch; Fels
- (5110) Shantz; Tanner
- (5111) Kemp; McDonald
- (5112) Smith; Almor
- (5113) Dempsey; Brehm

Letter/Word Processing I (5114-5126)

- (5114) Lindell; Savopoulos
- (5115) Veldre; Andrews
- (5116) Hino; Lupker; Kusunose
- (5117) Colombo; Sulpizio
- (5118) Yang; Chen; Lupker
- (5119) Yap; Lim; Tse
- (5120) Kacinik; Norberg; Choudhary; Scotto
- (5121) Job; Sulpizio
- (5122) Massol; Vergara-Martinez; Marcet; Perea
- (5123) Carlos; Hirshorn; Durisko; Fiez; Coutanche
- (5124) Kuperman; Sneffella
- (5125) White D; Weatherhead; Besner; White K
- (5126) Carter; Luke

False Memory II (5127-5138)

- (5127) Gilet; Colombel; Evrard
- (5128) Calvillo; Flores; Lara; Hawkins
- (5129) Burke; Shehadeh; Lee; Anastasi
- (5130) Ithisuphalap; Rindal; Zaragoza
- (5131) Williamson; Lam; Bodner
- (5132) Umanath; Huff; Ries; Clubb
- (5133) Jang; Kuper
- (5134) Long; Belli; Gordon
- (5135) Doss; Weafer; Gallo; de Wit
- (5136) Sheaffer; Pansky
- (5137) Xu; Yu; McBride; Coane
- (5138) Wilson; Westerman

Human Learning and Instruction III (5139-5157)

- (5139) Yue; Bjork; McDaniel
- (5140) Ryan; Costa; Cruz
- (5141) Donovan; Scott; Rapp
- (5142) Potts; Shanks
- (5143) McCartha; Horn; Stubbs
- (5144) Geller; Carpenter; Coffman; Manz; Rahman; Armstrong; Lamm
- (5145) Rudiger; Hinze
- (5146) Harada; Endoh
- (5147) Hays; Smith
- (5148) Maddox; Myers; Porter; White
- (5149) Davis; Chan
- (5150) Eglington; Kang
- (5151) Zarny; Wissman; Rawson
- (5152) Sparck; Kiper; Bjork E; Bjork R
- (5153) Wang; Raley; Lee; Butler
- (5154) O'Day; Karpicke
- (5155) Chen; HolcDorf; McCusker; Gaillard; Howe
- (5156) Schubert; McCloskey
- (5157) Pan; Rickard

Prospective Memory (5158-5171)

- (5158) Reese-Melancon; Smith; Multhaup; Davoli
- (5159) VonderHaar; McBride; Rosenbaum
- (5160) Ball; Bugg
- (5161) Spitler; Hicks; Papesh
- (5162) Penningroth; Scott
- (5163) Kubik; Del Missier; Mäntylä
- (5164) Munoz Gomez Andrade; McCrea; Sensibaugh
- (5165) Workman; McBride
- (5166) Frankenstein; McCurdy; Sklenar; Leshikar
- (5167) Csik; O’Rear; Rose
- (5168) Kytola; Reese-Melancon; Hancock
- (5169) Anderson; McDaniel
- (5170) Christopher; Redick
- (5171) Martin; Verhaeghen

Recall and Recognition (5172-5187)

- (5172) Herweg; Johri; Sperling; Brandt; Schulze-Bonhage; Kahana
- (5173) Kliegl; Bäuml
- (5174) Pecher; Canits; Zeelenberg
- (5175) Yu; Liu
- (5176) Klapatch; Clark-Foos; Lopez; Weissenfels
- (5177) Briere; Marsh; Marche
- (5178) Kilic; Aytac
- (5179) Ostrand; Ferreira
- (5180) Ma; Starns
- (5181) Pyc; Fenger; Cheung; de Belle; Tully
- (5182) Ensor; Bancroft; Surprenant; Hockley
- (5183) Nakamura; Brainerd
- (5184) Jeye; Slotnick
- (5185) Malejka; Ciecior; Möller; Bröder
- (5186) Limcangco; Kato; Caplan
- (5187) Lee; Koji; Fernandes

Audition (5188-5195)

- (5188) Scheerer; Jones

- (5189) Mathôt; Ivanov
- (5190) Soto-Faraco; Castro; Moris-Fernández; Ruzzoli
- (5191) Keller; Cook
- (5192) Gillen; Agus; Fosker
- (5193) Kimura; Yotsumoto
- (5194) McMullin; Bharvani; Gregg
- (5195) Kobrina; Screven; Dent

Vision (5196-5210)

- (5196) Forsyth; Cinque; Bukach
- (5197) Tong; Dubé
- (5198) Dopkins; Hoyer
- (5199) New; Jones; Reppa
- (5200) Peissig; Drain; Bukach
- (5201) Mathis; Kahan; Altschuler
- (5202) Ueda; Gao; Yakushijin; Ishiguchi
- (5203) Yokosawa; Kita; Asano
- (5204) Corbin; Crawford
- (5205) Sager; Kreykenbohm; Spalek
- (5206) Yang; Tokita; Ishiguchi
- (5207) Chen; Wu
- (5208) Liu; Zhang; Townsend; Wenger
- (5209) Bruett; Coutanche
- (5210) Hollands; Dyre

Spatial Cognition II (5211-5222)

- (5211) Lei; Mou; Zhang
- (5212) Hoyer; Dopkins
- (5213) Jabbari; Mohrenschildt; Shedden
- (5214) Cherep; Kelly; Costabile
- (5216) Minear; Sensibaugh; Cowen
- (5217) Wang
- (5218) Liu; Huang; zeng
- (5219) Holmes; Newcombe; Shipley
- (5220) Hund; Cody
- (5221) Bilge; Telli; Talasli
- (5222) Meade M; Meade J; Fernandes; Sauzéon

SATURDAY EVENING, NOVEMBER 11, 2017

5:10 PM-6:00 PM

Business Meeting West Meeting Room 114

5:10-6:00 PM

SUNDAY MORNING, NOVEMBER 12, 2017

8:00 AM-10:00 AM

Spoken Sessions (260-323)

Attention (260-265) West Meeting Room 118-120

- 8:00-8:15 AM Enns; Kealong; Tichon; Visser
- 8:20-8:35 AM Nieuwenstein; Kromm
- 8:40-8:55 AM Wyble; Chen
- 9:00-9:15 AM Cave; Chen
- 9:20-9:35 AM Serva; Yildirim; Intraub
- 9:40-9:55 AM Foulsham; Barry

Bilingualism II (266-271) West Meeting Room 208-209

- 8:00-8:15 AM Service; Shekari
- 8:20-8:35 AM von Bastian; Simoni; Kane; Carruth; Miyake
- 8:40-8:55 AM Francis; Arteaga; Soltero; Etienne

- 9:00-9:15 AM Griffin; Bedore; Peña; Hixon
- 9:20-9:35 AM Viviani; Crepaldi
- 9:40-9:55 AM Brennan; Hwang; Kim; He

Enhancing STEM Learning Using Spatial Thinking (272-277) West Meeting Room 211

- 8:00-8:15 AM Burte; Taylor; Hutton
- 9:00-9:15 AM Stull; Hegarty
- 9:20-9:35 AM Novack; Congdon; Wakefield; Franconeri; Goldin-Meadow
- 9:40-9:55 AM Kraemer; Cetron; Connolly; Haxby; May; Diamond



Learning and Memory (278-283) West Meeting Room 212-214

8:00-8:15 AM Howe; Akhtar; Bland; Hellenthal
 8:20-8:35 AM Lyle; Leppanen; Depue
 8:40-8:55 AM Starns; Dube; Frelinger
 9:00-9:15 AM Delaney; de Leon Guerrero; Jones
 9:20-9:35 AM Simon; Gomez; Nadel
 9:40-9:55 AM Kan; Drummey; O’Gorman; Cushing

Sensation and Perception (284-288) West Meeting Room 205-207

8:00-8:15 AM Blumenthal; Peterson
 8:20-8:35 AM Dye; Terhune-Cotter; Kimbley; Hauser
 8:40-8:55 AM Medina; Katz
 9:00-9:15 AM Reeves; Dresp-Langley
 9:20-9:35 AM Schloss; Lessard; Walmsley; Foley

Statistics and Methodology (289-293) West Meeting Room 202-204

8:00-8:15 AM Estes; Adelman
 8:20-8:35 AM Kravitz; Mitroff
 8:40-8:55 AM Cipresso; Riva
 9:00-9:15 AM Morey
 9:20-9:35 AM Chen; Campbell

Cognitive Control (294-298) West Meeting Room 118-120

10:20-10:35 AM Helie; Fansher
 10:40-10:55 AM Kikomoto; Mayr
 11:00-11:15 AM Pfister; Wirth; Foerster; Schwarz; Kunde
 11:20-11:35 AM Li; Gollan
 11:40-11:55 AM Hommel; Lippelt; Gurbuz; Pfister

Decision Making (299-303) West Meeting Room 211

10:20-10:35 AM Budescu; Fan; Mandel; Himmelstein
 10:40-10:55 AM Lewandowsky; Oberauer
 11:00-11:15 AM Trueblood; Holmes; Eichbaum
 11:20-11:35 AM Del Missier; Salomonsson; Visentini; Mäntylä
 11:40-11:55 AM Johnson; Pleskac; Cesario

Cognition (304-309) West Meeting Room 205-207

10:00-10:15 AM Neuhoff
 10:20-10:35 AM Casasanto; Singh; Wang
 10:40-10:55 AM Fostick; Bekhor; Hillel-Ben-Lulu; Neuhoff; Halpern
 11:00-11:15 AM Osaka M; Yaoi; Minamoto; Azuma; Osaka N
 11:20-11:35 AM Koshino; Osaka M; Shimokawa; Minamoto; Kaneda; Yaoi; Azuma; Higo; Osaka N
 11:40-11:55 AM Hubbard; Ruppel

Language Comprehension and Production (310-314) West Meeting Room 208-209

10:20-10:35 AM Saint-Aubin; Klein; Geraghty
 10:40-10:55 AM Finley
 11:00-11:15 AM Toscano; Folk
 11:20-11:35 AM Breen; Fitzroy
 11:40-11:55 AM James; Silver; Small

Human Learning and Instruction III (315-319) West Meeting Room 202-204

10:00-10:15 AM Cokely; Ghazal; Allan; Petrova; Feltz; Garcia-Retamero
 10:20-10:35 AM Weatherford; Blake; Carlson; Freasier
 10:40-10:55 AM Moore; Lampinen
 11:00-11:15 AM Carlisle
 11:20-11:35 AM Forrin; Ralph; Li; Smilek; MacLeod

Event Cognition (320-323) West Meeting Room 212-214

10:20-10:35 AM Roskos; Mendoza; Crawford; Ewoldsen
 10:40-10:55 AM McRae; Elman
 11:00-11:15 AM Brown; Shi
 11:20-11:35 AM Panoz-Brown; Crystal



Automatic Processing

West Meeting Room 118-120, Friday Morning, 8:00-9:40

Chaired by Sarah Shomstein, *George Washington University*

8:00-8:15 AM (1)

Intrusive Effects of Task-Irrelevant Information on Visual Selective Attention. SARAH SHOMSTEIN, ANDREW J. COLLEGIO and JOSEPH NAH, *George Washington University* — The study of attentional selection is often framed in terms of task relevance or salience. In this talk, I will challenge this dichotomy and discuss evidence demonstrating that attentional selection is constrained by non-salient task-irrelevant high-level representations such as knowledge of real-world object-size as well as semantic properties of objects. Evidence from multiple behavioral and fMRI experiments will demonstrate that influence from task-irrelevant aspects of the scene employs the same neural mechanisms as those described in goal-directed attentional control. Taken together, I will argue that traditional accounts of attentional selection need to be revised to incorporate intrusive effects of task-irrelevant sensory stimuli. I will conclude by outlining challenges that studies of attention will have to face in light of recent findings.

Email: Sarah Shomstein, shom@gwu.edu

8:20-8:35 AM (2)

Division and integration in Joint Task Performance. MOTONORI YAMAGUCHI, *Edge Hill University* — A successful completion of a joint task requires both the division of labor between co-actors and the integration of divided task parts into individuals' task representations. Studies of joint performance have emphasized *co-representation* of a shared task, in which divided parts are integrated into a mental representation. However, little has been said about the division of labor. Recent studies on joint Simon task, Stroop task, and task-switching, in my lab demonstrated the division of labor and provided little evidence supporting the notion of co-representation. To reconcile between the division and integration of a joint task, a hierarchical response-selection model is proposed, according to which higher level selection requires an integration to determine who to perform a trial, whereas lower level selection is characterized by the division of labor in which each co-actor focuses only on their own part. Results of joint task studies are discussed to support the hierarchical view.

Email: Motonori Yamaguchi, yamagucm@edgehill.ac.uk

8:40-8:55 AM (3)

Automatic Control: How Experts Act Without Thinking. GORDON D. LOGAN, *Vanderbilt University* — Experts act without thinking because their skill is hierarchical. A single conscious thought automatically produces a series of actions without top-down monitoring. I present a theory of automatic control in skilled typing, where thinking of a word automatically produces a series of keystrokes. The theory assumes that keystrokes are selected by context retrieval and updating. Context is generated by the typist's own actions, representing the goal (type DOGS) and the keys struck so far. Top-down control initiates typing by setting the goal but

does not sequence keystrokes. The theory explains hierarchical control phenomena in skilled typing, including differential loads on higher and lower level processes, the importance of words, and poor explicit knowledge of key locations and finger mappings. The theory is fit to error corpora from 24 skilled typists, predicting error probabilities, magnitudes, and patterns. The theory extends to other sequential skills, like speaking, playing music, and serial recall.

Email: Gordon D. Logan, gordon.logan@vanderbilt.edu

9:00-9:15 AM (4)

Searching for the Social Attention Bias. JELENA RISTIC, *McGill University*, ELINA BIRMINGHAM, *Simon Fraser University*, EFFIE J. PEREIRA, *McGill University* — It is commonly accepted that attention is spontaneously biased towards faces and eyes. However, the influences of stimulus features and task settings in this effect have not yet been investigated. Here we test if faces and facial features bias attention spontaneously when stimulus factors, task properties, response conditions, and eye movements are controlled. Across three experiments, participants were shown face, house, and control images (scrambled faces and houses) in an upright or inverted orientation. The task was to discriminate a target that appeared with equal probability at the previous location of the face (eyes or mouth), the house (top or bottom) or the control image. The data consistently indicated no spontaneous biasing of attention towards face cues. Our final experiment, which additionally measured eye movements, suggested an infrequent but reliable oculomotor bias towards the eye region of upright faces. These results suggest that the spontaneous social attentional bias is more fragile than originally thought.

Email: Jelena Ristic, jelena.ristic@mcgill.ca

9:20-9:35 AM (5)

Implicit Retrieval: A Benefit to Memory. JENNIFER C. WEEKS and LYNN HASHER, *University of Toronto* (Presented by Lynn Hasher) — Are memories retrieved automatically by associated cues? We addressed this question in a series of studies with older adult participants because of evidence that their reduced cognitive control enables broader encoding of information, including non-target items that co-occur with target items, for example irrelevant words seen in a 1-back task in which only pictures were relevant. Participants did a 1-back task on pictures and after a delay were tested on a free recall list made up of words from the 1-back task. Between the 1-back task and the recall task, pictures, some of which had occurred in the initial task, were presented for living/nonliving judgments. If the pictures trigger retrieval of their irrelevant words, those words should have an advantage in recall compared to recall of totally new words, and they did. Pictures can spontaneously cue their associates and increase their accessibility to memory.

Email: Lynn Hasher, hasher@psych.utoronto.ca

**Cognitive Processes in Non-Human Animals**

West Meeting Room 208-209, Friday Morning, 8:00-9:40

Chaired by Travis Smith, Georgia State University

8:00-8:15 AM (6)

Training Arbitrary Symmetry Relations in Rhesus Monkeys (*Macaca Mulatta*). TRAVIS RAY SMITH and MICHAEL J. BERAN, *Georgia State University* — Nonhuman animals rarely demonstrate that they have learned symmetry relations between arbitrary stimuli (e.g., training stimulus A1 to stimulus B1 does not automatically result in animals knowing that B1 goes with A1). However, new training techniques have begun to reveal symmetrical relations in pigeons (Urcuioli, 2008) and capuchin monkeys (Picanco & Barros, 2015). In the present study, four rhesus macaques (*Macaca mulatta*) demonstrated above chance symmetrical learning using a multiple-exemplar training routine in a Go/NoGo procedure. Training phases involved establishing the forward relationship (A1->B1), testing for the symmetry relationship (B1->A1), explicit training of the B1->A1 relationship, and finally retesting to assess whether the formerly learned A1->B1 relationship was still intact. Test data showed that monkeys acquired the symmetrical relationship after a fairly small number of exemplars, and these data confirm that nonhuman animals can develop these relations after they are explicitly taught that A1-B1 entails B1-A1.

Email: Travis Smith, smith.travis.r@gmail.com

8:20-8:35 AM (7)

Honeybees Learn to Discriminate Same and Different Pairs of Colors in A Trial-Unique Oddity Problem. NICOLE M. MUSZYNSKI and PATRICIA A. COUVILLON, *University of Hawaii at Manoa* (Presented by Patricia Couvillon) — Studies of associative learning in honeybees have produced a body of evidence that suggests the principles of invertebrate and vertebrate learning are similar. Recent results of relational learning studies with bees also suggest similarity despite the view that such phenomena require explanations beyond basic associative principles and are the purview of vertebrates, particularly mammals. In this experiment, free-flying honeybees were trained in an oddity problem to choose among three pairs of colors presented simultaneously. The colors in each pair could be the same or different. On each trial, choice of the pair with the odd relationship was rewarded: *same, same, different* on half the trials, and *different, different, same* on the others. With the sets of color pairs unique on each trial, discrimination required recognition of the relationships within and among pairs. The bees learned to choose the odd relationship. The results are considered in relation to those for vertebrates.

Email: Patricia A. Couvillon, pat@pbrc.hawaii.edu

8:40-8:55 AM (8)

Cue - Cue Associations as an Explanation for Potentiation of Corner Shape by Wall Color in Kite Boxes. MARK R. COLE, *Huron University College at Western* — Potentiation, not overshadowing, of corner shape by wall color sometimes occurs in which rats search for food or safety in one of the two distinctive 90° corners of a kite box which is also surrounded by uniquely-colored walls. A hypothesis that has been advanced

to explain this is the formation of corner-shape and wall-color associations during training. If testing without reward then occurs in a kite box in which all the walls are the color of the rewarded corner cue during training, the previously-rewarded wall color evokes the corner shape previously associated with it, and rats head for that corner. Thus, colour is demonstrated to potentiate learning about corner shape. However, if testing without reward occurs in a kite box in which the wall color associated with the location of reward during training is not present at all, evocation of the formerly-rewarded corner shape cannot occur, and overshadowing of geometry by wall color is the result. The present research was designed to test this hypothesis and two experiments using kite boxes and square boxes yielded data that supported this cue-cue association explanation for the potentiation effect often seen in research using kite boxes.

Email: Mark R. Cole, mcole@uwo.ca

9:00-9:15 AM (9)

A Comparative Investigation Into the Relationship Between Yawn Duration and Brain Size. ANDREW C. GALLUP, *SUNY Polytechnic Institute* — Yawning functions to promote state change and arousal through enhanced intracranial circulation and brain cooling. Since the neurophysiologic effects from yawns are likely tied to the magnitude of the action, animals with larger and more complex brains should have longer yawns. Consistent with this view, previous research has shown yawn duration to be a robust predictor of brain size and cortical neuron number across a diverse sample of mammalian taxa. The current report examines whether this relationship exists across other vertebrate classes (birds) and within different taxonomic ranks of mammals, including family (Felidae) and species (*Canis lupus*). Openly accessible videos from the Internet were reviewed to obtain average yawn durations, and these figures were then correlated with previously published brain parameters from each species. In all cases, yawn duration was strongly correlated with measures of brain size. When combined, these results demonstrate the robust and reproducible nature of this relationship.

Email: Andrew C. Gallup, a.c.gallup@gmail.com

9:20-9:35 AM (10)

Evolution of Mechanisms Underlying Visual Working Memory Manipulation: When “Bird-Brain” is a Compliment. IRENE M. PEPPERBERG and HRAG PAILIAN, *Harvard University* — To explore evolutionary bases for visual working memory storage and manipulation, we compared humans' performance on a task akin to the “Shell-Game” with that of a Grey parrot, Griffin. 2-4 colored items were presented briefly and subsequently occluded. On static trials, items remained stationary (*storage*). On dynamic trials, pairs of occluders swapped positions up to four times (*manipulation of color-location bindings*). Participants reported the color that was expected under a cued occluder. Performance on static trials was consistent with 3-4 item storage limits. Interestingly, performance on 2-item dynamic trials was near ceiling for all subjects, but diverged thereafter. Griffin remained near ceiling on 3-item trials, whereas humans' performance decreased systematically. Griffin continued to outperform humans on



4-items (1-2 swaps), but did worse when manipulation demands increased (3-4 swaps). These results suggest that abstract mental manipulations are not uniquely human computations. Whether common versus separate mechanisms are involved across species remains to-be-determined.

Email: Irene M. Pepperberg, impepper@media.mit.edu

Judgment I

West Meeting Room 211, Friday Morning, 8:00-10:00

Chaired by Denis Cousineau, Université d'Ottawa

8:00-8:15 AM (11)

A Single Process Model to Predict RT and Accuracy of the Same-Different Task. BRADLEY HARDING, MARC-ANDRÉ GOULET and DENIS COUSINEAU, *Université d'Ottawa* (Presented by Denis Cousineau) — The same-different task is a classic paradigm which requires participants to judge whether two successively presented stimuli are the “same” or “different” (Bamber, 1969). While this straightforward task has been extensively replicated (Sternberg, 1998), its response time (RT) and accuracy patterns for both “same” and “different” decisions as a function of stimulus complexity and the number of mismatching features remain un-modelled using a single process (Proctor, 1981, Ratcliff & Hacker, 1981). Obstacles include: 1) the *fast-same phenomenon*, where participants are much faster at responding “same” than “different”; 2) that the RT of physically mismatching “same” stimuli remain faster than those of the slowest “different” condition; 3) the presence of numerous *false-different* errors (Krueger, 1978). In this presentation, we introduce a new, parsimonious, single-process model of same-different judgments that predicts both RTs and accuracies for numerous task variants. It is based on coactive accumulation of evidence, priming, and capacity hindrances. Email: Denis Cousineau, denis.cousineau@uottawa.ca

8:20-8:35 AM (12)

Reversing the Similarity Effect: The Influence of Presentation Format. ANDREA CATALDO and ANDREW L. COHEN, *University of Massachusetts, Amherst* (Presented by Andrew Cohen) — When a similar, competitive alternative is added to a choice set, the new alternative tends to take a disproportionate choice proportion from similar alternatives. This *similarity effect* has been used as a key benchmark for models of multi-alternative, multi-attribute choice. Recent work, however, suggests that this effect depends on factors such as the order in which information is gathered. The current experiment kept information constant across conditions, but encouraged different comparisons by changing presentation format. Each choice set consisted of three alternatives with two separable attributes, displayed as a bar length. In the by-alternative condition, the bars were grouped by alternative. The standard similarity effect was replicated. In the experimental by-attribute condition, the bars were grouped by attribute. The similarity effect reversed, i.e., the relative choice proportion of the similar alternative increased. These results have implications for models of choice and highlight the need to consider variations in stimulus presentation.

Email: Andrew L. Cohen, alc@umass.edu

8:40-8:55 AM (13)

Modeling Developmental Differences in Instance-Based Inference. CHRISTIN SCHULZE (Member Select-Speaker Award Recipient), THORSTEN PACHUR and RALPH HERTWIG, *Max Planck Institute for Human Development* — To make inferences about the frequency of events in the world (e.g., the prevalence of diseases or the popularity of consumer products), people often exploit their memory of instances sampled from their personal social network. How does inference about event frequencies based on instance knowledge develop ontogenetically? In an experiment, we asked children and adults to judge the relative frequencies of first names in Germany and recall instances of the names in their social networks. We tested various computational models for describing participants' frequency judgments (implemented with Bayesian hierarchical modeling) and compared them using a latent-mixture approach. Children and adults differed in the strategies they used: The judgments of most adults were best described by a strategy that assumes limited and sequentially ordered search (social-circle model); the judgments of more children were best described by a strategy that assumes exhaustive search (availability-by-recall). These results highlight that already children use instance knowledge to infer event frequencies and suggest that the ability to conduct ordered search is a central aspect in the development of instance-based inference.

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9:00-9:15 AM (14)

How the Mind Exploits Risk-Reward Structures to Tame Uncertainty. CHRISTINA LEUKER, TIMOTHY J. PLESKAC, THORSTEN PACHUR and RALPH HERTWIG, *Max Planck Institute for Human Development* (Presented by Timothy Pleskac) — An adaptive view of decision making presumes that choices can reflect and exploit statistical regularities in the world. We investigated the degree to which the robust ecological relationship between risks and rewards is used in this way to make decisions under uncertainty. We hypothesized that people capitalize on the risk-reward relationship to infer the missing probability information from the magnitudes of the payoffs. Across three studies, we exposed participants to monetary gambles from environments with either a positive, negative, or uncorrelated, risk-reward relationship. Participants were not made aware of the different structures. Yet, they reliably learned the rules underlying the different structures, a notable case of incidental learning. In a subsequent choice task, there was clear indication that participants used this rule to make decisions among uncertain prospects: people who had been exposed to a negative risk-reward relationship were risk seeking for low payoffs and risk averse for high payoffs. This pattern reversed for positive structures and disappeared for uncorrelated structures. This adaptive change in preferences is traced to the use of the risk-reward heuristic.

Email: Tim Pleskac, tim.pleskac@gmail.com

9:20-9:35 AM (15)

Cognitive Consistency and Gist Processing in the Risky-Choice Framing Bias. JONATHAN C. CORBIN, *Univ of Richmond*, JAY RUSSO and VALERIE REYNA, *Cornell Univ.* (Presented by Jay Russo) — Risky-choice framing bias is the



shifting of preferences when identical alternatives are presented as gains and as losses. We test for (a) the role of cognitive consistency to reduce risky-choice framing and (b) fuzzy-trace theory's prediction that verbatim processes should decrease framing while gist processing should increase it. In a study, all participants made the same five risky choices, first in either the gain or loss frame and then again in the other frame. A memory task enabled the assessment of both gist and verbatim processing. First, an experimental manipulation that increased activation of the consistency goal led to reduced framing and, critically, a shift in risk-preference toward consistency with the initially presented frame (more risk-aversion overall when gains were presented first and more risk-seeking when losses were seen first). Second, more verbatim processing was associated with smaller framing bias, while greater gist numeracy was associated with more bias.

Email: Jay Russo, jer9@cornell.edu

9:40-9:55 AM (16)

Silence is Golden, Seeing is Better: An Exploration of an Anchoring Effect of Minimum Payment Information. KUNINORI NAKAMURA, *Seijo University* — Stewart (2009) found evidence for the anchoring effect of minimum payment information that decisions about repayments are “anchored” (Tversky & Kahneman, 1974) upon minimum payment information and that people would repay less than they otherwise would and incur greater interest charges. Based on Stewart’s (2009) study, the current study examined whether (1) anchoring effect of minimum payment information would differ between “affect rich” and “affect poor” situations (e.g., Rottenstreich & Hsee, 2001), and (2) anchoring effect of minimum payment information would occur even when the anchor information did not actually limit the payment value. Participants were required to indicate the payment value for donation to save stray dogs under conditions where the affect rich/poor situations were manipulated by presentation of pictures of the dogs (Experiment 1) and those where the anchor values were manipulated (“from one yen” or “as much as you can”; Experiment 2). Results indicated that the manipulations in both Experiments 1 and 2 significantly affected participants’ payment values.

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Discourse Processes

West Meeting Room 205-207, Friday Morning, 8:00-10:20

Chaired by Julie E Boland, University of Michigan

8:00-8:15 AM (17)

Working Memory and Conversational Fluency. JULIE E. BOLAND, RENNIE PASQUINELLI, MEHER SABRI, ASHLEY SMITH, KELLY KENDRO and JOCELYN BRICKMAN, *University of Michigan* — Turn transition times in conversation average around 200ms, suggesting that listeners multi-task— simultaneously comprehending the speaker, planning a response, and predicting break-points— to execute their response as quickly as they do. This implies a heavy working memory load, and indeed, prior research found some trade-offs between simultaneous mouse-tracking and

conversation (Boiteau et al., 2014, *JEP:Gen*). In our study, 26 college students conversed with a female confederate in three blocks: no secondary load, minimal secondary load (visuo-spatial 1-back task, mean accuracy .94) and moderate secondary load (2-back, mean accuracy .84). Within blocks, transition time for the participant was not correlated with N-back accuracy ($r^2 < .01$). Transition times were longer with 2-back (232ms) than with 1-back (145ms), but longest (451ms) and most variable in the first, no-load block. The 1-back and 2-back blocks did not differ in transition time variability, speech rate, or words per turn. The minimal impact of secondary load must be considered within current theories of both conversational fluency (Levinson & Torreira, 2015; Garrod & Pickering, 2015) and working memory (e.g., Engle, 2002; Martin & Slevc, 2014). Email: Julie E Boland, jeboland@umich.edu

8:20-8:35 AM (18)

Constraints on Appealing to Conceptual Pacts in Conversations. DELPHINE DAHAN, *University of Pennsylvania* — When making reference to a specific entity, a speaker must decide how to talk about it. As shown by part research, the choice is in part influenced by the way the speaker and their addressee have talked about it before and the conceptual ‘pact’ they have formed. However, people do not always appeal to conceptual pacts. This study examined when and why, in a referential communication task involving a set of hard-to-describe figure. When referring to a figure for the second time, people tended to produce a description used before first, resorting to novel descriptions only if the first proved unsuccessful. Furthermore, a description produced the first time a figure was discussed was more likely to be used again if both participants had used it than if only one of them had. Appealing to conceptual pacts, far from automatic, may reflect people’s confidence in the effectiveness of the pact.

Email: Delphine Dahan, dahan@psych.upenn.edu

8:40-8:55 AM (19)

Efficacy and Efficiency in Task-Oriented Conversational Interaction. JENNIFER S. PARDO, ADELYA URMACHE, HANNAH GASH, JACLYN WIENER, NICHOLAS MASON, SHERILYN WILMAN, KEAGAN FRANCIS and ALEXA DECKER, *Montclair State University* — This study examines conversational efficacy and efficiency using a new role-neutral map-matching task, the Montclair Map Task, which involves paired iconic maps with labeled landmarks. In contrast with map tasks used in previous research, the current version focusses conversation on the landmarks and evokes natural, more balanced conversational interaction while ensuring that a set of pre-determined phrases will be repeated between talkers. A total of 96 native English speakers completed the task in 16 same-sex female, 16 same-sex male, and 16 mixed-sex pairings. Conversations averaged 32 minutes in duration, yielding approximately 217,000 words. One advantage of this task-oriented corpus is the ability to derive independent objective measures of task performance for both members of a conversational pair that can be related to aspects of communicative style. Analyses of communication style and task performance reveal that male talkers were more verbose than females overall, and male pairs of talkers were less efficient in



task completion than female and mixed-sex pairs. To facilitate future research, recordings and transcriptions of the Montclair Map Task Corpus will be shared via the Linguistic Data Consortium.

Email: Jennifer Pardo, pardo@mac.com

9:00-9:15 AM (20)

Social and Configural Cues Influence the Cognitive Dynamics of Perspective-Taking. ALEXIA GALATI, *University of Cyprus, University of California, Merced*, NICHOLAS D. DURAN, *Arizona State University*, RICK DALE, *University of California, Merced* — We examined how the convergence of a configural cue (the orientation of a configuration) with social cues (the egocentric and other-centric perspectives) influences the dynamics of perspective selection. Listeners received instructions (e.g., “Give me the folder on the left”) from a simulated partner, whose depicted position around a table varied. They selected objects from triangular configurations that were aligned with their own perspective (ego-aligned), their partner’s perspective (other-aligned), or neither perspective. Listeners who adopted the partner’s perspective (other-centric responders) were influenced more by the configural cue than egocentric responders, making faster mouse trajectories with fewer directional shifts on other-aligned (vs. ego-aligned) configurations and more deviated trajectories on neither-aligned configurations. Although other-centric responding incurs a cognitive cost—indicated by overall slower and more complex trajectories than egocentric responding—it enhances sensitivity to configural cues that potentially facilitate perspective-taking. Such configural cues can be ignored when responding egocentrically, along with social cues.

Email: Alexia Galati, galati@ucy.ac.cy

9:20-9:35 AM (21)

Compensating for an Inattentive Audience. NICOLE CRAYCRAFT and SARAH BROWN-SCHMIDT, *Vanderbilt University* (Presented by Sarah Brown-Schmidt) — Are assumptions about what is common ground with a partner modulated by whether that partner was paying attention in the situation? Participant speakers learned names for monster pictures with two partners. The critical manipulation was the (in)attentiveness of one partner. The inattentive behavior occurred during an irrelevant task in Exp1, but in Exp2, inattentiveness occurred as the partners learned the monster names. In E3, we manipulated whether the inattentive behavior occurred during an irrelevant task or during the name-learning task itself. Analysis of referential form during a subsequent referential communication task revealed that speakers assumed their partner shared common ground for the monster names only when that partner exhibited engaged attention as the names were learned. Consistent with a prominent view of the way common ground is formed in conversation, we find that common ground is assumed when it can be inferred that one’s partner jointly attended to that information.

Email: Sarah Brown-Schmidt, sarahbrownschmidt@gmail.com

9:40-9:55 AM (22)

Wrapping Up Sentence Comprehension: The Role of Task Demands and Individual Differences. SALLY ANDREWS, AARON VELDRE, *University of Sydney* — Successful discourse comprehension requires integration of information within and between clauses and sentences. This study uses wrap-up effects on eye movements to investigate whether and how integrative processes are modulated by the comprehension demands of the reading task and individual differences in reading proficiency. Skilled adult readers, assessed on independent measures of reading, spelling and vocabulary ability read 2-3 sentence passages that manipulated whether a syntactic boundary was *unmarked* by punctuation cues, *weakly marked* by a comma, or *strongly marked* by an end of sentence period. Comprehension demands were manipulated by comparing counterbalanced blocks of trials in which moderately demanding comprehension questions were presented after either 25% or 100% of sentences. Previous research manipulating comprehension demands suggests that readers should engage in more incremental wrap-up processing at unmarked and weakly marked boundaries under high comprehension demands. This research will provide novel insights into how these processes vary with reading proficiency.

Email: Sally Andrews, sally.andrews@sydney.edu.au

10:00-10:15 AM (23)

Validation of Strongly Presupposed Text Concepts. MURRAY SINGER and JACKIE SPEAR, *University of Manitoba* — Readers continually validate text accuracy and coherence. Despite certain evidence of impaired validation of presupposed ideas, Singer, Solar, and Spear (*Memory & Cognition*, 2017) documented effective validation both of focused and presupposed text ideas. This study inspected the validation of especially strongly presupposed text ideas: in cleft constructions (It was a windowsill that Jerry fixed with the WRENCH, his uncle determined) and implicit questions. Four experiments manipulated the focus (focused, presupposed) of critical concepts in narrative target sentences and the match between those concepts and a text antecedent (wrench/hammer). In clefts (Experiments 1, 2), Mismatch target reading time exceeded Match time regardless of focus, diagnosing validation (like Singer et al.). In implicit questions (Exps. 3 and 4), however, Mismatch reading item exceeded Match reading time for neither focused nor presupposed concepts. This suggests that factive verbs (e.g., determined) but not nonfactive verbs (ask) promote the validation of their complements, but we are exploring competing explanations.

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Recognition Memory

West Meeting Room 212-214, Friday Morning, 8:00-10:00

Chaired by Ian G. Dobbins, *Washington University in St. Louis*

8:00-8:15 AM (24)

The Language of Recognition Decisions. IAN G. DOBBINS, *Washington University in Saint Louis*, JUSTIN KANTNER, *California State University at Northridge* — Dual-process recognition models assume that recollection and familiarity



processes differ in explicit content. However, subjects typically do not freely report the bases of recognition decisions. Here, we collected natural language response justifications following hits and false alarms, and trained a machine learner (ML - lasso regression) to classify these outcomes based on language content. Using a leave-one -subject-out procedure, the ML successfully classified 57% of observers' outcomes. The top three features of hit justifications were 'clearly', 'when', and 'remember' versus 'maybe', 'similar', and 'guessed' for false alarm justifications. When this trained classifier was applied to independent Remember versus Know, and High versus Medium confidence hit justification data, it achieved remarkable success (82% and 83% classification rates). Thus, even though overt judgments for hits and false alarms are identical ('old'), the ML detects supporting language marking the greater prevalence of recollection for hits.

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8:20-8:35 AM (25)

Proactive Regulation of Memory Retrieval. SHAYNE LOFT, *University of Western Australia*, MICHAEL S. HUMPHREYS, *The University of Queensland* (Presented by Michael S. Humphreys) — In two experiments subjects performed a probe recognition task on short word lists before being given a delayed recognition test on both study words and probes. In Experiment 1 the delayed recognition of non-matched (new) probes was better following four- and eight-word lists than following a one-word list showing that the memory retrieval process differed between one-word and multi-word lists. In Experiment 2, the delayed recognition of list words following a non-matching probe was better for the early words than for the late words, whereas probe recognition for the last word in four- and eight-word lists was better than for the only word in a one word list. We argue that this pattern indicates that subjects were able to anticipate the end of the longer lists and prepare to retrieve. Other evidence for the proactive regulation of memory retrieval and the relevance of these results to prospective memory is discussed.

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8:40-8:55 AM (26)

Differential Short-Term interference in Item vs. Source Memory: Resistance of Source Memory, Even in Older Adults. BEATRICE G. KUHLMANN, ARNDT BRÖDER and THERESA PFEIFFER, *University of Mannheim* — Dissociations such as greater age-related differences in source memory (e.g., for a word's screen position) compared to item (e.g., word) memory support the distinction of these two memory types. However, few studies have compared forgetting mechanisms between these systems. A neuropsychological account predicts unique resistance to short-term interference for hippocampally-represented source memories. In two experiments, we compared short-term interference effects on item versus source memory in younger (18-30 years) and older (60-85 years) adults using words as items and screen positions (top vs. bottom) as sources. Experiment 1 employed a continuous source-monitoring task, assessing memory after short, high-interference retention intervals (8, 16, or 32 intervening trials, length: 40-160 seconds). Experiment 2 tested

memory immediately or one hour after study. As predicted, source memory was generally resistant to interference (i.e., remained constant across retention intervals). This held for older adults, despite replication of the large immediate source-memory deficit in this age group.

Email: Beatrice G. Kuhlmann, kuhlmann@psychologie.uni-mannheim.de

9:00-9:15 AM (27)

Forgetting Visual Representations in Long-Term Memory. ASHLEIGH M. MAXCEY, *Ohio State University* — Recent research from my laboratory has demonstrated that practice recognizing everyday objects (e.g., a purple vase) induces the forgetting of non-practiced objects from the same category that were learned at the same time (e.g., blue and red vases). I will describe the original *recognition-induced forgetting* framework and our subsequent use of this paradigm to understand how this access-related forgetting operates in young children and older adults. I will describe our experiments with brain stimulation that dissociated this forgetting effect from the forgetting of words. I will discuss how this paradigm is simple enough to use with many applied stimuli, such as memory for temporally grouped objects and faces. I will conclude by discussing the applied consequences of these findings for real-world situations such as eyewitness testimony.

Email: Ashleigh M. Maxcey, ammaxcey@gmail.com

9:20-9:35 AM (28)

Brain Activity Tracks A Unitary Recognition Memory Signal. CHRISTOPH T. WEIDEMANN, *Swansea University*, MICHAEL J. KAHANA, *University of Pennsylvania* — A repeated encounter with a person or object frequently elicits feelings of familiarity and recollections of previous interactions. The question of whether these constitute independent signals for recognition has been an issue of contention for decades. Using statistical classifiers trained on spectral EEG features, we quantified neural evidence for recognition decisions as a function of time. These classifiers corresponded closely with overt responses and, at each time point, appeared to track accumulated evidence with negligible contributions from earlier features. These results indicate an ongoing, continuously accruing, memory strength signal that incorporates any recollective information and forms the basis for recognition memory decisions.

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9:40-9:55 AM (29)

The Effect of Delay on Activation in the Parietal Memory Network. KATHLEEN MCDERMOTT and NATHAN L. ANDERSON, *Washington University in St. Louis*, ADRIAN W. GILMORE, *National Institute of Mental Health* — Recent work has identified a Parietal Memory Network (PMN), which exhibits regular patterns during memory encoding and retrieval. Specifically, the network displays a reliable "encoding/retrieval flip," deactivating in response to novel items but activating for familiar items. To date, most relevant studies have used short retention intervals. Here, we ask if the retrieval-related activation response would remain consistent



over a delay. Twenty-four participants underwent fMRI while encoding and recognizing scenes. Activations within PMN regions were observed for familiar items after a short delay (~10 min), replicating prior reports. However, after a long retention interval (~48 hours), the network deactivated in response to familiar stimuli in a manner similar to that observed for the same items during their initial encoding. These findings suggest an as-yet unappreciated temporal effect on PMN activity, highlighting the need to improve our inchoate understanding of this memory-related brain network.

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Embodied Cognition

West Meeting Room 202-204, Friday Morning, 8:00-9:40

Chaired by Jessica K. Witt, Colorado State University

8:00-8:15 AM (30)

A Role for Control in an Action-Specific Effect on Perception. JESSICA K. WITT, *Colorado State University* — Spatial perception is influenced by the perceiver's ability to act. For example, balls that are easier to block appear slower than balls that are more difficult to block. Spatial perception is not disembodied but instead captures the relationship between the environment and the perceiver. The mechanism connecting action to perception is unspecified. According to an integration account, information from various sources are weighted, and the strength of these weights dictates the strength of that source of information on the resulting percept. Varying the strength of the weights should impact the size of a particular effect. To reduce the effect of action on perception, control over the action was taken away from participants. As predicted, losing control reduced the impact of action on spatial perception. This is the first reported instance of a partial action-specific effect, and is consistent with an integration-based mechanism.

Email: Jessica K. Witt, jessica.witt@colostate.edu

8:20-8:35 AM (31)

Alignment Effects For Pictured Objects: Do Instructions to "Imagine Picking Up An Object" Prime Actions? RENE ZEELLENBERG, EMILY THOMAS and DIANE PECHER, *Erasmus University Rotterdam* — Research suggests that responses to pictures of manipulable objects are facilitated when the location of the response is aligned with the side of the object handle. Alignment effects are, however, not ubiquitously found. Yu, Abrams, and Zacks (2014) found an alignment effect when participants were instructed to imagine picking up the pictured objects while making upright-inverted judgments. Six other experiments, that did not use such instructions, found no positive alignment effect. One possible explanation is that motor-imagery instructions draw attention to the graspable parts of an object which results in the activation of actions associated with the object. This account predicts that alignment effects are restricted to responses with the right and left hand. Another explanation is that motor-imagery instructions result in the formation of abstract spatial codes for left vs. right. This spatial coding account predicts that alignment effects are present for other types of responses that involve a left-right dimension. Consistent with the latter account, we found that

alignment effects were found even when participants responded with the index and middle finger of the same hand or with their left and right feet.

Email: Rene Zeelenberg, memorylab.eu@gmail.com

8:40-8:55 AM (32)

Actual and Imagined Action Inhibition. MARTINA RIEGER and STEPHAN F. DAHM, *UMIT, Hall in Tirol* — Inhibiting an ongoing action represents an interesting situation for motor imagery: People are asked to mentally inhibit an action that has already been inhibited from execution due to its imagined nature. We used the stop signal task to investigate action inhibition in motor imagery. Participants performed a visual discrimination task (go task). Occasionally a stop signal occurred (a tone, stop task), which indicated that participants should try to stop the response. The task was performed in three conditions a) actual go and actual stop task, b) actual go and imagined stop task, and c) imagined go and imagined stop task. After each stop signal trial participants were asked, whether they were successful in (actually or mentally) inhibiting the response. We calculated the inhibition functions of each condition based on the probability of responding at different stop signal delays. Similar inhibition functions were observed in all three conditions, indicating that the action inhibition is similar in imagination and execution. However, parts of the inhibition functions were less steep when inhibition was imagined, indicating that imagined inhibition is less precise than actual inhibition.

Email: Martina Rieger, martina.rieger@umit.at

9:00-9:15 AM (33)

Gesturing Helps Dynamic Thinking. BARBARA TVERSKY, *Stanford University/Columbia University*, MELISSA BRADLEY-ZRADA and YANG LIU, *Columbia Teachers College* — Previous research has shown that congruent gestures help others think and spontaneous gestures help us think. Here we show that spontaneous gestures for self are especially helpful for dynamic thinking.

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SYMPOSIUM I: Dual Process Theory 2.0

West Meeting Room 109-110, Friday Morning, 10:00-12:00

Chaired by Wim De Neys, CNRS & Paris Descartes University, France,

10:00-10:20 AM (35)

A Three-Stage Dual-Process Model of Analytic Engagement. GORDON PENNYCOOK, *Yale University, USA*, JONATHAN FUGELSANG and DEREK J. KOEHLER, *University of Waterloo, Canada* — Dual-process theories formalize a salient feature of human cognition: Although we have the capacity to rapidly generate answers to questions, we sometimes engage in deliberate reasoning processes before responding. We have, in other words, two minds that might influence what we decide to do. Although this distinction is widely accepted (with some notable exceptions), it poses serious (and largely unappreciated) challenges for our understanding of cognitive architecture. What features of our cognitive architecture trigger the engagement of analytic thought? To what extent is analytic



thinking discretionary? Do we truly have the capacity to decide when to think? If so, what underlying processes trigger the decision to think? The goal of this talk will be to highlight the areas of ambiguity in dual-process theories with the objective of outlining some potential theoretical and empirical groundwork for future dual-process models.

Email: Gordon Pennycook, gpennyco@uwaterloo.ca

10:30-10:50 AM (36)

Empirical Evidence for a Parallel Processing Model of Belief Bias. DRIES TRIPPAS, *Max Planck Institute for Human Development, Germany*, SIMON HANDLEY, *Macquarie University, Australia* — Belief bias is the tendency for people to respond the basis of their prior beliefs in a task where they are instructed to respond on the basis of logical structure. The default-interventionist account of belief bias explains this finding as follows: a quick intuition-based (Type 1) process provides a response based upon the conclusion's believability before a slower deliberation-based (Type 2) process has the chance to kick in and provide a response based on logical analysis. In this talk we review a series of recent empirical findings which suggest that this account of belief bias needs revision. First, some people have a degree of implicit sensitivity to logical validity, suggesting that deliberation is not always necessary for logical responding. Second, some people draw upon effortful processing to integrate their prior beliefs in order to achieve higher reasoning accuracy, suggesting that intuition is not always sufficient for belief-based responding. Third, consistent with these findings, logic-based processing can interfere more with belief-based processing than the converse. We conclude by presenting results consistent with predictions drawn from an alternative parallel processing account of belief bias.

Email: Dries Trippas, dries.trippas@gmail.com

11:00-11:20 AM (37)

The Smart System 1. WIM DE NEYS, *CNRS & Paris Descartes University, France* — Daily life experiences and scientific research on human thinking indicate that people's intuitions can often lead them astray. Traditional dual process models have presented an influential account of these biases. In my talk I will review evidence for two controversial claims: 1) biased intuitive reasoners show sensitivity to their bias, and 2) correct deliberate responses are typically generated intuitively. I will discuss how these findings force us to fundamentally re-conceptualize our view of intuitive and deliberate thinking.

Email: Wim De Neys, wim.de-neys@parisdescartes.fr

11:30-11:50 AM (38)

Logical Intuitions and Other Conundra for Dual Process Theories. VALERIE THOMPSON, *University of Saskatchewan, Canada* — Dual-Process Theories (DPT), posit that reasoning reflects the joint contribution of two qualitatively different sets of processes: Type 1 processes are autonomous, and therefore usually faster and Type 2 processes require working-memory, and are therefore usually slower. The DPT explanation for many reasoning phenomena rests on this asymmetry: Type 1 processes produce a default answer that may not be overturned

by Type 2 processes. Two corollaries to the speed-asymmetry assumption are that processing is sequential (Type 1 precedes Type 2) and that the basis of the IQ-reasoning relationship is due to Type 2 processes (i.e., that high IQ reasoners have the capacity to inhibit the default response and reformulate the problem). In this talk, I will outline some of the evidence that challenges these core assumptions, discuss their implications for DPT moving forward, and highlight some of the outstanding questions that remain for DPT.

Email: Valerie Thompson, valerie.thompson@usask.ca

Bilingualism I

West Meeting Room 211, Friday Morning, 10:20-12:00

Chaired by Kenneth Paap, *San Francisco State University*

10:20-10:35 AM (39)

More Than 100 Studies and 150 Tests of the Hypothesis That the Differences Between Congruent and Incongruent Trials are Smaller For Bilinguals Compared to Monolinguals.

KENNETH PAAP, REGINA ANDERS, ROMAN MIKULINSKY, LAUREN MASON and KATERINNE ALVARADO, *San Francisco State University* — Five databases were searched for documents satisfying this Boolean expression: bilingual AND ((Stroop OR Simon OR flanker OR ANT) OR (congruent AND incongruent)). Our intent was to find all studies that compared bilinguals to monolinguals on an RT difference score between the congruent and incongruent trials of a nonverbal interference task. The full text of the 586 studies was then examined and a study was eliminated if it did not report new empirical results, if only verbal tasks were used (e.g., a standard Stroop color-word task), if RTs were not reported and analyzed, or if there was no monolingual comparison group. Both meta-analyses on the effect size of all the studies and p-curve analyses of the studies showing bilingual advantages with $p < .05$ were conducted. Moderating effects such as sample size, age of participants, type of bilingual experience, fluid intelligence, education, SES, and culture were explored.

Email: Kenneth Paap, kenp@sfsu.edu

10:40-10:55 AM (40)

Cross-Language Negative Priming Remains Intact, While Positive Priming Disappears: Evidence for two Sources of Selective Inhibition.

IVY K. NKRUMAH and EWALD NEUMANN, *University of Canterbury* (Presented by Ewald Neumann) — Within and between-language primed lexical decision tasks were employed with Twi (a native language of Ghana, Africa)-English bilinguals to explore the priming effects produced by attended and ignored words. In the within-language (Twi-Twi) experiment, facilitated lexical decisions to probe target words resulted when the word matched the preceding target word, whereas delayed lexical decisions to probe target words occurred when the word matched the preceding ignored non-target word. In the between-language (Twi-English) experiment, however, the ignored repetition negative priming effect replicated across languages, but attended repetition positive priming effect did not. These between-language findings undermine episodic retrieval models of selective attention that discount inhibitory processes in negative priming



paradigms. Instead, they substantiate inhibition-based accounts by showing that there are two sources of inhibition operating in the between-language task; one at the level of the local prime distractor word, and the other at the global language level of the priming words.

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11:00-11:15 AM (41)

Studying Texts in a Second Language: How is the Information Encoded? MARC BRYLSBAERT and HELEEN VANDER BEKEN, *Ghent University* — Little is known about the extent to which information encoding and retrieval differ between materials studied in first and second language (L1 and L2). In our studies we compared memory for short, expository texts in L1 and L2, tested with recall and recognition tests. Our results show that students performed at the same level in both languages on recognition tests and short recall tests but not on a free, essay-type recall test, with much lower performance in L2 than in L1. These data will be discussed related to the questions how information is encoded and retrieved in text learning. The L2 free-recall cost also suggests that students' performance may be underestimated if they are exclusively tested with essay-type exams in L2.

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11:20-11:35 AM (42)

Can We Simulate Language Immersion? Second Language Listening Practice in Virtual Reality. EWA GOLONKA, MEDHA TARE, SUNHEE KIM and JARED LINCK, *University of Maryland* (Presented by Jared Linck) — Virtual Reality (VR) technology can enhance learning of information, such as visual patterns. For second language (L2) comprehension, VR has the potential to mimic aspects of immersion (e.g., authentic speech, contextual cues)—a context that enhances L2 learning—and increase the learner's sense of *presence* (i.e., subjective experience of being in a place). In the current study, we test the hypothesis that L2 listening practice within a VR context increases presence, leading to corresponding learning gains. Native English speakers with advanced L2 Russian proficiency completed measures of L2 proficiency, L2 vocabulary knowledge, and language history prior to watching a video of a Russian conversation at an embassy cocktail party in either 2D on a computer screen or 360-degree video viewed in an Oculus VR headset. Posttests included L2 vocabulary, listening comprehension, oral production, and a presence questionnaire. We discuss implications for cognitive mechanisms that support learning in virtual environments.

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11:40-11:55 AM (43)

The Fate of the Native Language In Second Language Learning. JUDITH F. KROLL, *University of California, Riverside*, ANNE BEATTY-MARTINEZ and KINSEY BICE, *Pennsylvania State University*, ANDREA TAKAHESU TABORI, *University of California, Riverside*, HAOYUN ZHANG, *Pennsylvania State University*, EMILY MECH and OLUYEMISI ESHUGBOHUNGBE, *University of California, Riverside*, MICHELLE BRUNI and PAOLA E. DUSSIAS, *Pennsylvania*

State University — An enduring question about late second language (L2) learning is why there are apparent constraints on the ability of adults to successfully master the L2. Past research suggests that these constraints reflect characteristics of learners and also the language learning contexts available to them. We propose a new hypothesis that shifts the focus to consider how a model of proficient adult bilingualism may provide new insights into late L2 learning. The critical observation is that proficient bilinguals are not monolingual-like in their native language. The new hypothesis is that successful adult L2 learners are individuals who are able to effectively learn to regulate the native language to accommodate the L2 and to negotiate the cross-language competition that characterizes proficient bilingualism. We present preliminary data from a study of native English speakers in the early stages of learning Spanish and compare their performance in English to proficient bilingual and monolingual speakers of English.

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Associative Learning

West Meeting Room 118-120, Friday Morning, 10:00-12:00

Chaired by Colin M MacLeod, University of Waterloo

10:00-10:15 AM (44)

On the Relation Between Contingency Learning and Attention. COLIN M. MACLEOD and NOAH D. FORRIN, *University of Waterloo* — Humans are highly adept at learning associations between stimuli or between dimensions of stimuli, often doing so quite implicitly (without the intention to learn). Consider a very simple task: You respond on each trial by identifying which color is shown, unaware that the irrelevant word or shape carrying that color information is either usually (high contingency) or not usually (low contingency) presented in that color. High contingency instances are responded to faster than low contingency instances, a pattern that develops remarkably quickly and that does not require awareness of the contingencies. We will present evidence concerning the relation between attention and the learning of these contingencies.

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10:20-10:35 AM (45)

Learning to Choose: Associative Learning and Preference Formation in Risky Choice. PETKO KUSEV, *Huddersfield Business School, Department of Management*, PAUL VAN SCHAIK, *Teesside University*, BRADLEY LOVE, *University College London* — Theories of decision-making preferences and utility formation (e.g., normative, descriptive and experience-based) share common assumptions and predictions. Despite all their differences, normative (utilitarian), psychological descriptive and experience-based decision theories predict that human agents have stable and coherent preferences, informed by consistent use of psychological strategy/processing (computational or non-computational sampling) that guide their choices between alternatives varying in risk and reward. Rather than having fixed preferences/strategies (utilitarian or non-utilitarian) for risky choice, we argue that decision preferences are constructed dynamically based on strategy selection as a reinforcement-learning model. Accordingly, we



found that associative learning (supervised learning tasks) predicts strategy selection (probability-bet and dollar-bet strategies) and govern decision makers' risky preferences. Email: Petko Kusev, p.kusev@kingston.ac.uk

10:40-10:55 AM (46)

Learning Where to Move Your Eyes is Easier Than Learning Which Direction to Move Your Eyes When Shapes Predict Responses. TIMOTHY J. VICKERY, XIAXIN ZHONG and VALERIE M. BECK, *University of Delaware* — Demonstrations of stimulus-response learning often confound basic aspects of action with more abstract properties, such as orientation towards a spatial goal. Using eye tracking, we asked whether shape-action learning is equally effective whether simple or abstract action contingencies were learned. Participants made a series of speeded eye movements to shapes that sequentially appeared at four corners of a square region. 'Retinotopically predictive' shapes predicted simple motor actions (e.g., 100% of subsequent eye movements were to the left for one shape, regardless of where the shape appeared). 'Spatiotopically predictive' shapes predicted the next shape's absolute position (e.g., 100% of subsequent eye movements were made to the upper-left position following another of the shapes, regardless of that shape's location). Subjects learned contingencies over time, showing speeded eye movements following predictive compared to location-matched non-predictive shapes. However, such learning was only observed for spatiotopically predictive shapes. Our results imply that shape-action learning is possible only when shapes cue goal locations, implying that such learning preferentially occurs for abstractions compared with simple actions.

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11:00-11:15 AM (47)

A Memory Perspective on Evaluative Conditioning. CHRISTOPH STAHL, *University of Cologne* — Evaluative conditioning (EC) has long been considered a distinct form of classical conditioning, mainly because it is claimed to obtain in the absence of contingency awareness, and because it supposedly dissociates from expectancies (e.g., is resistant to extinction). A cognitive perspective on EC distinguishes between effects occurring at the encoding, maintenance, and retrieval stages, and it takes into account the specific properties of the different dependent measures (e.g., evaluative ratings versus expectancy ratings). This perspective suggests a re-interpretation of previous and newer findings: For instance, recent reviews suggest that evidence for awareness-independent EC is weak or inconsistent, suggesting that the assumption of unconscious encoding is not supported. In addition, the finding that EC dissociates from expectancy ratings has been attributed to the performance- or retrieval stage (i.e., to properties of the dependent measures) instead of the encoding stage. In sum, many (if not all) EC phenomena are readily accounted for if viewed as reflecting evaluative judgments based on what people retrieve from (episodic) memory.

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11:20-11:35 AM (48)

Effects of Reminding on Proactive and Retroactive Interference. COLLEEN M. KELLEY and JANE KOMSKY, *Florida State University*, LARRY L. JACOBY, *Washington University in St. Louis* — Retroactive and proactive interference are major causes of forgetting that share some mechanisms. However, dissociative effects of variables suggest distinct mechanisms: A long delay between encoding and retrieval often eliminates retroactive interference but leaves proactive interference intact. We test whether the differential effect of delay on retroactive and proactive interference stems from consequences of being reminded of earlier material while studying subsequent similar material. Being reminded of an earlier similar event strengthens the competitor in cases of proactive interference, and strengthens the target in cases of retroactive interference. We manipulate and assess the likelihood of being reminded and trace the consequences for proactive versus retroactive interference across delays.

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11:40-11:55 AM (49)

Refining the Law of Practice. NATHAN EVANS, *Vanderbilt University*, SCOTT D. BROWN, *Newcastle University*, DOUGLAS J.K. MEWHORT, *Queen's University*, ANDREW HEATHCOTE, *University of Tasmania* (Presented by Andrew Heathcote) — The "Law of Practice" — a simple nonlinear function describing the relationship between mean response time (RT) and practice — has provided a practically and theoretically useful way of quantifying the speed up that characterizes skill acquisition. Early work favored a power law, but this was shown to be an artifact of biases caused by averaging over participants who are individually better described by an exponential law. However, both power and exponential functions make the strong assumption that the speedup always proceeds at a steadily decreasing rate, even though there are sometimes clear exceptions. We propose a new law that can both accommodate transitions in the rate of learning, with either power or exponential forms as limiting cases, and which can account for not only mean RT but also the effect of practice on the entire distribution of RT. We evaluated this proposal with data from a broad array of tasks using hierarchical Bayesian modeling, which pools data across participants without averaging artifacts, and using inference procedures that take into account differences in flexibility among laws. In a clear majority of paradigms our results supported the presence of transitions and the limiting exponential case.

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Working Memory Structure

West Meeting Room 212-214, Friday Morning, 10:20-12:00

Chaired by Randi Martin, Rice University

10:20-10:35 AM (50)

Domain-Specific Working Memory Systems: Evidence From Neuropsychology. RANDI C. MARTIN, *Rice University*, JENNIFER SHEA, *Johns Hopkins University*, GIULIA CAMPANA, *Rice University*, BRENDA RAPP, *Johns Hopkins University* — According to the embedded processes approach,



WM consists of the activated portion of long-term memory (LTM), which includes a limited number of readily accessible items that are in the focus of attention. According to this view, brain damaged individuals with deficits in WM for specific types of information should have disrupted LTM for that information. Here we present neuropsychological data for individuals showing dissociations among orthographic, nonverbal visual, semantic and phonological WM. Their WM deficits showed little relation to their LTM abilities in these domains. Moreover, some of them performed well on executive function tasks, arguing against general difficulties focusing attention. Although one might suggest that domain-specific attentional abilities have been damaged in these individuals, proposing such specific abilities would seem to undermine the parsimony argued to be a feature of the embedded processes approach. We suggest that the findings support models assuming dedicated domain-specific WM systems.
Email: Randi Martin, rmartin@rice.edu

10:40-10:55 AM (51)

Using Alpha Activity to Track the Encoding and Retrieval of Visual Information From Memory. KEISUKE FUKUDA, *University of Toronto Mississauga*, GEOFFREY F. WOODMAN, *Vanderbilt University* (Presented by Geoffrey Woodman) — A growing body of work suggests that the suppression of posterior alpha-band activity (i.e., from 8-12 Hz) measured from subjects' electroencephalogram (EEG) can effectively index what is stored in visual working memory. In a recent series of experiments, we showed that this alpha-band activity can be used measure how well information is encoded into memory on a single trial, providing an effective way to predict subsequent recognition performance up to a couple of hours later. This makes sense given classic models where the accuracy of encoding into working memory will in part determine long-term memory storage. Next, we used the alpha-band activity to determine the role of working memory in long-term memory retrieval. We found that when people retrieve multiple pieces of information from long-term memory, that the alpha-band activity can be used to track this retrieval process, showing the same capacity limited profile that is observed when people try to encode large arrays of information presented visually. These findings demonstrate that the alpha-band activity is a useful new tool with which to track how information is shuttled between human memory stores as people store information across the short and long term.
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11:00-11:15 AM (52)

Spatially Selective Alpha-Band Activity Degrades With Increasing Working Memory Load. EDWARD AWH, DAVID SUTTERER, JOSHUA FOSTER, KIRSTEN ADAM and EDWARD VOGEL, *University of Chicago* — Recent work has shown that oscillatory activity in the alpha frequency band tracks the content of representations in spatial working memory (WM). Here, we examined how the spatial selectivity of alpha activity is affected by increased WM loads. As in prior work, the topography of alpha activity on the scalp tracked the position of the memoranda with high temporal resolution and good spatial precision. When two locations had to be stored simultaneously,

we observed a superposition of the alpha representations that would have been generated by either item alone, confirming the simultaneous storage of the two positions. In addition, there were robust declines in the spatial selectivity of these neural oscillations when WM load increased, in parallel with declines in mnemonic precision. Thus, oscillatory activity in the alpha band enables time-resolved tracking of concurrent representations in visual WM, and may provide a useful method for understanding the neural basis of WM load effects on the quality of online memory representations.

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11:20-11:35 AM (53)

The Dynamic Processing Model of Working Memory. NATHAN S. ROSE, *University of Notre Dame* — In this presentation I review recent shifts in working memory (WM) theory resulting from evidence for the existence of dynamic, activity-silent, short-term-retention processes. We show that a targeted pulse of transcranial magnetic stimulation (TMS) could 'ping' the brain to reactivate an unattended item held in WM, as long as the item was still potentially relevant on the trial. Further study of TMS-evoked responses on source-localized EEG reveals significant current scattering in the brain from the site of TMS to regions distributed throughout fronto-parietal and sensory cortex that differs depending on the category of unattended items, thereby providing some support for the sensory recruitment hypothesis. Additionally, associations between neural evidence for attended and unattended items during a delay-period and subsequent recognition of the items on WM and long-term memory tests support the involvement of both maintenance-rehearsal and episodic-retrieval processes for the short-term retention and retrieval of items inside versus outside focal attention, respectively. I present a dynamic processing model of WM to account for the overall pattern of these recent results.

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11:40-11:55 AM (54)

Saccadic Remapping Reveals a Common Representational System Shared With Spatial Working Memory. MATTHEW STEELY PETERSON, SHANE P. KELLY and ERIC J. BLUMBERG, *George Mason University* — If spatial working memory, perception, and saccades share the same spatial representation system, then multiple saccades along the same axis should lead to representational errors due to saccadic remapping. Subjects performed a spatial change detection task. During the retention interval, subjects detected an X (go) or O (no-go). Depending on the session, the X or O was either located centrally (no-shift), peripherally and identified covertly, or peripherally requiring a saccade. Spatial changes to memory items occurred along the vertical or horizontal axes. For Experiment 1, saccades and covert shifts occurred along the horizontal axis, and in Experiment 2 shifts were made along the vertical axis. Gaussian PDFs were fit to the memory data, with standard deviation (precision), guessing, and bias as parameters. Covert attention shifts led to a loss of memory precision compared to the no-shift condition, and this was equal along both axes. Importantly, saccades had a directionally specific effect: there was an additional loss of precision for



changes that occurred along the same axis as the saccade. Saccade driven remapping impacts the precision of SWM — saccades smeared SWM.

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Concepts and Categories

West Meeting Room 202-204, Friday Morning, 10:00-12:00

Chaired by Gary Lupyan, University of Wisconsin - Madison

10:00-10:15 AM (55)

The Role of Language in Reasoning About Geometric Concepts. GARY LUPYAN and ASHLEY WENDORF, *University of Wisconsin - Madison*, JING PAUL, *Agnes Scott College* — It has been suggested that people possess “core knowledge” of geometry that allows them to apprehend a range of abstract geometric relations in the absence of formal education and knowledge of relevant linguistic terms (Dehaene, Izard, Pica, Spelke, 2006). We challenge this claim by showing that performance on geometric reasoning tasks is selectively affected by language. We show strong correlations between how nameable geometric relations are and how easy they are to reason about. A causal role for language is supported by three sources of evidence: (1) Overt naming of geometric relations improves performance, (2) Verbal interference impairs performance, (3) Children with delayed access to language perform poorly. We argue that language facilitates geometric reasoning by helping to construct a more categorical hypothesis space.

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10:20-10:35 AM (56)

Internal Structure is Relative to Semantic Context: The Case of Gender Bias in STEM Applicant Ratings. TYLER DAVIS and MOLLY IRELAND, *Texas Tech University* — Category contrast influences representations by increasing perceptions of typicality for items that are caricatures of their categories. Theory suggests that category contrast influences representations via feedback-sensitive learning mechanisms that move representations apart along dimensions that are relevant for a learner’s goals. Here we find that category contrast can lead to separation of categories along dimensions that are irrelevant for task goals and independent of explicit feedback. Participants rated hypothetical applicants that differed in gender, SAT scores, and personality characteristics for admission to STEM and non-STEM programs. Absent instructions about which dimensions to consider, participants exhibited a reliable bias against female applicants when there were contrasting non-STEM disciplines present, but not when STEM disciplines were considered in isolation. The results suggest that contrast-induced changes to representations do not depend on explicit goals or feedback. Instead, category contrast effects arise from participants’ tendencies to construct orthogonalized categories based on the current context.

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10:40-10:55 AM (57)

A Good Family Resemblance Sort is Hard to Find. JOHN D. PATTERSON, SEAN SNODDY and KENNETH J. KURTZ, *Binghamton University (SUNY)* (Presented by Kenneth Kurtz)

— The family resemblance basis thought to underlie natural categories (i.e., characteristic, not defining features) suggests a default organizing principle for category construction in novel domains. However, people overwhelmingly group an array of novel items based on a unidimensional rule even when a family resemblance basis is available. We ask: Do people use a family resemblance basis when explicitly instructed not to sort unidimensionally? Most subjects produced a low coherence sort — suggesting that the phenomenon is not just about the draw of unidimensional rules, but also about the difficulty of picking out family resemblance structure in this paradigm. Our next question: Which do people prefer when presented with a family resemblance versus unidimensional sort? Most subjects chose the family resemblance sort. This suggests that the family resemblance basis is more psychologically compelling, but the difficulty of noticing weak statistical regularities in the standard paradigm prevents people from sorting in this manner.

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11:00-11:15 AM (58)

Seeing Category Membership in Non-Perceptual Categories. JESSECAE K. MARSH, *Lehigh University*, GISELLE A. FERGUSON, *College of William and Mary*, KATHERINE W. HAMILTON, *Yeshiva University* — Category membership is often established through perceptual, visual features (e.g., feathers for the category ‘bird’). However, not all categories are easily identified via such features (e.g., ad hoc categories). We measured beliefs about the observability of membership in categories highly associated with non-perceptual features. Participants rated their ability to categorize a target person as a member of a mental disorder category via hypothetical interactions (e.g., seeing a picture, overhearing a conversation) that did not involve displaying disorder symptoms. Despite disorder categories being defined by internal features (e.g., thoughts, emotions), participants judged they could categorize targets from these minimal interactions. Category membership was rated easier to judge in closer interactions, but categorization did not rely on the target explicitly revealing her membership. Visible, behavioral disorder features were rated as equally observable as internal, mental features. Our findings suggest people believe categories’ internal features leak out in perceivable ways.

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11:20-11:35 AM (59)

When is Likely Unlikely: Investigating the Variability of Vagueness. PERNILLE HEMMER, KIMELE PERSAUD, BRIAN MCMAHAN, MALIHE ALIKHANI, KEVIN PEI and MATTHEW STONE, *Rutgers University* — An important task for understanding how people communicate, remember, and interact with the world is to understand how they relate language to objects. The assignment of language to objects is complicated by the flexibility of words to refer to different measurements (e.g. tall toddler vs. tall skyscraper) – a phenomenon called vagueness. Despite the variability inherent in vagueness, people prefer vague words (e.g. probability phrases such as ‘likely’), and use them successfully. A potential strategy to constrain the use of appropriate vague words is to leverage the set of available words to converge on the best option in context. To



evaluate this strategy, we conducted a series of experiments where participants selected vague words from different sets of alternatives to describe probability and color values. The set of alternatives from which participants could choose varied. Empirical evidence supports the use of this strategy and the theoretical implications of this work are discussed.

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11:40-11:55 AM (60)

Progressive Challenge in the Discrimination of Visual Categories. JASON TANGEN, BROOKLYN CORBETT and BENJAMIN MATTHEWS, *The University of Queensland*, RACHEL SEARSTON, *University of Melbourne*, MATTHEW THOMPSON, *Murdoch University* — To develop perceptual expertise, learners must increase their sensitivity to the visual structure of a category in order to quickly and accurately classify new members. An important design element in developing expertise is the notion of “progressive challenge”: constantly working at the edge of one’s competence by ramping up the difficulty of the items, but “difficulty” in visual discrimination is in the eye of the beholder. We will present a novel approach to progressive challenge in visual discrimination based on the cosine similarity of the images between and within the categories. Participants work their way from easy pairs (highly similar matches and highly dissimilar non-matches) to difficult pairs (highly dissimilar matches and highly similar non-matches) adaptively over a series of trials. In doing so, they learn to refine their analysis from the course to the fine similarities and differences within and between the categories. Recent work in disparate fields such as face recognition and medical education have demonstrated the importance of “within-category variability,” but we argue that this type of static variation is only half of the story when it comes to visual discrimination learning.

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Increasing Transparency and Replicability

West Meeting Room 205-207, Friday Morning, 10:40-12:00

Chaired by Jeffery Rouder, *University of Missouri*

10:40-10:55 AM (61)

Teaching Open Science. JEFFREY N. ROUDER and JULIA M. HAAF, *University of Missouri* — How do we prepare our student, our colleagues, and ourselves for the age of Open Science? In this talk we focus on how the goals of Open Science—increased transparency and reproducibility—can be implemented. We highlight the following themes: 1. That adopting Open Science does not make your life more difficult but easier; 2. That adopting Open Science incentivizes you to use better judgment and avoid ethical dilemmas; 3. That adopting Open Science makes your activities more consistent and less error prone; 4. That adopting Open Science motivates you to think more about the long run; and, most importantly, 5. That adopting Open Science is a practice of making-oneself-vulnerable, a mindset that is needed for effective writing and

analysis. Making-oneself-vulnerable is an overlooked, life-long orientation that allows researchers to deal with the stress and anxiety of participating in communal science.

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11:00-11:15 AM (62)

Rewarding Open Science. MORTON ANN GERNSBACHER, *University of Wisconsin-Madison* — Enthusiasm is growing for the increased transparency and reproducibility promoted by the Open Science movement (or as Spellman suggests, our field’s ‘return to the core values of science’). However, researchers’ enthusiasm will be tempered if the research reward system (jobs, tenure, awards) remains too many steps behind. In this presentation, I will forward concrete recommendations for how to incorporate, acknowledge, and reward Open Science during the academic job search (with recommendations for job applicants, reference letter writers, and search committees); tenure evaluation (with recommendations for tenure candidates, external evaluators, and departmental tenure committees); and society and national award selection (with recommendations for nominees, nomination letter writers, and selection committees).

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11:20-11:35 AM (63)

Publication Bias and Statistical Evidence in the Psychological Literature. JOACHIM VANDEKERCKHOVE, ALEXANDER ETZ and MAIME GUAN, *University of California, Irvine* — The reliability of published research findings in psychology has been a topic of rising concern. Publication bias, or treating positive findings differently from negative findings, is a contributing factor to this “crisis of confidence,” in that it is likely inflating the number of false alarm effects in the literature. A newly developed set of generative behavioral models for the biasing process is considered and compared using Bayesian methods. This allows us to compare the evidence for or against an empirical claim under competing scenarios: with and without publication bias. We demonstrate that the mere presence of a biasing process reduces the evidential value even of the results that make it to publication.

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11:40-11:55 AM (64)

What Can Journal Editors do to Promote Transparency and Replicability? D. STEPHEN LINDSAY, *University of Victoria* — I will describe the background and rationale for the following ten recommendations: 1. Sign on to the Transparency and Openness Promotion guidelines; 2. Be wary of papers that report a single underpowered study with surprising findings; 3. Encourage preregistration; 4. Invite revisions with preregistered replications; 5. Encourage sharing data and materials with reviewers (and more widely after publication); 6. Ensure that at least one reviewer has fierce stats chops; 7. Require fine-grained graphical presentations of data; 8. Require authors to address known/anticipated constraints on generality; 9. Use tools such as StatCheck to detect errors; and 10. Consider inviting submissions that propose Registered Reports (pre data



collection). The overarching principle is to value replicability and importance over flashiness. Although the talk is pitched to journal editors, authors may find the information useful too.

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SYMPOSIUM II: Improving Use of Statistical Inference in Science

West Meeting Room 109-110, Friday Afternoon, 1:30-3:30

Chaired by Don van Ravenzwaaij, University of Groningen, The Netherlands; and Rink Hoekstra, University of Groningen, The Netherlands,

1:30-1:45 PM (65)

A Simulation Study of the Strength of Evidence in the Recommendation of Medications Based on Two Trials With Statistically Significant Results. DON VAN RAVENZWAAIJ, *University of Groningen, The Netherlands*, JON P.A. IOANNIDIS, *Stanford University, USA* — A typical rule that has been used for the endorsement of new medications by the Food and Drug Administration is to have two trials, each with $p < .05$, demonstrating effectiveness. In this paper, we calculate with simulations what it means to have exactly two trials, each with $p < .05$, in terms of the actual strength of evidence quantified by Bayes factors. Our results show that different cases where two trials have a p-value below .05 have wildly differing Bayes factors. Bayes factors of at least 20 in favor of the alternative hypothesis are not necessarily achieved and they fail to be reached in a large proportion of cases. In a non-trivial number of cases, evidence actually points to the null hypothesis. We recommend use of Bayes factors as a routine tool to assess endorsement of new medications, because Bayes factors consistently quantify strength of evidence.

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1:45-2:00 PM (66)

Using Theory to Improve Statistical Inference in Science. STEPHAN LEWANDOWSKY, *University of Bristol, United Kingdom*, KLAUS OBERAUER, *University of Zurich, Switzerland* — Recent debate of the presumed “replication crisis” has largely focused on statistics, with practices such as “p-hacking” (deciding when to stop testing based on preliminary analyses) and “HARKing” (hypothesizing after results are known) being identified as problematic. We suggest that statistical practices should not be considered in isolation. Instead, we also need to strengthen theorizing: Theories should make unambiguous predictions such that the absence of the predicted phenomenon counts as evidence against the theory. The distinction between exploratory and confirmatory research then turns into the distinction between testing a prediction of a theory and research that does not, regardless of whether the researcher thought of the prediction before or after looking at the data. Rigorous theorizing can thus address the risks of HARKing, and reduce the incentive for p-hacking because positive and negative findings become equally informative. For theorizing to meet these criteria, it must be instantiated in computational models.

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2:15-2:30 PM (67)

Response Inhibition in the Real World: A Bayesian Hierarchical Model for Messy Stop-Signal Data. DORA MATZKE, *University of Amsterdam, The Netherlands*, SAMUEL CURLEY, *The University of Newcastle, Australia*, ANDREW HEATHCOTE, *University of Tasmania, Australia* — Response inhibition is frequently investigated using the stop-signal paradigm. In this paradigm, participants perform a two-choice response time task that is occasionally interrupted by a stop signal that instructs participants to withhold their response. Stop-signal performance is typically modeled as horse race between a go and a stop process. If the go process wins, the primary response is executed; if the stop process wins, the primary response is inhibited. The standard horse-race model allows for the estimation of the latency of the unobservable stop response. It does so, however, without accounting for accuracy on the primary task and the possibility that participants occasionally fail to trigger the go or the stop process. We propose a Bayesian mixture model that addresses these limitations. We discuss the operating characteristics of our model, apply it to stop-signal data featuring the manipulation of task difficulty, and outline the strengths and weaknesses of the approach.

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2:30-2:45 PM (68)

Inference on Constellations of Orders. JEFFREY N. ROUDER and JULIA M. HAAF, *University of Missouri, USA* — Most theories in cognitive psychology are verbal and provide ordinal-level constraint. For example, a theory might predict that performance is better in one condition than another. One way of gaining additional specificity is to posit multiple ordinal constraints simultaneously. For example a theory might predict an effect in one condition, a larger effect in another, and none in a third. Unfortunately, there is no good inference system for assessing multiple order and equality constraints simultaneously. We call such simultaneous constraints “constellations of orders” and show how common theoretical positions lead naturally to constellation-of-order predictions. We develop a Bayesian model comparison approach to assess evidence from data for competing constellations. The result is a statistical system custom tuned for the way psychologists propose theory that is more intuitive and far more accurate than current (linear model) approaches. Come see if it is not the best thing since sliced bread.

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2:45-3:00 PM (69)

The Debiasing Gauntlet: Challenges for Publication Bias Mitigation. ALEXANDER ETZ, *University of California, Irvine, USA*, JOACHIM VANDEKERCKHOVE, *University of Leuven, Belgium* — The published literature is a selective sample from the studies researchers perform. Consequently, meta-analyses have a positivity bias, inflating our impression of empirical effect sizes. Recently, it has been argued that this renders meta-analysis essentially useless. However, many methods have now been proposed that purport to mitigate this bias. We suggest certain usability criteria these mitigation methods must meet, and translate them into a series of concrete challenges. The criteria are similar to classical model assessment desiderata,



revolving around maximizing generalization performance: A successful debiasing method must yield accurate predictions about new, direct replications, based on information that is publicly available. We present a series of incrementally challenging tests for debiasing methods based on real – as opposed to simulated – datasets, and discuss the performance of some common methods. We suggest upper and lower limits of predictive performance and point out limitations in many methods that preclude evaluation of their performance.
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3:00-3:15 PM (70)

Robust Tests of Theory With Randomly Sampled Experiments. JOACHIM VANDEKERCKHOVE and BETH BARIBAUT, *University of California, Irvine*, CHRISTOPHER DONKIN, *University of New South Wales*, DANIEL R. LITTLE, *The University of Melbourne*, JENNIFER S. TRUEBLOOD, *Vanderbilt University, USA*, ZITA ORAVECZ, *The Pennsylvania State University*, DON VAN RAVENZWAAIJ, *University of Groningen*, COREY WHITE, *Syracuse University* — We describe and demonstrate a novel strategy useful for replicating empirical effects in psychological science. The new method involves the indiscriminate randomization of independent experimental variables that may be moderators of a to-be-replicated empirical finding, and is used to test the robustness of an empirical claim to some of the vagaries and idiosyncrasies of experimental protocols. The strategy is made feasible by advances in Bayesian inference which allow for the pooling of information across unlike experiments and designs, and is proposed as a gold standard for replication research. We demonstrate the practical feasibility of the strategy with a replication of a study on subliminal priming.
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3:15-3:30 PM (71)

Bayesian Reanalysis of Null Results Reported in Medicine: Strong Yet Variable Evidence for the Absence of Treatment Effects. RINK HOEKSTRA, REI TENDEIRO-MONDEN and DON VAN RAVENZWAAIJ, *University of Groningen, The Netherlands*, ERIC-JAN WAGENMAKERS, *University of Amsterdam, The Netherlands* — Efficient progress requires that we know when a treatment effect is absent. We considered 207 articles from the *New England Journal of Medicine* and found that 22% reported a null result for at least one of the primary outcome measures. Unfortunately, standard statistical analyses are unable to quantify the degree to which these null results actually support the null hypothesis. Such quantification is possible, however, by conducting a Bayesian hypothesis test. Here we reanalyzed a subset of 43 null results from 36 articles using a default Bayesian test for contingency tables. This Bayesian reanalysis revealed that, on average, the reported null results provided strong evidence for the absence of an effect. However, the degree of this evidence is variable and cannot be reliably predicted from the p-value. Instead, sample size is a better (albeit imperfect) predictor for the strength of evidence in favor of the null hypothesis.
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Test Effects on Learning and Memory

West Meeting Room 211, Friday Afternoon, 1:30-3:30

Chaired by David A. Balota, *Washington University in St. Louis*

1:30-1:45 PM (72)

Benefits and Costs of Priming Recollection Based Retrieval. DAVID A. BALOTA, *Washington University in St. Louis*, GEOFFREY B. MADDOX, *Rhodes College*, PETER R. MILLAR and LUKE CHURCHILL, *Washington University in St. Louis* — Past studies examining the influence of near threshold priming on episodic memory performance have primarily used recognition tests in which familiarity can serve as a basis for the memory decision (e.g., Jacoby & Whitehouse, 1989). This issue has been relatively unexplored in studies examining more explicit, recollection-based retrieval (e.g., cued-recall). In the current experiments, participants initially studied a list of unrelated paired associates (DOG-CHAIR) and then completed an immediate cued recall test in which each test trial (DOG-????) was briefly primed (and forward and backward masked) with the target word (CHAIR), an associatively related word (TABLE), a neutral prime (XXXXX), or an unrelated word (APPLE). Facilitatory priming on recall accuracy was found in the identical condition and at longer durations in the associative condition. Results from a delayed cued recall test indicated reliably greater forgetting in the conditions that facilitated initial retrieval, consistent with the notion of desirable difficulty.
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1:50-2:05 PM (73)

Retrieval Practice Makes Perfect: An Automatization Account of the Testing Effect. MIHÁLY RACSMÁNY, *Hungarian Academy of Sciences, Hungary*, ÁGNES SZÖLLÖSI and DOROTTYA BENCZE, *Budapest University of Technology and Economics*, PÉTER PAJKOSSY, *Hungarian Academy of Sciences, Hungary* — Retrieval practice is a more effective learning strategy for long-term learning than additional restudying of the same information, a phenomenon called “the testing effect”. In three experiments we showed that the reaction time of retrieval during retrieval practice followed a power function speed up, that typically characterizes automaticity and skill learning. More importantly, it was found that the measure of goodness of fit to this power function was associated with long-term recall success. In a further experiment the level of mental effort and attentional control involvement were measured by task-related pupil dilation during retrieval/study practice and later recall. Repeated study produced no decrease of effort during practice cycles and higher effort at final recall, in contrast, retrieval practice decreased effort during practice and final recall and has been the more successful long-term learning strategy. Here we suggest that the automatization of retrieval is an explanatory component of the testing effect. Consequently, retrieval-based learning has the properties characteristic of skill learning: diminishing involvement of attentional control, faster processing, resistance to interference, and lower forgetting rate.
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2:10-2:25 PM (74)

The Optimal Learning Strategy Depends on Learning Goals and Processes: Repeated Testing vs. Repeated Studying. DARREN J. YEO and LISA K. FAZIO, *Vanderbilt University* (Presented by Lisa Fazio) — Both testing and studying worked examples are effective learning strategies. Yet, these methods are inherently contradictory. The testing literature suggests that actively recalling an answer is more effective than studying, while the worked example literature suggests that studying a solution is more effective than active problem-solving. We examined this contradiction and sought to show that the key difference lies in the kind of knowledge being learned (stable facts versus flexible procedures) and the materials used (identical versus non-identical problems). When students' goal was to remember the text of a worked example, repeated testing was more effective than repeated studying. However, when students' goal was to learn a novel math procedure, non-identical problems favored repeated studying, and identical problems favored repeated testing. Overall, the optimal learning strategy depends both on one's learning goal and the learning processes supported by the materials.

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2:30-2:45 PM (75)

The Effect of Retrieval Practice vs. Summarizing on Retention and Text Comprehension. GINO CAMP, LUCIA ROZENDAL, TIM SURMA, KRISTEL VANHOYWEGEN and PAUL A. KIRSCHNER, *Open University of the Netherlands* — Retrieval practice and distributed practice have been evaluated as having high utility as learning techniques for students, whereas other, commonly used techniques such as summarizing have low utility (Dunlosky et al., 2013). Our first study focused on the relative utility of summarization when compared to retrieval practice. The process of summarizing is often used to promote reading comprehension, whereas retrieval practice is more often used to promote retention. Therefore, we compared the effect of repeated retrieval and repeated summarization on both retention and text comprehension in primary school and found an interaction: retrieval practice enhanced retention and summarization enhanced reading comprehension. In a second study, we investigated whether teachers are aware of the high utility of retrieval practice and distributed practice. We assessed if teacher training programs refer to study strategies such as retrieval practice and distributed practice. This was hardly ever the case.

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2:50-3:05 PM (76)

Beneficial Effects of Selective Item Repetition on the Recall of Other Items. LISA WALLNER and KARL-HEINZ T. BÄUML, *Regensburg University* (Presented by Karl-Heinz Bäuml) — Selective retrieval can improve recall of other material when study and test contexts differ, an effect attributed to context reactivation processes. To test this proposal, we examined the influence of mental reinstatement of study context for the effects of selective retrieval. In addition, we examined whether the beneficial effect generalizes from selective retrieval to selective restudy, and varies with retrieval difficulty. Prolonged retention intervals between study and selective item repetition

were employed to induce differences between study and test contexts. Results showed that (1) mental reinstatement of study context eliminated, and even reversed, the beneficial effect of selective retrieval; (2) the size of the beneficial effect varied with repetition format, and was larger after selective retrieval than selective restudy, and larger when selective retrieval was demanding. The findings indicate that context reactivation mediates the beneficial effects of selective item repetition, and degree of repetition-induced context reactivation varies with repetition format.

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3:10-3:25 PM (77)

Testing Enhances Motor Practice. TOBIAS TEMPEL and CHRISTIAN FRINGS, *University of Trier* — The acquisition of motor sequences is only seldom examined from a memory perspective, instead, a learning perspective predominates. We investigated how retrieval of a set of newly learned motor sequences influences subsequent encoding of another set of motor sequences. In a series of experiments, we found a double forward effect of testing, affecting a measure of encoding quality (study-trial response times) as well as recall performance in a final test. Typically, accelerated movement execution is considered to be an index of sequence learning (e.g. in the serial-reaction-time task). However, accelerations probably reflect limited practice effects that are insufficient for impacting explicit sequence knowledge. Here, retrieval reduced an acceleration in subsequent study trials. This relative slowing-down was associated with better recall performance in a final memory test. Thus, explicit retrievability of motor sequences benefited from longer study-trial response times, suggesting that retrieval caused more attentive encoding.

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Motor Control and Performance

West Meeting Room 212-214, Friday Afternoon, 1:30-3:10*Chaired by Rouwen Canal-Bruland, Friedrich-Schiller-Universität Jena*

1:30-1:45 PM (78)

Visual Illusions Impinge on Motor Performance and Skill Acquisition. ROUWEN CANAL-BRULAND, *Friedrich Schiller University Jena, Germany* — Recent studies scrutinizing the influence of visual illusions on motor performance and skill acquisition cast doubt on clear-cut separations between vision for perception and vision for action as proposed by the two-visual-systems model. I will present and discuss two studies that allow to generate hypotheses as to when (i.e. under which circumstances) visual illusions may influence both motor performance and skill acquisition. In the first study, participants performed a verbal distance estimation task or a beanbag throwing task towards the end location of the shaft of a large-scale Müller-Lyer illusion. Manipulations of the egocentric and allocentric reference frames across three experiments revealed that whether illusions impinge on action may depend on the relative availability of egocentric and allocentric information. In the second study, participants practiced an aiming task embedded in an Ebbinghaus illusion configuration that made



the target appear larger or smaller. Pre-post-test comparisons showed that the group practicing with the smaller appearing target enhanced performance from pre- to posttest (as did the control group). Yet, the group practicing with the apparently larger target did not show any improvements.

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1:50-2:05 PM (79)

Effector Selection is a Major Component of the Uncertainty Effect in Choice-Reaction Time. CHARLES E. WRIGHT, VALERIE F. MARINO, CHARLES CHUBB, and DANIEL MANN, *University of California, Irvine* — Hick's law describes a large increase in choice reaction time (CRT) associated with the increase in the number of stimulus-response alternatives. For over half a century, this uncertainty effect has been ascribed primarily to the time taken to map a stimulus to its associated response. Here, data from two experiments demonstrate that selection of the appropriate effector – the particular body part to make a response – also can contribute substantially to these uncertainty effects. In fact, in the prototypical CRT task – one in which one of N buttons is to be pressed in response to the light directly above it illuminating – essentially all of the uncertainty effect is due effector selection. This insight is important both for our understanding of basic cognitive architecture and because many classic experiments studying stimulus-response mapping have confounded the number of stimulus-response alternatives with the number of effectors.

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2:10-2:25 PM (80)

Habit Outweighs Planning in Grasp Selection for Object Manipulation. OLIVER HERBORT and WILFRIED KUNDE, *University of Wuerzburg* — Actions are usually planned with the next step in mind. For example, participants who grasp and manipulate objects select grasps that reduce the arm excursion at the end of the object manipulation (“end-state comfort effect”). We addressed whether the adjustment of grasps to subsequent object manipulations is controlled habitually, based on experienced action outcomes, or by planning, based on an evaluation of expected action outcomes. In an experiment, we devaluated the adjustment of grasps to various dial rotations, which led to a reduction of the end-state comfort effect. Participants continued to use the grasps acquired during the devaluation phases in test trials, even though adjusting the grasp to different rotations would have been – and could be predicted to be – more efficient in these trials. This suggests that grasp selection for object manipulation is primarily under habitual control.

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2:30-2:45 PM (81)

Bottom-Up Regulation of Control in Dual-Tasking: Sequential Modulations of Backward Crosstalk. MARKUS JANCZYK, *Eberhard Karls University of Tübingen* — In multitasking, the backward crosstalk effect (BCE) means that Task 1 performance is influenced by characteristics of Task 2. For

example, (1) RT1 is shorter when the two responses are made on the same (compatible trial) compared with opposite sides (incompatible conflict-trial), and (2) RT1 is longer when Task 2 is no-go compared with a go-trial. Across several experiments, I investigated the impact of recently experienced trial and conflict history on the size of such BCEs. Similar to the Gratton effect in standard conflict tasks, clear sequential modulations were observed for the two kinds of BCEs, which were only present following (1) compatible trials and (2) go-trials. This shows a strong impact of the trial history and experienced conflict on multitasking performance, and the present study informs theories of multitasking and adds evidence that the cognitive system flexibly regulates control even in multitasking settings to adapt to current environmental demands.

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2:50-3:05 PM (82)

Effects of Stimulus and Response Repetitions on Go/No-Go Performance. J. TOBY MORDKOFF and CHAN XU, *University of Iowa* — Manipulations of stimulus and response probability are known to have different effects on simple performance. However, the manner in which these manipulations have their effects is less clear, because any change to the probability of a given trial type also changes the probability of an exact repetition. We have made numerous attempts to separate the effects of these confounded changes in go/no-go tasks. Complicating matters, we have found that both types of repetition effect depend on more than only the immediately preceding trial. Our (tentative) conclusion is that manipulations of stimulus probability have effects beyond those produced by changes in the rates of repetition. In contrast, all of the effects manipulating response probability might well be explained by the changes in response repetitions.

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Beliefs and Reasoning

West Meeting Room 202-204, Friday Afternoon, 1:30-3:10

Chaired by Merim Bilalic, Northumbria University

1:30-1:45 PM (83)

Why Do Good Thoughts Block Better Ones? MERIM BILALIC, *Northumbria University* — The Einstellung (set) effect occurs when the first idea that comes to mind, triggered by familiar features of a problem, prevents a better solution being found. Here I first show that it works by influencing mechanisms that determine what information is attended to. I present a series of experiments where, having found one solution, expert chess players reported that they were looking for a better one. But their eye movements showed that they continued to look at features of the problem related to the solution they had already thought of. The result is that alternatives to the first idea are ignored. I then demonstrate a range of phenomena that seemingly share the same cognitive mechanism. They range from cognitive biases to phenomena in problem solving and reasoning, to perceptual errors and failures in memory. I propose that the interplay between memory, attention and perception at the core of the Einstellung mechanism is the building block of the



human cognition. Paradoxically, the very same mechanism that makes people highly efficient is also the source of their biases both in everyday and expert thought.

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1:50-2:05 PM (84)

Toxic Beliefs and Belief Polarization. DEREK POWELL, *Stanford University*, ZACHARY HORNE, *Arizona State University*, JOHN HUMMEL, *University of Illinois* (Presented by Zachary Horne) — Attempting to correct scientific misconceptions can often backfire. In cases where evidence is ambiguous, backfire effects can be accounted for by confirmation bias (e.g., Lord et al., 1979). However, backfire has also been observed when evidence unequivocally supports one hypothesis (e.g., Betsche et al., 2013). Here, we examined whether backfire following unambiguous evidence hinges on the presence of beliefs we call “toxic beliefs.” These are belief networks where auxiliary beliefs are structured so that they allow reasoners to interpret unambiguous evidence against a hypothesis as evidence for that hypothesis. In two studies, we tested this hypothesis by examining how unambiguous evidence for evolution affected people’s beliefs in evolution and how the interpretation of this evidence was modulated by the presence of a toxic belief. We observed and then replicated the predicted link between backfire effects and toxic beliefs.

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2:10-2:25 PM (85)

The Role of Non-Evidence Based Beliefs and Thinking Style in the Receptivity to Pseudo-Profound Bullshit. MICHELLE M. ARNOLD, TOBY PRIKE and MATTHEW W. CHRISTIAN, *Flinders University* — Pseudo-profound bullshit (PPB) appears to convey wisdom, yet is meaningless (e.g., *The future explains irrational facts*; Pennycook et al., 2015). The current study extended on previous work showing positive correlations between several non-evidence based beliefs, intuitive thinking style, and profoundness ratings for PPB. Participants first rated profoundness for both conventionally profound and PPB (i.e., randomly generated) statements. They then categorized the statements by putting exactly half of the items into each of “profound” and “randomly generated” categories (Experiment 1), or by completing a “profound/randomly generated” two-alternative forced-choice task (Experiment 2). Half of the participants were warned at the start that some statements were randomly generated, and all participants completed measures of thinking style, religiosity, anomalous belief, and complementary and alternative medicine belief. The key findings included no effect of forewarning and regression analyses demonstrating that a more intuitive thinking style predicted a higher propensity to see meaning in PPB statements. Email: Michelle Arnold, michelle.arnold@flinders.edu.au

2:30-2:45 PM (86)

Belief Revision by Learning Indicative Conditionals: Selecting Among Doubly Bayesian Models Using Bayes Factors. HENRIK SINGMANN, *University of Zurich*, STEPHAN HARTMANN, *LMU Munich*, QUENTIN GRONAU, *University of Amsterdam* — Bayesian Belief revision provides a formal and

rational framework for how agents should update their beliefs in light of new probabilistic information using Bayes’ rule or Jeffrey’s rule. One question that is as of yet unanswered in theoretical as well as empirical terms is how agents update their beliefs if the new information is not a proposition (i.e., an event or $P(\text{event})$), but a conditional statement of the form “If A then B”, which is usually understood as the conditional probability $P(B|A)$. Learning a conditional within this framework can be characterized as updating a prior probability distribution F by conditioning on the conditional probability resulting in the posterior probability distribution F' . We compared a variety of plausible and rational updating schemes on a large data corpus ($N > 100$) for which we could estimate both, prior probability distributions as well as posterior distribution after learning the conditional. The different schemes were instantiated as hierarchical Bayesian cognitive models and we employed Bayes Factors to select among the different schemes. Our results suggest that updating increases $P(B|A)$ and F and F' differ such that they minimize the inverse Kullback-Leibler divergence.

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2:50-3:05 PM (87)

Asking the Right Questions About Human Inquiry. ANNA COENEN, *New York University*, JONATHAN D. NELSON, *Max Planck Institute for Human Development*, TODD M. GURECKIS, *New York University* (Presented by Todd Gureckis) — The ability to act on the world with the goal of gaining information is what makes humans such an adaptable and intelligent species. Perhaps the most successful and influential account of such abilities is the Optimal Experiment Design (OED) hypothesis, which argues that humans intuitively perform experiments on the world similar to the way an effective scientist designs an experiment. The widespread application of this theory within many areas of psychology calls for a critical evaluation of the theory’s core claims. We argue that the OED hypothesis remains lacking as a theory and that research in the area often fails to confront some of the most interesting and important questions about human inquiry. Our critic takes the form of nine open questions about the psychology of human inquiry, along with answers for how to tackle these challenges in future work.

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Speech Perception

West Meeting Room 205-207, Friday Afternoon, 1:30-3:50

Chaired by Sarah Creel, University of California, San Diego

1:30-1:45 PM (88)

Protracted Auditory-Perceptual Learning During Development. SARAH C. CREEL and CONOR I. FRYE, *University of California San Diego* — Many theories suggest that auditory pattern learning proceeds rapidly and hierarchically. For example, infants are thought to solidify their native-language sound representations in the first year of life. These sound categories then allow efficient storage of the sound forms of words, the next level in the hierarchy. A very different interpretation is that infants’ early learning reflects only the beginnings of a gradual accretion of sound pattern knowledge,



from which speech sounds, words, and other auditory objects emerge. We discuss findings from 3-5-year-old children's word learning and music perception. When auditory patterns are similar to each other (e.g. novel words *zev*, *zef*), children have difficulty retaining auditory-visual associations. This is inconsistent with accounts of early perceptual expertise in either domain, but is more consistent with auditory perceptual pattern learning that proceeds slowly over development. Another implication is that auditory pattern learning in language is not "special;" rather, it is fundamentally similar to nonlinguistic auditory pattern learning. Implications for theories of language and auditory development are discussed.
Email: Sarah Creel, screel@ucsd.edu

1:50-2:05 PM (89)

Word Learning Influences Phonotactic Influences on Speech Perception. DAVID W. GOW, *Massachusetts General Hospital*, ASHLEY M. HANBURY, *Salem State University* — Language-specific constraints on the combination of speech sounds to form words and syllables (phonotactic constraints) are alternatively attributed to a causal role of abstract phonological constraints or to the normalizing effects of top-down lexical influences on spoken language processing. In this work we present the results of two experiments examining how sleep-consolidated word learning influences the perception of phonotactically disallowed patterns. Typically, listeners "repair" illegal phoneme sequences by either recategorization (*sr* - *shr*), or epenthesis (*gb* - *gəb*). In Experiment 1 we used a found that listeners who learned novel words with illicit onsets (e.g. *srigin*) showed an increased ability to discriminate between repaired and unrepaired versions of the onset (*srae* v. *shrae*). In Experiment 2 we found that learning words with licit "repaired" versions of onsets (*gəbot*) decreased the ability to discriminate between repaired and unrepaired forms (*gbæ* v. *gəbæ*). These results support the lexical account of phonotactic constraints.
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2:10-2:25 PM (90)

Prior Experience and Adaptation to Disordered Speech. STEPHANIE A. BORRIE, *Utah State University*, KAITLIN L. LANSFORD, *Florida State University* — This study investigated whether adaptation to a talker with disordered speech could be predicted by the nature of the listener's prior familiarization experience, specifically similarity of perceptual features and level of intelligibility. Following an intelligibility pretest involving a talker with dysarthria, 160 listeners were familiarized with 1 of 7 talkers with dysarthria—who differed from the test talker in terms of perceptual similarity (same, similar, different) and level of intelligibility (low, mid, high)—or a talker with no speech disorder (control). Listeners then completed an intelligibility posttest on the test talker. All listeners benefited from familiarization with a talker with dysarthria, however adaptation to the test talker was superior when the familiarization talker had similar perceptual features; and reduced when the familiarization talker had low intelligibility. Evidence for both generalization and specificity

of learning highlights the differential value of listeners' prior experiences for adaptation to, and improved understanding of, disordered speech.

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2:30-2:45 PM (91)

Speaker-Independent Factors Influence Listeners' Accent Ratings. CONOR T. MCLENNAN, *Cleveland State University*, SARA INCERA, *Eastern Kentucky University* — We conducted two studies designed to determine whether speaker-independent factors (sentence context and memory load) influence listeners' accent ratings independently from the speaker or the speech signal. We used computer mouse tracking to ascertain whether participants rate the same audio recording as more or less accented in different contextual situations. First, sentence context altered the ratings for both foreign- and native-accented speakers. Participants were more likely to rate words as spoken with a "Foreign" accent when presented in an unpredictable sentence context. Second, cognitive load altered the ratings for foreign-accented speakers. Participants rated the foreign-accented words as less "Foreign" when presented in a high working memory load condition. Taken together, these results indicate that contextual influences - completely independent from the speaker or the speech signal - influence listeners' ratings of accentedness. These findings support the idea that there is a bidirectional relationship between language processing and accent ratings.
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2:50-3:05 PM (92)

Activation of Embedded Words: Evidence From Eye Tracking and Long-Term Priming. ARTHUR G. SAMUEL, *BCBL and Stony Brook University*, EUGENIA MARIN-GARCIA, *Basque Center on Cognition, Brain, Language* — Most polysyllabic words have at least one embedded word within them. Prior studies have demonstrated transient activation of the embedded words when their carrier words are heard. Zhang and Samuel (2015), using immediate semantic priming, showed that embedded words are more activated if they begin their carrier words, and if they are relatively long (two syllables rather than one). In the current study, Spanish-Basque (L1 test) and Basque-Spanish (L2 test) bilinguals heard Spanish words, looking for a picture that matched the word they heard. We measured how much they looked at pictures corresponding to the carrier word itself (e.g., "camarera" [waitress]), an embedded word (e.g., "cama" [bed]), or a filler. A final test looked for long term priming of the embedded words, and allowed us to see if longer initial looks to an embedded word increased later priming. The results confirm the roles of position and length of embedded words.
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3:10-3:25 PM (93)

Masked Form-Based Priming in Second Language Learners. MITCHELL SOMMERS and JOE BARCROFT, *Washington University in St. Louis*, SHUSAKU KIDA, *Hiroshima University* — Research on first language (L1) word recognition has demonstrated that, in masked form-based priming lexical decision tasks (LDTs), neighborhood nonword primes facilitate



the processing of target words whereas neighborhood word primes inhibit it due to the lexical competition between primes and targets. What is unclear, however, is whether such orthographic similarity effects occur in second language (L2) word recognition. In this light, the present study included L2 English speakers in a masked form-based priming LDT experiment involving unfamiliar orthographic neighbor word primes. A linear mixed effect model analysis demonstrated that priming effects were facilitatory instead of inhibitory. This result suggests that effects of orthographic similarity also exist in L2 word recognition. Results of L1 speakers' baseline data are also discussed.

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3:30-3:45 PM (94)

Effects of Intrinsic Temporal Distortion on the Multimodal Perceptual Organization of Speech. ROBERT E. REMEZ and LAUREN H. BELTRONE, *Barnard College, Columbia University*, ANDREA A. WILLIMETZ, *Barnard College* — Why look at the talker when you listen? According to recent research, multimodal speech perception may be more tolerant of temporal distortion than unimodal auditory perception. We tested this conjecture by attempting to disrupt perceptual organization in order to deduce the integration of auditory and visual sensory samples. Subjects with normal vision and hearing listened to sine-wave speech samples while watching video recordings of a talking face. In the first condition, the auditory sensory samples underwent intrinsic temporal distortions of 30 ms, 60 ms, or 90 ms. In the second condition, the visual sensory samples underwent intrinsic temporal distortions of 30 ms, 60 ms, or 90 ms. In the third condition, the auditory and visual sensory samples remained unperturbed temporally. Intelligibility of unperturbed speech was 45.2%. Any type of auditory distortion rendered its contribution to multimodal integration useless or nearly so. However, distortion of the visual component was tolerable at 30 ms. At 60 ms and 90 ms of distortion, the visual component still contributed to integration. These measures expose the differential and characteristic temporal dynamic of each sensory modality in audiovisual integration.

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Working Memory: Attentional Processes

West Meeting Room 118-120, Friday Afternoon, 1:30-3:10

Chaired by Robert Logie, University of Edinburgh

1:30-1:45 PM (95)

Storage and Processing in Working Memory: An Adversarial Collaboration. ROBERT H. LOGIE, JASON DOHERTY and AGNIESZKA JAROSLAWSKA, *University of Edinburgh*, STEPHEN RHODES, NELSON COWAN and MOSHE NAVEH-BENJAMIN, *University of Missouri - Columbia*, CLEMENT BELLETIER, *University of Fribourg*, PIERRE BARROUILLET, *University of Geneva*, VALERIE CAMOS, *University of Fribourg* — An ongoing debate contests whether concurrent demands for storage and processing in working memory are constrained by limited capacity attention, by the ability to switch attention between task components, or by combined capacities of domain-specific cognitive functions.

Whether there are costs when combining memory and processing varies across studies. Young adults performed delayed serial recall for visually presented lists with typed recall, and speeded arithmetic verification. These were performed as single tasks or with verification during a retention interval, without or with articulatory suppression. Each theory generated different, pre-registered predictions. Crucially, task demand was adjusted for each participant so that single task accuracy was around 80%. Results were not fully predicted by any of the theoretical frameworks. Memory performance dropped when combined with processing or with suppression, but with substantial residual performance. Verification was unaffected by a memory load or by suppression. We describe a possible, new hybrid theoretical framework.

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1:50-2:05 PM (96)

Experimentally Examining the Role of Rehearsal in Working Memory. COREY I. MCGILL and EMILY M. ELLIOTT, *Louisiana State University* (Presented by Emily Elliott) — While rehearsal, or the sub-vocal recitation of to-be-remembered items, plays an important role in a number of models of working memory, the use of rehearsal to explain experimental effects remains contentious. Direct examination of rehearsal remains difficult; however, concurrent articulation of irrelevant information is used to both limit and examine the role of rehearsal within a number of standard paradigms. Alternative rehearsal limiting techniques may provide additional insight into the role of rehearsal within working memory. By limiting rehearsal through speeded presentation (4 items/s), in addition to concurrent articulation, the mechanisms underlying experimental effects such as the irrelevant sound effect and the phonological similarity effect can be better understood. The current results indicated that while concurrent articulation eliminated these experimental effects, speeded presentation did not. These findings suggested that concurrent articulation may block other cognitively important processes in addition to rehearsal, and that the role of rehearsal within working memory may be overstated.

Email: Emily Elliott, eelliott@lsu.edu

2:10-2:25 PM (97)

Where to Attend Next? Assessing Refreshing in Working Memory With the Guided-Refreshing Method. ALESSANDRA S. SOUZA, *University of Zurich*, EVIE VERGAUWE, *University of Geneva*, KLAUS OBERAUER, *University of Zurich* — One of the functions that attention may serve in working memory (WM) is of boosting information accessibility, a mechanism known as *attentional refreshing*. Refreshing is often assessed indirectly by implementing conditions assumed to prevent its use (i.e., via concurrent distractor tasks). Here, I will review evidence on a new approach that gauges the direct impact of attending to individual WM representations: the *guided-refreshing method*. This method consists of presenting cues during the retention interval of a WM task to instruct people to refresh (i.e., attend to) the cued items. I will show that refreshing improves the accessibility of WM contents as a direct function of refreshing frequency. I will further show that this effect generalizes across different materials (colors, orientations, and



words) in accordance with the idea that refreshing is domain-general. I will conclude by showing how this method leverages our understanding of the role of attention to WM maintenance. Email: Alessandra Souza, a.souza@psychologie.uzh.ch

2:30-2:45 PM (98)

Domain-General Evidence for the Local Effects of Attentional Refreshing in Working Memory? EVIE VERGAUWE and NAOMI LANGEROCK, *University of Geneva* — Working memory keeps information temporarily accessible for ongoing cognition. Refreshing is a proposed mechanism to keep information active in working memory, by bringing memory items into the focus of attention. Recently, we proposed to use response times to examine attentional refreshing and presented evidence for 1) the presumed local effect of refreshing that is heightened accessibility of the just-refreshed item, 2) the use of speeded responses to WM probes as a direct, independent index of the occurrence of refreshing, and 3) spontaneous occurrence of refreshing of to-be-remembered information during slow list presentation and during an empty delay following list presentation (Vergauwe & Langerock, in press). Here, we report a series of experiments that examine to what extent our previous findings generalize across different memory materials and different presentation modes. Implications for the assumed domain-general nature of refreshing will be discussed. Email: Evie Vergauwe, Evie.Vergauwe@unige.ch

2:50-3:05 PM (99)

Children's Multimodal Working Memory: The Development of Needing Less Attention? NELSON COWAN, *University of Missouri* — Some past experiments on working memory with adults have combined recognition of colors from an array with recognition of sounds from a series (spoken digits or tones). Both domain-specific and across-domain-general types of working memory storage are observed. When the methods are used with participants from the early elementary school years through adulthood, the developmental trend suggests that children acquire the ability to retain more information in domain-specific forms, with no evidence of an increase in across-domain storage with development. The discussion will focus on implications for theories of cognitive development, working memory, and the role of selective attention. Email: Nelson Cowan, cowann@missouri.edu

SYMPOSIUM III: Leading Edge Workshop: Using Big Data to Discover Principles of Cognition

West Meeting Room 109-110, Friday Afternoon, 3:50-5:50
 Chaired by Gary Lupyan, *University of Wisconsin-Madison*; and Robert Goldstone, *Indiana University Bloomington*

3:50-3:55 PM

Introduction. GARY LUPYAN, *University of Wisconsin* — Email: Gary Lupyan, lupyan@wisc.edu

3:55-4:15 PM (100)

Mapping the Lexicon Using Large-Scale Empirical Semantic Networks. SIMON DE DEYNE, *University of Leuven* — Large semantic networks can be used to explore how the mental

lexicon is structured at different scales. In this talk, we show how local network properties (a node and its direct neighbors) affect the global structure of the network using data from the *Small World of Words* project. Due to local assortativity, words with similar lexical properties are more likely to be neighbors than words with non-matching properties. This strongly affects global network structure as well, resulting in a lexicon broadly characterized by valence and concreteness. A sizeable semantic network also enables us to move from local to global measures of similarity. The former only consider relations between the direct neighbors of two nodes, whereas the latter exploits the full structure of the network. This is supported by empirical data for judgments about weakly related words and captured by global similarity measures implemented as a random walk. Email: Simon De Deyne, simon.dedeyne@adelaide.edu.au

4:15-4:35 PM (101)

Decision Contamination in the Wild: Sequential Dependencies in Online Review Ratings. RICK DALE, *University of California, Los Angeles* — Current judgments are systematically biased by prior judgments. Such biases occur in ways that seem to reflect the cognitive system's ability to adapt to statistical regularities within the environment. These cognitive sequential dependencies have primarily been evaluated in carefully controlled laboratory experiments. In this study, we use these well-known laboratory findings to guide our analysis of two datasets consisting of over 2.2 million business review ratings from Yelp and 4.2 million movie and television review ratings from Amazon. We explore how within-reviewer ratings are influenced by previous ratings. Our findings suggest a contrast effect: Current ratings are systematically biased away from prior ratings, and the magnitude of this bias decays over several reviews. This work is couched within a broader program that aims to use well-established laboratory findings to guide our understanding of patterns in naturally occurring and large-scale behavioral data. Email: Rick Dale, rdale@ucmerced.edu

4:35-4:55 PM (102)

Scene Category Structure Reflects Lived Experience. MICHELLE R. GREENE, *Bates College* — Paraphrasing Bruner, every act of recognition is an act of categorization. Thus, understanding category structure is critical to understanding visual perception. I posit that environmental category structure should reflect how visual information is used. The American Time Use Survey (ATUS) assesses the distribution of time spent on hundreds of possibly daily activities. I collected a 1055x1055 scene category similarity matrix using crowdsourcing (5 million trials). A separate study normed scenes for each of the ATUS activities (4 million trials). I observed three things: (1) scenes that shared potential actions tend to share a category, and that this effect is stronger than for object- or feature-based similarities; (2) scenes that afford more common actions have a finer-grained entry-level category; (3) these patterns only become apparent at scale. Therefore, scene categories can be seen as a reflection of one's previous actions, rather than the scene's constituent visual features per se. Email: Michelle Greene, mgreene2@bates.edu



4:55-5:15 PM (103)

Studying Language Development Using Daylong Home Audio Recordings. ANNE WARLAUMONT, *University of California, Los Angeles* — Daylong home recordings are transforming the study of early communication development. I will present some of my own research focused on how these data can be used to study exploration dynamics and social rewards in the development of speech sound production in infancy. I will also talk about some international efforts to develop an accessible database of these recordings and to connect behavioral scientists with automatic speech recognition experts to develop better tools for working with this type of data.
Email: Anne Warlaumont, anne.warlaumont@gmail.com

5:15-5:35 PM (104)

Using Large-Scale Data to Build Continuous Theories of Development. DANIEL YUROVSKY, *University of Chicago* — Children's first years are a time of rapid change. For instance, children typically producing their first words shortly before their first birthday, but producing over 1000 words by the time they can run down the street. The magnitude of these changes, examined through the lens of small datasets, has led to the construction of discrete theories of development. I describe three projects that leverage large-scale data to build continuous theories of early language development. The first project shows that the speech that parents produce to children changes continuously over the first five years, tracking their developmental level. The second project shows that children's gestures provide a continuous signal of their word knowledge, reflecting in-the-moment communicative pressure. Finally, the third project shows how cross-linguistic consistency and variability in the predictors of children's word learning can inform us about process universals in language acquisition.
Email: Daniel Yurovsky, yurovsky@uchicago.edu

5:35-5:50 PM

Discussion. ROBERT GOLDSTONE, *Indiana University* —
Email: Robert Goldstone, rgoldsto@indiana.edu

Autobiographical Memory

West Meeting Room 205-207, Friday Afternoon, 4:10-5:30
Chaired by Kimberly Chiew, Duke University

4:10-4:25 PM (105)

Motivated Autobiographical Memory: Effects of Valence and Surprise on Memory for the 2016 U.S. Presidential Election. KIMBERLY S. CHIEW, KEVIN S. LABAR and R. ALISON ADCOCK, *Duke University* — Positively- and negatively-valenced autobiographical memories may differ in consistency, confidence, and vividness, but the role of surprise in autobiographical memory formation is not well-characterized. Conversely, laboratory evidence suggests that surprise influences memory encoding differently in positive and negative emotional contexts, but these differences have not been investigated in complex autobiographical memories. In November 2016, Donald Trump was elected U.S. President, an event surprising to many but construed by some as positive and by others as negative. In a large online sample, we evaluated

memory representations for Election Night 2016 as a function of self-reported valence (positive or negative, depending on desired outcome) and surprise (anticipated outcome). Memory detail and vividness did not vary with valence, but greater emotional intensity was observed as a main effect of surprise. Six-month follow-up characterized memory consistency relative to these factors and in relation to ongoing affective changes in response to the shifting political landscape.
Email: Kimberly Chiew, kimberly.chiew@duke.edu

4:30-4:45 PM (106)

A Naturally Occurring Reminiscence Bump. CATHERINE LOVEDAY and AMY WOY, *University of Westminster*, MARTIN A. CONWAY, *City, University of London* (Presented by Martin Conway) — In a popular radio program (now in its 75th year) celebrities chose 8 records they would be happy to be stranded on a desert island with and provide reasons for taking each song. (Web address: <http://www.bbc.co.uk/programmes/b006qnmr>). Programs for 55 interviewees who spontaneously provided dating information were coded and analyzed. An early prominent reminiscence bump was observed and most record choices dated to when interviewees were aged between 11 and 20 years. Record choice was linked to general and specific memories, including self-defining memories. General memories consisted of mentions of time periods, others, and locations. Specific memories were dominated by detailed personal episodic memories and by memories of first time experiences. These findings show the integration of autobiographical memory with the cultural history of individual lives over a 75-year period.
Email: Martin A. Conway, Martin.Conway.1@city.ac.uk

4:50-5:05 PM (107)

The Effect of Repeated Retrieval on Memories for Emotional Events. ANDREW C. BUTLER, *Washington University in St. Louis*, DAVID C. RUBIN, *Duke University* — In two experiments, we investigated how repeated retrieval affects the content and phenomenology of memories for positive and negative events. Participants watched two positive and two negative videos, and then wrote a description and rated the phenomenology of their memory for each video. Once every three days for the next three weeks, they retrieved their memories for one of the positive and one of the negative videos. In Experiment 2, participants were given one of two goals to perform during this repeated retrieval: either creating meaning or re-experiencing perceptual details (no instructions were given in Experiment 1). Three weeks after the initial session, they wrote another description and re-rated the phenomenology of their memories for the videos. In both experiments, repeated retrieval had little effect on the emotional characteristics of participants' memory for the videos. However, repeated retrieval did help to maintain visuospatial characteristics and a sense of reliving.
Email: Andrew C. Butler, butler@wustl.edu

5:10-5:25 PM (108)

Experimentally Distinguishing Appraisals of Occurrence and Accuracy for Simple Scenes. ALAN SCOBORIA and KASSANDRA KORCSOG, *University of Windsor* — Evidence taken from retrospective ratings about existing autobiographical



memories indicates that belief in the occurrence of events and belief that events are recollected accurately are distinct (Scoboria, Talarico & Pascal, 2014). This study experimentally examined predictors of occurrence versus accuracy using novel stimuli. Participants viewed 30 video recorded and listened to 30 audiotaped descriptions of simple scenes (e.g., an actress making a sandwich). One week later, participants indicated the source of 90 scenes, described what they recalled about each scene, and provided occurrence and accuracy ratings. After the test, feedback was provided about 10 correctly recollected viewed scenes. The indicated that the scene was or was not presented as a video, and that the proportion of correct recall was above 90% or below 50%. After receiving feedback for each scene, participants re-rated occurrence and accuracy. Feedback about the source led to changes in belief in occurrence but not belief in accuracy ratings. Feedback about the proportion of correct recall led to changes in belief in accuracy but not belief in occurrence ratings.

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Attention: Features & Objects

West Meeting Room 118-120, Friday Afternoon, 3:30-5:30

Chaired by Michi Matsukura, University of Iowa

3:30-3:45 PM (109)

Actively Removing Unattended Items When One is Told to Keep a Single Attended Item in Visual Working Memory. MICHU MATSUKURA, *University of Iowa* — When a single item is selected from visual short-term/working memory, that attended item tends to be remembered better than other unattended items. Among different mechanisms proposed to explain this benefit, the account that such a benefit is produced by “actively” removing unattended items—despite the observers are motivated to keep a single attended item in memory—is unique. It contradicts the findings that active removal of unattended items requires effortful or strategic control (i.e., the observers were actually motivated to remove unattended items). Interestingly though, because the aforementioned account has always been tested in the presence of an additional factor manipulated through the within-subjects design (e.g., set size, probe order switching), it remains possible that the signature effect (representing “active removal”) is driven by inclusion of this additional variable. Indeed, when the account was rigorously tested in the absence of an additional variable, no evidence for active removal was found.

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3:50-4:05 PM (110)

Was That a Shift of Attention or Binding in a Buffer? CHARLES JH. LUDOWICI and ALEX O. HOLCOMBE, *University of Sydney* (Presented by Alex Holcombe) — Cueing a stimulus can boost the rate of success reporting it. This is usually thought to reflect a time-consuming attention shift to the stimulus location. Recent results support an additional process of “buffering and binding” – stimulus representations have persisting (buffered) activations and one is bound with the cue. Here, an RSVP stream of letters is presented, with one letter cued by a ring. The presentation time, relative to the cue,

of the letters reported are aggregated across trials. The resulting distribution appears time-symmetric and includes more items before the cue than are predicted by guessing. When a central cue is used rather than the peripheral ring, the data no longer favor the symmetric model, suggesting an attention shift rather than buffering and binding. To explore the capacity of buffering in the peripheral cue condition, we vary the number of streams, documenting changes in the temporal dispersion of letters reported and the time of the letter most frequently reported.

Email: Alex O. Holcombe, alex.holcombe@sydney.edu.au

4:10-4:25 PM (111)

Multiple Object Representation: The Role of Perceptual vs. Conceptual Similarity in Stimulus-Competition. NURIT GRONAU, *The Open University of Israel*, HANNA BENONI, *The Israeli College of Management*, ANNA IZOUTCHEEV, *The Open University of Israel* — Multiple stimuli often compete for representation. Similarity among stimuli plays an important role in competition, yet it may be perceived at different processing levels - a featural (low) or a conceptual/categorical (high) level of representation. Here, we tried to tease apart these two types of similarity factors. Using a “dilution” paradigm, we measured whether neutral stimuli diluted (i.e., attenuated) distractor interference effects: target and distractors comprised digital letters (H,T), while diluter stimuli comprised either letters or digits. Critically, the diluters were identical in their low-level features across both categories. Results showed a significantly larger dilution effect among the letters than the digits condition, suggesting a strong inter-category competition effect. When using letters only and manipulating their visual features, only robust changes in diluters’ appearance yielded reduced competition. These findings suggest that competition occurs at both categorical and featural levels, yet the former may actually dominate the latter under certain circumstances.

Email: Nurit Gronau, nuritgro@openu.ac.il

4:30-4:45 PM (112)

Object-Based Representations can Contribute to Attentional Selection in the Absence of Spatial Cuing. ZHE CHEN, *University of Canterbury*, KYLE R. CAVE, *University of Massachusetts - Amherst* — We investigate whether object representations influence attentional selection in the absence of spatial cuing. In several experiments, participants judged whether two letters were the same or different. The letters were either both within the same object or in different objects. Our results show higher accuracy when both letters are in the same object. This object-based effect appeared under different conditions: when one part of an object was selected first, when participants were allowed to view a configuration with multiple objects freely before the onset of the letter targets, or when the two targets appeared more frequently in the same object than in different objects. Some of these results are inconsistent with the recent proposal by Donovan et al. (2017) that object representations contribute to attentional guidance only in tandem with spatial selection.

Email: Zhe Chen, zhe.chen@canterbury.ac.nz



4:50-5:05 PM (113)

Parallelism Is Perceived Directly, Not Through Computing and Comparing Line Slopes. CURTISS CHAPMAN, *Rice University*, JONATHAN FLYNN, *University Texas Health Sciences Center Houston*, COLIN NOE, YINGXUE TIAN and JAMES R. POMERANTZ, *Rice University* (Presented by James Pomerantz) — Humans are highly sensitive to parallelism, but the process we use to detect it remains unknown. One could detect parallelism by registering and then comparing line slopes, but our results suggest otherwise. When the task is to detect the one oddly oriented line segment amidst three other, identically sloped lines, subjects perform better when those lines are in cardinal orientation (vertical or horizontal) rather than diagonal (the Oblique Effect, or OE). But when the task is to find the one *pair* of line segments that is *not* parallel in a field of three other, identical pairs that are parallel, the OE is greatly reduced despite there being twice as many diagonals to process. We also find a Configural Superiority Effect: we are better at discriminating line orientations when non-informative context lines are added nearby to create the emergent feature of parallelism. The results suggest we may perceive parallelism directly.

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5:10-5:25 PM (114)

Behind the Face of Holistic Perception: Do Face- and Non-Face- Stimuli Recruit Overlapping Holistic Perception Mechanisms? KIM M. CURBY and DENISE MOEREL, *Macquarie University* — Holistic perception is often demonstrated by a failure of selective attention to individual parts within stimuli. Such processing is typically considered specific to faces and non-face stimuli of expertise. However, recent research has demonstrated that holistic perception can arise for novel line patterns with salient Gestalt cues of perceptual grouping. Further, disrupting such grouping cues within faces disrupts holistic face perception. It remains unclear whether this Gestalt-related holistic perception is supported by mechanisms overlapping those that support holistic face perception. Here, we overlaid faces and line stimuli strong in Gestalt grouping cues and participants made part judgments about either the faces (Experiment 1) or line stimuli (Experiment 2) in a composite task indexing holistic perception. The data revealed evidence of reciprocal interference between the holistic processing of the line and face stimuli, suggesting that the mechanisms supporting holistic perception of the line patterns is not independent from those supporting holistic perception of faces. We discuss potential mechanistic accounts of this interference.

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Semantics

West Meeting Room 212-214, Friday Afternoon, 3:30-5:30

Chaired by Curt Burgess, University of California, Riverside

3:30-3:45 PM (115)

Statistical Regularity in Language Predicts Verb Granularity. KIMBERLY MILLER and CURT BURGESS, *University of California - Riverside* (Presented by Curt Burgess) — This

research describes how the Hyperspace Analogue to Language model (HAL; Lund & Burgess, 1996) has extended the scope of semantic models to account for granular levels of grammatical representation. Earlier work (Burgess & Lund, 1997) has demonstrated the model's ability to distinguish between morphologically ambiguous and unambiguous verbs; furthermore, it can make the subtle semantic distinction between *praise* and *flatter* verbs. Following Levin's (1993) theory, we evaluated HAL's ability to categorize coarse, medium, and fine-grained verb classes. We are able to report success with the model's ability to distinguish between these levels of granularity and have accounted for a broader range of verbs within these levels. This includes, at the finest level of granularity, distinguishing manner and instrument subclasses of *wipe* verbs and the *get* and *obtain* subclasses of *give* verbs. These results will be discussed in the context of the behavioral regularities of core meaning and argument structure.

Email: Curt Burgess, curt@ucr.edu

3:50-4:05 PM (116)

Emotional Sound Symbolism: Languages Rapidly Signal Valence Via Phonemes. JAMES S. ADELMAN, *University of Warwick*, MARTINA COSSU and ZACHARY ESTES, *Bocconi University* — Rapidly communicating the emotional valence of stimuli (i.e., negativity or positivity) is vital for averting dangers and acquiring rewards. We therefore hypothesized that human languages signal emotions via individual phonemes (*emotional sound symbolism*), and more specifically that the phonemes at the beginning of the word signal its valence, as this would maximize the receiver's time to respond adaptively. Analyzing approximately 37,000 words across five different languages (English, Spanish, Dutch, German, and Polish), we found emotional sound symbolism in all five languages, and within each language the first phoneme of a word predicted its valence better than subsequent phonemes. Moreover, given that averting danger is more urgent than acquiring rewards, we further hypothesized and demonstrated that phonemes that are uttered most rapidly tend to convey negativity rather than positivity. Thus, emotional sound symbolism provides an early warning system in human languages, analogous to other species' alarm calls.

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4:10-4:25 PM (117)

A Large Scale Analysis of Individual Variability in Written Language. BRENDAN JOHNS (Member Select-Speaker Award Recipient), *University at Buffalo*, RANDALL JAMIESON, *University of Manitoba* — Language is inherently variable, with its use changing by production medium, genre, and individual, along with a host of other variables. However, it is undetermined at what level (e.g. individual versus genre) this variability arises from. To answer this question, it would require the collection of a large amount of data that escapes traditionally methodology. To overcome this problem, a collection of thousands of fiction books, across multiple authors and genres, was assembled. To examine the underlying variability of this material, multiple distributional analyses (Landauer & Dumais, 1997; Jones & Mewhort, 2007) of semantic content was done on this material. The analyses revealed differences in language use both within



and between genres of fiction by the same and different authors, across both content and syntax. Most surprisingly, it was found that most of the variance in language usage comes from individual authors, suggesting that every author has a unique signature of language usage, revealed within the distributional structure of their works. This work provides fundamental information about the structure of the natural language environment and provides constraints for models of language processing.

Email: Brendan T. Johns, btjohns@buffalo.edu

4:30-4:45 PM (118)

The Grounding Problem in Semantic Representations Derived From Word Associations and Natural Language: A Multimodal Approach Using Visual and Affective Features. SIMON DE DEYNE, *University of Adelaide*, GUILLEM COLLELL, *University of Leuven*, DANIEL J. NAVARRO, *University of New South Wales* — A major limitation of language-based distributional semantic models is the lack of grounding in their representations. In this study, we evaluate how language can be grounded in a multimodal model that includes both visual and affective features. Linguistic representations were based on either *external* language (E-language) derived from text, or *internal* language (I-language) derived from word associations. Contrary to common beliefs, we assume that word-association-based representations reflect linguistically encoded sensory-motor and affective properties that are not present in natural language. To test this, we compared unimodal with multimodal language models in two semantic judgment tasks. Our results showed that adding visual and affective features in multimodal E-language models leads to substantial improvements. In contrast, unimodal I-language representations already provided an excellent prediction and the addition of affective and visual modalities was negligible. This supports the idea that I-language captures representations that are more grounded.

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4:50-5:05 PM (119)

The (Un)Reliability of Semantic Priming. TOM HEYMAN, *University of Leuven*, KEITH HUTCHISON, *Montana State University*, GERT STORMS, *University of Leuven* (Presented by Gert Storms) — Many researchers have tried to predict semantic priming effects using a myriad of variables (e.g., prime-target associative strength, co-occurrence frequency,...). The idea is that relatedness varies across prime-target pairs, which should be reflected in the priming effect (e.g., “cat” should prime “dog” more than “animal” does). However, it’s only insightful to predict item-level priming effects, if they can be measured reliably. Thus, the present study examined the split-half and test-retest reliability of item-level priming effects under conditions that should discourage the use of strategies. The resulting priming effects proved extremely unreliable and re-analyses of published priming datasets revealed similar cases of low reliability. These results imply that previous attempts to predict semantic priming were unlikely to be successful. However, one study with an unusually large sample size yielded

more favorable reliability estimates, suggesting that big data, in terms of items and participants, should be the future for semantic priming research.

Email: Tom Heyman, tom.heyman@kuleuven.be

5:10-5:25 PM (120)

Perceptual Uncertainty and Repeated Reference to Visual Objects. ADRIANA BALTARETU and CRAIG G. CHAMBERS, *University of Toronto* (Presented by Craig Chambers) — Two experiments investigated how speakers design and update descriptions for listeners given uncertainty in the physical context. On critical trials, participants had to repeatedly refer to a visually-present object in instructions to an addressee. Color adjectives were necessary to ensure the description successfully differentiated target objects from other objects. Targets were located behind either transparent or colored panels (the latter changed objects’ perceived color: e.g., blue->green). Of interest was how speakers’ descriptions (i) were initially designed given the perceptual uncertainty in the scene, (ii) were tailored over the course of repeated mention, and (iii) might change once the real color of (filtered) objects became known. Results show that (i) speakers routinely use “apparent” color in descriptions despite perceptual uncertainty, (ii) repeated mention led to shorter descriptions, and (iii) that speakers will readily abandon their conversationally-entrenched descriptions given new information about objects’ properties. Implications for accounts of referential production are discussed.

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Reading

West Meeting Room 202-204, Friday Afternoon, 3:30-5:30

Chaired by Elizabeth R. Schotter, University of South Florida

3:30-3:45 PM (121)

The Relationship Between Language Skills and Parafoveal Sensitivity to Word Frequency. ELIZABETH R. SCHOTTER, *University of South Florida* — Eye movements during reading are sensitive to linguistic properties of the text and skill level of the reader (e.g., Luke et al., 2015), but in complex and nuanced ways. Some readers prioritize speed over comprehension and may show little sensitivity to text properties (e.g., word frequency), while for other readers speed indexes efficiency and correlates with accuracy. Additionally, some readers benefit from access to words parafoveally, before directly fixating them (Schotter et al., 2012), but not all readers show this benefit to equivalent degrees (e.g., Veldre & Andrews, 2015a,b). The current study investigated the relationship between offline measures of linguistic skills (e.g., vocabulary size, spelling ability, comprehension ability) and online skipping sensitivity to word frequency parafoveally. The boundary paradigm (Rayner, 1975) was used to provide high- or low-frequency parafoveal previews that changed to identical, higher- or lower-frequency unrelated word, or nonword targets upon direct fixation. For readers who were sensitive to word frequency (i.e., did not skip



indiscriminately), the size of the frequency effect on skipping correlated with their vocabulary size and comprehension ability, but not spelling ability.

Email: Elizabeth R. Schotter, eschotter@usf.edu

3:50-4:05 PM (122)

An Exploration of the Time Course of Age-of-Acquisition Effects During Eye Movements in Reading. BARBARA J. JUHASZ, *Wesleyan University*, HEATHER SHERIDAN, *University at Albany, SUNY* — Adults process words that are rated as being learned earlier in childhood faster than words that are rated as being learned later in childhood in a variety of tasks. These age-of-acquisition (AoA) effects have previously been observed during fixation durations when reading. The present study extended this research by exploring the time course of AoA effects on distributions of fixation durations during reading. Fifty pairs of early and late acquired words that were controlled on relevant linguistic variables were embedded in sentences. AoA significantly influenced reading times, replicating past eye movement studies. Survival analyses revealed that the earliest discernible effect of AoA on fixation distributions emerged rapidly, beginning at 158 ms from the start of fixation. Further, Vincentile plots demonstrated a relatively consistent AoA effect across the distribution of fixations. These new insights into the time course of AoA effects on fixation distributions have implications for theories of AoA effects.

Email: Barbara J Juhasz, bjuhasz@wesleyan.edu

4:10-4:25 PM (123)

Return Sweep Saccades and Undersweep Fixations During Reading. TIMOTHY J. SLATTERY and ADAM J. PARKER, *Bournemouth University* — Models of eye movement control during reading focus on the reading of single lines of text. However, with multi-line texts return sweep saccades which bring fixation from the end of one line to the beginning of the next occur on a regular basis. Our understanding of return sweeps is still limited. One common feature of return sweeps is the prevalence of oculomotor errors. Return sweeps, often initially under-shoot the start of the line. Corrective saccades then bring fixation closer to the line start. The fixation occurring between the undershoot and the corrective saccade (undersweep fixation) has important theoretical implications for the serial nature of lexical processing during reading, as they occur on words ahead of the intended attentional target. We explore questions related to undersweep fixations and ongoing lexical processing, and discuss implications for models of eye movement control during reading.

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4:30-4:45 PM (124)

Individual Differences in Statistical Learning and Learning to Read. JAY G. RUECKL and TONG LI, *University of Connecticut and Haskins Labs*, JULIE M. BROWN, *Haskins Labs* — We report two experiments investigating visual statistical learning (VSL) and artificial orthography learning (AOL). In the AOL task we've employed, the orthographic forms are modeled after Chinese phonograms, allowing for

the independent manipulation of the statistical structure of the mappings between both orthography and phonology (O-P) and orthography and semantics (O-S). In Experiment 1 both the O-P and O-S mappings were highly structured, creating reliable sublexical regularities in both mappings. The results revealed that participants acquired both lexical and sublexical knowledge of both O-P and O-S, that performance on the VSL task was correlated with both O-P and O-S learning, and that these correlations were of comparable magnitudes. In Experiment 2, the O-P and O-S mappings of the AOL task were nonsystematic, eliminating any sublexical regularities. Even under these conditions, performance on the VSL task was correlated with both O-P and O-S learning. These findings suggest that common processes underlie the extraction of transitional probabilities in a VSL task and learning the mappings from printed words to their meanings and pronunciation and demand a componential theory of learning in each domain.

Email: Jay Rueckl, jay.rueckl@uconn.edu

4:50-5:05 PM (125)

The Dramatic Benefit of Explicit Instruction on Learning to Read an Artificial Orthography. KATHLEEN RASTLE, JO TAYLOR and CLARE LALLY, *Royal Holloway, University of London*, MATTHEW H. DAVIS, *MRC Cognition & Brain Sciences Unit* — Reading acquisition involves coming to appreciate the statistical regularities of a writing system. We investigated the impact of explicit instruction on this process. Two groups of adults learned to read 48 novel words printed in an artificial script. One group learned the underlying print-sound and print-meaning regularities of the writing system implicitly; the other group received explicit instruction on these regularities before learning the novel words. We observed dramatic benefits of explicit instruction on participants' learning of the novel words, on their ability to generalize this knowledge to untrained words, and on their oral language knowledge. These benefits persisted after 9 days of training. Findings are discussed in the context of theories of learning, and how these speak to the persistent and intense debate around methods of reading instruction.

Email: Kathleen Rastle, Kathy.Rastle@rhul.ac.uk

5:10-5:25 PM (126)

Morphological Processing in Single-Word and Sentence Reading. SASCHA SCHROEDER and BETTY MOUSIKOU, *Max Planck Institute for Human Development* — Extensive research on morphological decomposition has focused on single-word reading using the masked priming paradigm. While this research has yielded important findings, it is unclear whether they generalize to sentence reading. In the present study, we investigated morphological processing of prefixed and suffixed German words using the same prime-target combinations in a masked priming lexical decision task (Experiments 1a and 2a) and a sentence reading task that used the fast priming (Experiment 1b) and boundary eye-tracking paradigms (Experiment 2b). Results from both experiments indicated embedded stem activation for both prefixed and suffixed words, independently of the presence of an affix in the prime. The eye movement data further revealed that



embedded stem processing routinely occurs during sentence reading. We discuss our findings with regard to extant models of morphological processing and eye movement control.

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Numerical Cognition

West Meeting Room 208-209, Friday Afternoon, 3:50-5:30

Chaired by Anthony D. Cate, Virginia Polytechnic Institute and State University

3:50-4:05 PM (127)

Numeracy Neuroimaging: Cortical Surface-Based Meta-Analysis. ANTHONY D. CATE, LEAH COOPER, RISHI DEVULAPALLI, TAYLOR FLYNN, DALE HILES and TIMOTHY QUINN, *Virginia Tech* — Neuroimaging research has identified regions in parietal cortex related to visual numeracy, including the horizontal segment of the intraparietal sulcus (IPS) that has been proposed to be the site of number-specific neural activity. It can be difficult to assess the precise cortical location of meta-analysis foci in deep, variable sulci like the IPS using stereotaxic (3D) coordinates. This study projected coordinates from over 50 adult numeracy studies onto a cortical surface atlas to compare differences among parameters that varied across studies, including cognitive task, visual stimuli, and ranges of numbers. The horizontal segment of the IPS is activated during diverse kinds of number judgments. There was also evidence that symbolic and analog (e.g. dots) numbers activated relatively superior and inferior portions of the horizontal/anterior IPS. Finally, activation from subitizing range quantities (< 5) may be limited to the mesial parietal lobe. Relatively few studies employed this range, but this result could indicate a link between subitizing and manual actions like reaching and pointing that rely on mesial parietal cortex.

Email: Anthony D. Cate, acate@vt.edu

4:10-4:25 PM (128)

The Racing Diffusion Model of Speeded Decision Making. GABRIEL TILLMAN and GORDON D. LOGAN, *Vanderbilt University* — We describe and test a simple sequential sampling model of N-choice speeded decision making: the racing diffusion model. The model makes speeded decisions from a race of evidence accumulators that integrate information in a noisy fashion within a trial. Unlike many current sequential sampling models, the racing diffusion does not assume that evidence accumulation rate varies between trial, and so, the model provides alternative explanations of key response time (RT) phenomena, such as fast and slow error RTs relative to correct RTs. Applying the racing diffusion model is relatively fast and easy given the analytic solution to the likelihood of response times, yet the model contains processing dynamics that may be of interest to cognitive-neuroscientist. The racing diffusion is an alternative to simple sequential sampling models that do without within-trial drift variability and complex models that include this variability, but are difficult to implement.

Email: Gabriel Tillman, gabrieltillman.au@gmail.com

4:30-4:45 PM (129)

A Single-Boundary Accumulator Model of Decisions in a Mental Arithmetic Task. THOMAS J. FAULKENBERRY, *Tarleton State University* — Models of mental arithmetic differ with respect to the independence of encoding and calculation processes. Whereas additive models suggest that manipulations of number format affect only encoding processes, interactive models assume that number format has a direct impact on calculation processes. Evidence in favor of an interactive model usually comes in the form of a size-by-format interaction on mean RTs, though this interaction is not always found (e.g., Megias & Macizo, 2016). In the present study, we modeled participants' RT distributions in an arithmetic verification task using a single-boundary accumulator model (a shifted Wald distribution; Anders et al., 2016). We found that in addition to providing a more complete description of RT distributions, the accumulator model afforded a potentially more sensitive test of format effects. Specifically, we found that format affected drift rate, which implies that problem format has a direct impact on calculation processes. These data give further support for an interactive model of mental arithmetic.

Email: Thomas J. Faulkenberry, faulkenberry@tarleton.edu

4:50-5:05 PM (130)

No Transfer of Training in Simple Addition. JAMIE I.D. CAMPBELL and YALIN CHEN, *University of Saskatchewan* — Several researchers have proposed that skilled adults may solve single-digit addition problems (e.g. $3 + 1 = 4$, $4 + 3 = 7$) using a fast counting procedure. Practicing a procedure often leads to transfer of learning and faster performance of unpracticed items. Such transfer has been demonstrated using a counting-based alphabet arithmetic task (e.g., $B + 4 = C$ D E F) that indicated robust RT gains when untrained transfer problems at test had been implicitly practiced (e.g., practice $B + 3$, test $B + 2$ or $B + 1$). Here we constructed analogous simple addition problems (practice $4 + 3$, test $4 + 2$ or $4 + 1$). In three experiments ($n = 108$) there was no evidence of generalization for these items, but there was robust speed up when the items were repeated. The results are consistent with direct retrieval of addition facts from long-term memory rather than a counting procedure.

Email: Jamie Campbell, jamie.campbell@usask.ca

5:10-5:25 PM (131)

The Psychophysics of Algebra: Mathematics Perceptual Learning Interventions Produce Measurable and Lasting Changes in the Perceptual Encoding of Mathematical Objects. PHILIP J. KELLMAN, CAROLYN A. BUFFORD and EVERETT METTLER, *University of California, Los Angeles* — Perceptual learning (PL) refers to experience-induced improvements in information extraction, including complex pattern recognition that is a hallmark of expertise. PL interventions in mathematical domains produce substantial gains on tests of mathematical competence. Here we report direct evidence that such perceptual learning modules (PLMs) improve perceptual encoding of mathematical objects, measured psychophysically. In two experiments, accuracy and speed of college students' encoding of equations was assessed in a same-different task with brief exposures. Between a pretest



and a delayed posttest, the experimental group completed a brief Algebraic Transformations PLM, which involved mapping of equations across transformations. A control group received equal exposure to equations in a non-mathematical task. On a delayed posttest, the PLM group, but not the control group, showed reliably improved encoding on a psychophysical task that depended solely on physical identity. Perceptual learning interventions accelerate expertise in complex domains and produce detectable, durable changes in perceptual encoding. Email: Philip Kellman, Kellman@cognet.ucla.edu

Human Learning and Instruction

West Meeting Room 211, Saturday Morning, 8:00-10:00

Chaired by Robert A. Bjork, University of California, Los Angeles

8:00-8:15 AM (132)

Learning the Game From Another's Perspective: Contributions of Varied Practice to Motor Learning. SASKIA GIEBL, ELIZABETH LIGON BJORK and ROBERT A. BJORK, University of California, Los Angeles (Presented by Robert Bjork) — Prior research shows that varied practice of motor skills typically leads to more errors during practice, but better long-term retention and transfer (e.g., Schmidt, 1975; Kerr & Booth, 1978). We examined whether simply observing a given sports skill from another perspective might enhance learning. Participants practiced 4 blocks of 4 penalty kicks at a soccer goal. In between those blocks, a given participant observed another participant's kicks from one of three perspectives: from behind another kicker; from behind the goal; from behind both the kicker and goal; or not at all. On a delayed test, participants who got another perspective (from behind the goal) performed significantly better than participants who observed from behind another kicker. These results have theoretical and practical importance with respect to motor-skill learning: They suggest that providing another perspective may lead to better understanding of motor-skills dynamics, resulting in more durable and flexible learning.

Email: Robert A. Bjork, rabjork@psych.ucla.edu

8:20-8:35 AM (133)

Reminders vs. Comparison. JONATHAN G. TULLIS, University of Arizona, ROBERT GOLDSTONE, Indiana University — Creating long-lasting and transferrable knowledge from individual instances is vital to succeeding in a complex, ever-changing world. We compared the consequences of two prominent pedagogies (comparison and reminding) on memory and generalization. Learners studied a sequence of related, but superficially different, proverb pairs. In the comparison condition, learners studied the related proverbs together and explicitly created a generalization across them, which is theorized to allow learners to disregard superficial features and identify their shared, deep meaning. In the reminding condition, learners viewed the related proverbs separated in time; the later presentation is theorized to prompt learners to think back to the similar prior episode, retrieve it from memory, and compare across instances. Across three experiments, reminding supported better memory for individual examples and enabled more appropriate transfer to new situations than comparison.

When characteristics of stimuli allow for appropriate noticing of earlier related episodes, the benefits of reminding on memory and transfer outweigh those of comparison.

Email: Jonathan Tullis, jonathantullis@gmail.com

8:40-8:55 AM (134)

Individual Differences in Working Memory Interact With Implicit Learning Activities in Support of Mathematics Skill Acquisition. CHRISTOPHER WAS, ERIN GRAHAM, Kent State University, TIMOTHY C. INDAHL, Winona State University, DAN J. WOLTZ, University of Utah — Previous research suggests that well-constructed implicit learning activities may increase performance on tasks where participants make persistent errors and rely heavily on working memory. Due to the complexity of information to be learned and a relatively high error rate, mathematics represents an educational domain in which implicit learning strategies may prove especially beneficial. Although some recent evidence supports this hypothesis, other studies report conflicting results regarding the efficacy of implicit learning for complex mathematical procedures (e.g., resolving polynomial equations). One explanation for these inconclusive results is an interaction with working memory. In the present study, the implicit learning of complex mathematics was evaluated using an aptitude (working memory) by treatment (declarative learning vs. implicit learning) experimental design. Results indicate that for some participants – those with low working memory – the implicit learning intervention was ineffective. However, individuals with high working memory exhibited significant benefits following the implicit learning intervention. Email: Chris Was, cwas@kent.edu

9:00-9:15 AM (135)

Explicit Reflection During Cultural Concept Learning. BRIGID FINN and DELANO HEBERT, Educational Testing Service — In the current study participants used a game-based social simulation platform to learn how two social-cultural norms—collectivism and hierarchy—were represented in an artificial culture. Participants engaged in dynamic interactions with non-player game characters who gave verbal and facial feedback based on the cultural appropriateness of the player's verbal choices during the interaction. Learning was reflected in players' ability to respond adaptively to feedback and adjust their behavior in future interactions. We evaluated whether prompting players to explicitly reflect on their cultural beliefs had a beneficial or hindering effect on cultural concept learning. The study contrasted four belief-updating conditions that varied whether and when belief updating occurred. We tested the hypothesis that explicit reflection about cultural norms may alter how people process these concepts (Schooler, 2002; Wilson et al., 2000). We will discuss how belief updating impacted in-game learning and end-of-game post-test performance.

Email: Bridgid Finn, bfinn@ets.org

9:20-9:35 AM (136)

Does Coaching Promote Perceptual Category Learning? HAL PASHLER and JARRETT LOVELETT, University of California, San Diego — In the typical perceptual category



learning study, learners try to categorize sequentially presented stimuli, receiving feedback after each response (i.e., they learn through “trial-and-error”). By contrast, in many real-world category learning situations (such as medical students learning to classify skin lesions), learners are given explicit instruction about the typical characteristics of different categories and the mechanisms that produced them. For example, instruction may attempt to focus learners’ attention on important feature dimensions, divert attention from irrelevant variables, or provide instructive exemplars of different categories. Does this sort of coaching enhance learning? It might, but several popular ideas from cognitive psychology (e.g., desirable difficulties, verbal overshadowing) suggest that explicit verbal instruction might actually impair durable learning. We describe a number of studies in which people learn different types of categories and are randomly assigned to receive varying degrees of instruction about the generative process that produced the stimuli. Learning is assessed in immediate and delayed transfer tests involving novel instances.

Email: Hal Pashler, hpashler@gmail.com

9:40-9:55 AM (137)

Optimal Training Examples in Real-World Classification Learning. ROBERT NOSOFSKY and CRAIG SANDERS, *Indiana University Bloomington* — A fundamental initial goal in science education is teaching the key categories of the target domain. Here we use formal modeling approaches from cognitive psychology to help guide the search for effective methods of achieving this goal. In previous work, we showed that, when used in combination with a high-dimensional feature-space representation for a large set of rock stimuli, an exemplar-memory model achieved accurate predictions of rock-classification learning and generalization. In the present work, we use the model to guide the search for theoretically optimal sets of training exemplars for the rock categories. We then use the theoretical optimal training sets in new classification-learning experiments involving the rock stimuli to test the predictions from the model. In this talk we will report the outcomes of these ongoing investigations and their implications for theory and educational practice.

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Attention Capture

West Meeting Room 118-120, Saturday Morning, 8:00-10:00

Chaired by Daniel Weissman, *University of Michigan*

8:00-8:15 AM (138)

Perceptual Load is not Always a Crucial Determinant of Early vs. Late Selection. DANIEL H. WEISSMAN, BRITTANY DRAKE, KATHARINE COLELLA and DAPHNE SAMUEL, *University of Michigan at Ann Arbor* — The perceptual load hypothesis posits that early and late selection occur under conditions of high and low perceptual load, respectively. Recent work, however, suggests that the absence of an overall congruency effect in high-load trials – the behavioral signature of early selection in studies of perceptual load – may not directly index early selection (i.e., failing to identify distracters).

Prior research also suggests that the congruency sequence effect (CSE) – a modulation of the congruency effect after incongruent relative to congruent trials – provides complementary information about whether participants identify distracters. We therefore conducted a novel test of the perceptual load hypothesis that employed both the overall congruency effect and the CSE as measures of distracter identification. Contrary to the perceptual load hypothesis, participants identified distracters even in high-load trials wherein there was no overall congruency effect. These findings indicate that perceptual load is not always a crucial determinant of early versus late selection. Email: Daniel Weissman, danweiss@umich.edu

8:20-8:35 AM (139)

On the Role of Loudness in Auditory Spatial Attention Gradients. EDWARD J. GOLOB and JEFFREY R. MOCK, *University of Texas, San Antonio* — Previous work shows that the distribution of auditory spatial attention has both top-down and bottom-up influences. We developed a computational model to examine these dynamics, and tested two possible types of bottom up coding via intermittent loudness changes (increase or decrease). Two decibel ranges were used (40-60 vs. 60-80 dB SPL), and coding for saliency (increased or decreased loudness) was contrasted with energy (loudness increases only). Analyses showed different effects for increases vs. decreases. When the same 60 dB stimulus was louder than most stimuli in a block reaction times were much faster relative to when the same stimulus was quieter than most stimuli ($p < .001$). The loudness effect was evident to stimuli at midline and the right side when attending to lateral locations, and was not present when attending to midline. We conclude that loudness coding in this context reflects energy increments rather than saliency. Email: Edward Golob, edward.golob@utsa.edu

8:40-8:55 AM (140)

The Problem of Latent Attentional Capture: How to Shrink a Capture Effect Without Altering the Probability of Capture. NICHOLAS GASPELIN, *Binghamton University, SUNY*, MEI-CHING LIEN, *Oregon State University*, ERIC RUTHRUFF, *University of New Mexico* — Progress in understanding attentional capture has been stunted due to widespread, puzzling empirical discrepancies. We provide evidence that this discrepancy largely reflects the false assumption that response-time capture effects are a direct index of probability of capture. We show that the very same abrupt onset cue can produce either very small or very large capture effects depending on search difficulty. We propose an attentional dwelling account in which response-time capture effects reflect not just probability of capture but also the *costs of capture* – i.e., the time to reject the cued distractor and find the target. The use of difficult search is therefore critical for forcing capture models to make divergent predictions. Using this approach, we provide evidence that onsets do capture attention but color singletons do not. Email: Nicholas Gaspelin, nick.gaspelin@gmail.com

**9:00-9:15 AM (141)**

Using Rescorla's Truly Random Control Condition to Measure Truly Exogenous Covert Orienting. MOHAMMAD HABIBNEZHAD, MICHAEL A. LAWRENCE and RAYMOND M. KLEIN, *Dalhousie University* (Presented by Raymond Klein) — Studies of exogenous covert orienting use peripheral cues (stimuli) that are spatially uninformative about the locations of subsequent targets. When the time-course of the cue's influence on performance is explored (by varying cue-target onset asynchrony, CTOA) a bi-phasic pattern is usually seen with better performance at the cued location when the CTOA is short (typically attributed to attentional capture) and worse performance at the cued location when the CTOA is long (attributed to inhibition of return). However, while spatially uninformative, these cues entail a temporal contingency with the subsequent target. Consequently, this so-called "capture" may reflect an unintended consequence of endogenous allocation of temporal attention. Following Lawrence & Klein (2013) we used Rescorla's (1967) truly random control condition to ensure that the spatially uninformative peripheral stimuli were temporally completely uninformative. Even such completely uninformative peripheral stimuli generated the prototypical biphasic pattern. Email: Raymond Klein, ray.klein@dal.ca

9:20-9:35 AM (142)

Statistical Regularities Modulate Attentional Capture. JAN THEEUWES and BENCHI WANG, *Vrije Universiteit Amsterdam* — Recently, we argued that the history of attentional deployments can elicit lingering selection biases (Awh, Belopolsky & Theeuwes, 2012; *TICS*). Here, we investigated whether selection history regarding statistical regularities can bias visual selection. We used the classic additional singleton task in which participants searched for a salient shape singleton while ignoring a color distractor singleton. Crucially, the color distractor singleton was presented systematically more often in one location than in all other locations. We found that for this high probability location both the amount of attentional capture by distractors as well as the efficiency of selecting the target were reduced. There was a spatial gradient as the attentional capture effect scaled with the distance from the high probability location. Whether or not participants were aware of these statistical regularities did not modulate the effects. Active suppression of the location by means of trial-by-trial cueing was ineffective. We argue that statistical regularities, not known to the observer, can bias attention such that locations that are high likely to contain a distractor are suppressed relative to all other locations.

Email: Jan Theeuwes, J.Theeuwes@vu.nl

9:40-9:55 AM (143)

Mechanisms of Value-Learning in the Guidance of Spatial Attention. BRIAN A. ANDERSON and HAENA KIM, *Texas A&M University* — Although the role of reward learning in the guidance of feature-based attention is well established, the extent to which reward learning can modulate spatial attention remains controversial. Across multiple experiments, participants were rewarded for clicking on different regions within a variety of scenes, and then performed an unrelated visual search task in which previously experienced scenes served as the background.

Targets were reported faster when appearing in a previously high-value region. This spatial bias relies on representations that are anchored to the configuration of objects within the scene. It appears to be driven by reinforcement learning, and can be observed with equal strength following non-reward corrective feedback. The time course of the bias is consistent with a transient shift of attention, rather than a strategic search pattern. Taken together, our findings reconcile previously conflicting reports and offer an integrative account of how learning from feedback shapes the spatial attention system.

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Decision Making I**West Meeting Room 202-204, Saturday Morning, 8:00-10:00**

Chaired by Mike Le Pelley, University of New South Wales, Australia, Sydney

8:00-8:15 AM (144)

Testing the Extreme Outcomes Rule in Oculomotor Decision-Making From Experience. MIKE LE PELLEY, DANIEL PEARSON, NISHA MATHEW and BEN NEWELL, *University of New South Wales, Sydney* — Studies of decision-making from experience suggest an *extreme outcomes rule*, wherein the most extreme outcomes (e.g., the largest reward experienced) are overweighted in risky choice. This produces risk-seeking behavior when risky options are paired with an extreme outcome. We investigated whether the extreme outcomes rule also applies to low-level oculomotor decisions (decisions about where to move our eyes next). Visual search studies show that stimuli paired with large monetary reward are more likely to capture eye movements than stimuli paired with small reward, known as *value-modulated attentional capture* (VMAC). In Experiment 1 we show risk-seeking in VMAC when a risky option is paired with an extreme outcome, consistent with studies of explicit decision-making from experience. Experiment 2 manipulates whether the outcome paired with the risky option is extreme or not. Participants' explicit evaluations follow the extreme outcomes rule, but eye movements remain risk-seeking regardless of whether the risky option is paired with an extreme outcome. This suggests a dissociation between reward-related processes influencing oculomotor decisions and explicit evaluations.

Email: Mike Le Pelley, m.lepelley@unsw.edu.au

8:20-8:35 AM (145)

Cognitive Models of Distracted Performance and Strange Data. GUY E. HAWKINS, *University of Newcastle*, MATTHIAS MITTNER, *University of Tromsø*, ANDREW HEATHCOTE, *University of Tasmania*, BIRTE U. FORSTMANN, *University of Amsterdam* — Participants often use different strategies or experience different psychological states, including distraction, during task completion. Such shifts in strategy or state can generate atypical patterns in data - particularly response time data, for example, very fast responses - that are often excluded from analysis because they fall outside the explanatory scope of a theory. Rather than excluding such data, we developed a quantitative cognitive modeling framework that accounts for



performance in domains that can generate strange response time data. We propose a simple addition to standard accumulator models of decision making: a race between a stimulus-driven process and a 'failed-decision' accumulator. The failed-decision accumulator introduces an implicit timing component to the accumulator model framework that allows it to provide a good account of urgency-related and distraction-related response time data. Our approach demonstrates that excluding aberrant data might mask interesting theoretical accounts of performance, which can be understood in a quantitative modeling framework.

Email: Guy Hawkins, guy.hawkins@newcastle.edu.au

8:40-8:55 AM (146)

Time Course of Noisy Choices From Choice Sets Differing in Size. YAAKOV KAREEV and JUDITH AVRAHAMI, *The Hebrew University of Jerusalem*, GAEL LE MENS, *University Pompeu Fabra* — We modeled repeated choices of an item from a choice set when the experience with the chosen item's value is subject to noise, and the item's subjective valuation is updated in light of the (noisy) experience with it. In the model, items with higher valuations are more likely to be chosen. We explored how time and set size affected the unfolding of the choice process (time – from 0 to 40 previous choices; set size –from 4 to 36 items). The results thus bear on, and extend, previous research of adaptive sampling and choice overload. Regarding the effect of time, we found that the downward bias in valuation (predicted by adaptive sampling) indeed increased with the number of previous choices; this bias can explain nostalgia, happy surprises, and the advantage of novel items. Time also resulted in less conflict, hence greater confidence, at the time of choice, and in a smaller likelihood of feeling disappointed or of regretting one's choice; this led to greater product loyalty and the emergence of tastes. With respect to set size, larger choice sets resulted in better outcomes, but exacted a psychological price in increasing conflict, disappointment, and regret.

Email: Yaakov Kareev, yaakov.kareev@mail.huji.ac.il

9:00-9:15 AM (147)

Do Reduced Cognitive Capacities Change People's Preferences or Lead to More Decision Errors? SEBASTIAN OLSCHIEWSKI and JÖRG RIESKAMP, *University of Basel*, BENJAMIN SCHEIBEHENNE, *University of Geneva* (Presented by Jörg Rieskamp) — How do people make preferential choices in situations where their cognitive capacities are limited? Past studies link the manipulation of cognitive resources to qualitative changes in preferences. However, there is a widely overlooked alternative hypothesis: Namely that a reduction of cognitive capacities leads to an increase in choice error and hence less reliable preferences. We developed a mathematical model and a hierarchical Bayesian estimation to test to what extent a reduction in cognitive capacities leads to a shift in preferences or an increase in choice error. Using a within-subject n-back task to manipulate cognitive load, we conducted three experiments across different choice domains, including risky choice, temporal discounting, and strategic interaction (ultimatum game). Across all three domains results show that a reduction in cognitive capacity credibly affected participants' level of choice error rather than their respective preferences.

These results hold on an individual and on a group level. In sum, our approach makes the novel contribution of a rigorous test of how reduced cognitive capacity affects people's decision-making behavior.

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9:20-9:35 AM (148)

When Payoffs Look Like Probabilities: Separating Form and Content in Risky Choice. JOHANNES MUELLER-TREDE, *University of California, San Diego*, SHLOMI SHER, *Pomona College*, CRAIG R.M. MCKENZIE, *University of California, San Diego* (Presented by Craig McKenzie) — Prospect theory assumes a value function that is concave for gains and convex for losses, and an inverse S-shaped probability weighting function. But in typical experiments, form and content are confounded: Probabilities are represented on a bounded numerical scale, whereas representations of monetary gains (losses) are unbounded above (below). To unconfound form and content, we conducted experiments employing a probability-like representation of outcomes and an outcome-like representation of probability. We show that interchanging numerical representations can interchange the resulting psychophysical functions: A proportional (rather than absolute) representation of outcomes leads to an inverse S-shaped value function for gains. In addition, we show that an absolute (rather than proportional) representation of probability reduces sensitivity to large probabilities. These findings highlight the deeply constructive nature of the psychophysics of risky choice, and suggest that traditional models may reflect subjective reactions to numerical form rather than substantive content.

Email: Craig McKenzie, cmckenzie@ucsd.edu

9:40-9:55 AM (149)

Approximately Equal Judgments Affect Decisions About Breast Cancer Treatment. CHRISTOPHER WOLFE, *Miami University*, VALERIE F. REYNA, *Cornell University*, RICHARD J. SMITH, *Miami University* — Two experiments examined approximately equal judgments and decisions about breast cancer treatments. Participants read scenarios about patients facing treatment choices including one option with negative side effects but a greater probability of success. In Experiment 1, choices were framed using mortality or survival crossed with relative or absolute risk. Experiment 2 manipulated instructions focusing on side effects or approximately equality. In both experiments, the conditional probability of selecting treatments with side effects was lower when they were judged approximately equal (37%) than different (70%). In both experiments, relative negative framing (only) lead people with less breast cancer knowledge to produce more approximately equal judgments. Relative negative framing yielded fewer approximately equal judgments and more decisions for the option with side effects. Instructions focusing on side effects reduced the conditional probability of selecting the option with side effects given an approximately equal judgment. Fuzzy equality judgments appear to mediate treatment decisions.

Email: Christopher R. Wolfe, WolfeCR@MiamiOH.edu

**Statistics and Design****West Meeting Room 205-207, Saturday Morning, 8:00-9:40**Chaired by Brian P. Dyre, *University of Idaho***8:00-8:15 AM (150)**

Optimal Experimental Design for Joint Magnitude Estimation. BRIAN P. DYRE, *University of Idaho*, JUSTIN G. HOLLANDS, *Defence Research and Development Canada* — Supra-threshold scaling with joint magnitude estimation has used two experimental designs: a) independent variation of the part magnitudes such that relative and total magnitude covary (part-part design), or b) codependent variation of part magnitudes such that relative and total magnitude vary independently (part-whole design). Our aim was to determine which design is optimal for testing models of joint magnitude estimation. Using a Monte Carlo approach, we simulated data for both designs generated from a selection of separable joint magnitude estimation models (linear, power, super-additive, and Prelec). We then fit these models to the data to determine which design was best at selecting the data-generating model. We found the part-whole design to be generally better for selecting the data-generating model across variations in parameter values, stimulus ranges, and noise levels. Further, the part-part design was more likely to select models with simpler input stages than the data-generating model.
Email: Brian P. Dyre, bdyre@uidaho.edu

8:20-8:35 AM (151)

Adaptive Experimental Design for Systems Factorial Technology. JOSEPH W. HOUPPT, *Wright State University*, MARIO FIFIC, *Grand Valley State University* — Systems factorial technology (SFT) is a powerful frameworks for examining how people use multiple sources of information together. Unfortunately, it is often difficult to apply. Appropriate manipulation of the salience of each source of information is critical to assessing processing characteristics so a significant amount of time can be spent piloting to determine the correct levels. Even with piloting, some participants' data ends up unusable due to individual differences. In previous work, we demonstrated the use of the Psi method for determining individualized salience levels, however this approach focuses only on accuracy whereas response time (RT) is the primary measure with SFT. We will present an approach to adapting stimulus levels for each individual participant's accuracy and RT. This will increase the likelihood that salience manipulations will be effective and that a participant's data will be usable.
Email: Joseph Houpt, joseph.houpt@wright.edu

8:40-8:55 AM (152)

How Much Evidence is in a Significant Result? A Bayes Factor Analysis of 287,424 Psychological Findings. BALAZS ACZEL, BARNABAS SZASZI, *ELTE Eotvos Lorand University*, BENCE PALFI, *University of Sussex* — Customary statistical methods in psychology do not communicate the degree to which the collected data serve as evidence for the experimental hypothesis. In order to estimate the strength of evidence in significant psychological results, we calculated Bayes factors

for 287,424 findings of 35,515 articles published in 293 psychological journals between 1985 and 2016. Overall, 55% of all analyzed results were found to provide strong evidence (Bayes factor (BF) >10) for the alternative hypothesis, while more than half of the remaining results do not pass the level of the anecdotal evidence (BF=3). The results estimate that at least 82% of all published psychological articles contain one or more significant results which do not pass BF=10. This analysis highlights that due to the threshold of acceptance having been set too low for psychological findings, a substantial proportion of the published effects have weak evidential support.

Email: Balazs Aczel, balazs.aczel@ppk.elte.hu

9:00-9:15 AM (153)

Using a Bayesian Nonparametric Statistic. RICHARD CHECHILE, *Tufts University* — Bayesian statistics is a coherent system of inference for parametric analyses, but it has not heretofore developed methods for nonparametric statistics of ordinal and interval data. The current paper reviews a new Bayesian alternative to the classical nonparametric Wilcoxon signed-ranks statistic. The new statistic has high power for Gaussian data, but if the sampling is from an unknown distribution, then it can have a considerably higher probability for detecting a difference between conditions relative to a parametric test. This method is thus a robust method when parametric assumptions are questionable. The new metric also has important applicability for meta-analysis.
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9:20-9:35 AM (154)

Response Time Tests of Whether Experimental Factors Selectively Influence Processes in Multinomial Processing Trees. RICHARD SCHWEICKERT and XIAOFANG ZHENG, *Purdue University* — Multinomial Processing Trees are successful models in many psychological tasks, such as immediate serial recall. Although response probability is usually modeled, we also include response time. A mental process, such as memory retrieval, is represented as a vertex. An outcome of the process, such as successful retrieval, is represented by an arc descending from the vertex. An outcome occurs with some probability and takes some time. An experimental factor, such as phonological similarity, selectively influences a process if it changes probabilities and times on arcs descending from the corresponding vertex and no other. Consider a two factor experiment. We show with simulations how to use response probabilities and response times to test whether the data can be accounted for by the two factors selectively influencing processes in an underlying Multinomial Processing Tree. If such a tree is possible, we show how to determine its form.
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Cognitive Aging

West Meeting Room 208-209, Saturday Morning, 8:00-9:40

Chaired by Klaus Oberauer, University of Zurich

8:00-8:15 AM (155)

Simple Measurement Models for Complex Working Memory Tasks. KLAUS OBERAUER, *University of Zurich*, STEPHAN LEWANDOWSKY, *University of Bristol* — Current measures of working-memory capacity rely on theoretically uninformed summary statistics such as span or proportion correct. We will present a simple mathematical framework for building measurement models for working-memory tasks, and apply it to complex span and memory-updating tasks. Memory Measurement Models (M³) use the frequency distribution across response categories to measure continuous memory strength along two dimensions: Memory for individual elements, and memory for relations. The effects of experimental manipulations on these two dimensions can be captured by additional model parameters that reflect hypothetical processes affecting memory, such as strengthening of relevant information in memory, as well as filtering and removal of irrelevant information. We used M³ models to identify which memory-strength dimensions and which processes differ between young and old adults. With both complex span and updating, we found old adults to have weaker memory for relations, but unimpaired memory for elements. There was partial evidence for age differences in strengthening and in removal, and no age differences in the ability to filter irrelevant information at encoding.

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8:20-8:35 AM (156)

Age Differences in Emotional Responses to Monetary Losses and Gains. WÄNDI BRUINE DE BRUIN, *University of Leeds*, MARIJKE VAN PUTTEN and ROBIN VAN EMDEN, *Leiden University*, JONELL STROUGH, *West Virginia University* — Theories and evidence from life span developmental psychology suggest that older adults experience better emotional well-being than do younger adults. Yet, people of all ages may sometimes face losses (or gains) that may affect how they feel. Here, we examined age differences in emotions reported after actually experienced losses and gains, and their underlying mechanisms. Older and younger adults played a gamble with a 50% chance of losing or winning. Older adults reported better emotional well-being than younger adults, especially after losses (vs. gains). Older (vs. younger) adults reported more disengagement from ruminative thoughts (on the preoccupation component of the commonly used Action Control Scale), which was associated with their reduced negative emotions after losses. Older adults also reported seeing fewer opportunities (on the Future Time Perspective scale), which dampened positive emotions after gains. Our results suggest that, as compared to younger adults, older adults maintain more consistent positive emotional well-being that is relatively unaffected by their experience of losses and gains. Our findings have implications for interventions that aim to promote better emotional well-being across the life span.

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8:40-8:55 AM (157)

Learning About Trustworthiness With Age. ANGELA GUTCHES and EILEEN RASMUSSEN, *Brandeis University* — The literature on how aging affects trust is relatively limited. Previous research has indicated that although cognitive functions decline in older adulthood, socio-emotional processes can be maintained. There is some evidence that the propensity to trust others increases with age, consistent with enhanced or preserved social function with age. However, learning to trust based on the financial behavior of others could rely on learning processes (e.g., associative memory), which decline with age. 30 young adults and 30 older adults completed a survey measuring trust for others and trustworthiness of self, then completed an investment task with good, neutral, and bad brokers over three blocks. Our results indicate that age groups differ in their ability to learn who to trust. Older adult investment patterns suggest cognitive decline, in that older adults learned to distinguish the different broker types less well than younger adults. Furthermore, decisions to invest with good brokers and to avoid investing with bad brokers correlated with cognitive battery measures. Individual differences in levels of trust in others impact investment decisions in the first block, but do not affect decisions based on learning.

Email: Angela Gutches, gutches@brandeis.edu

9:00-9:15 AM (158)

Differences in Motor Sequence Learning in Younger and Older Adults: The Effect of Extended Practice. JONATHAN S. BARNHOORN, EDWIN H.F. VAN ASSELDONK and WILLEM B. VERWEY, *University of Twente* (Presented by Willem Verwey) — We present two experiments in which we studied motor sequence learning in healthy younger and older adults. In the first study we found reduced motor chunking behavior in older adults compared to younger adults. In the second study we investigated whether older adults are unable to use motor chunking strategies or whether they are just slower in developing them. We investigated also the influence of biomechanical factors on the occurrence of motor chunks in a sequence. In both experiments the participants performed a sequence of 3 and a sequence of 6 elements in a *Discrete Sequence Production* (DSP) task. We show that healthy older participants were slower developing motor chunks, but that with extensive practice age differences in chunking behavior diminish. Furthermore, in older (but not in young) adults slow responses that are often interpreted as chunk points were associated with a finger that was also slow during performance of the random sequences. This finding calls for more attention to biomechanical factors in future theory about aging and sequence learning.

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9:20-9:35 AM (159)

Differential Effects of Cognitive Training Modules on Healthy Aging and Mild Cognitive Impairment: A Comprehensive Meta-Analysis of Randomized Controlled Trials. CHANDRAMALLIKA BASAK, SHUO QIN and MARGARET O'CONNELL, *University of Texas at Dallas* — The main goals of the current comprehensive meta-analysis were to compare the effects of cognitive training on healthy



aging versus patients with MCI, and to compare gains across different types of training modules that targets either a single cognitive component, multiple cognitive components, or social engagement. Results from 116 studies showed that, in general, cognitive training modestly benefited cognition in older adults. All three training modules were similarly effective in improving overall cognition in healthy older adults, whereas in MCI patients only the single- and multi-component training modules were effective. This suggests that targeting specific cognitive functions during training may be the most effective in maintaining cognition in MCI. For healthy older adults, who were trained on a single cognitive component, executive control training resulted in greater cognitive improvements than memory training. For training studies targeting multiple cognitive components in healthy older adults gamebased training induced more cognitive gains than traditional multi-component approaches. Moderator analyses showed that studies with more than 40 hr of training were not effective in improving cognition in older adults.

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Spatial Cognition

West Meeting Room 212-214, Saturday Morning, 8:00-9:40

Chaired by Michael K. McBeath, Arizona State University

8:00-8:15 AM (160)

Cacti, Clocks, and Continents: Canonality and Near-Symmetry in Drawings and Web Images. MICHAEL K. MCBEATH and SUZANNE L. KHALIL, *Arizona State University* — We measured extent that canonical orientations and vertical symmetry are imposed in drawings versus web images of a variety of classes of objects that do not generally exhibit vertical bilateral symmetry. Participants were instructed to simply draw (1) a cactus, (2) a clock with hour and minute hand, and (3) a map of North and South America, and these were compared to web-based control images. The figures were examined for occurrence and degree of aspects of canonicity and symmetry. Our findings replicated work showing that participants exhibit biases to represent stimuli as more symmetric than both real-world and web control images. Drawn images were more vertically symmetric (but not completely so) for continents and cacti, but not for clocks. The cacti also exhibited an overwhelming bias for 2-armed saguaros, with arms oriented within the picture plane, apparently an archetypical, canonical representation. The results confirm that drawn depictions favor simple, canonical views oriented within the picture plane, with flatter, possibly anthropomorphized representations. Natural regularities of 3-D bilateral symmetry are imposed and the depth dimension minimized for representations over this broad range of object categories.

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8:20-8:35 AM (161)

Is Home Special? Examination of Errors During Path Integration. ELIZABETH R. CHRASTIL, GRACE L. NICORA and COURTNEY SHAFER, *University of California, Santa Barbara* — *Path integration*, the continuous updating

of position and orientation during self-motion, could be accomplished through two mechanisms: 1) maintaining a continuous homing vector signal back to the home position or 2) encoding the configuration of the outbound path and then computing the trajectory home. These two mechanisms are often confounded in traditional tests of path integration, which guide a participant through two legs of an outbound path and then require the participant to complete the triangle by making a trajectory back to the home location. Triangle completion also leaves open the potential for execution errors during the homebound trajectory, which could prevent a clear determination of errors in homing behavior. Here, we present the results of several experiments that examine the sources of error in path integration, introducing novel homing tasks to dissociate previously-confounded errors. The results lend new insight into the mechanisms of path integration.

Email: Elizabeth Chrastil, chrastil@ucsb.edu

8:40-8:55 AM (162)

Imprecise Vertical Localization in Surface-Based Locomotion but not in Flying. YU DU and WEIMIN MOU, *University of Alberta* (Presented by Weimin Mou) — Neuroscientific findings indicate that place cells of surface-based animals have a larger firing field vertically than horizontally. The current study investigated whether humans' localization is less accurate vertically than horizontally. Participants localized four objects on one wall of a virtual room. At learning, participants collected the objects by locomoting from a location on the floor to each object presented sequentially. Participants then replaced each object using memories, always locomoting from the floor. After the response, the correct location was indicated as a feedback and participants locomoted towards it. During testing, they replaced objects without feedbacks. One group of participants was allowed to fly three-dimensionally. Two other groups of participants traveled on surfaces only. These two groups differed in receiving the feedback: moving from the response location towards the correct location directly or being teleported to the floor before perceiving the correct location. The variance of localization error was larger vertically than horizontally only in the surface-based group who moved directly from response locations to correct locations during feedback. Several explanations are discussed.

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9:00-9:15 AM (163)

A User Study Comparing Two Low-Cost Chair Interfaces for Embodied Virtual Locomotion. ALEXANDRA KITSON, THINH NGUYEN-VO, ABRAHAM M. HASHEMIAN, EKATERINA R. STEPANOVA and BERNHARD E. RIECKE, *Simon Fraser University* (Presented by Bernhard Riecke) — Currently, there is a rise in popularity of immersive virtual reality (VR), yet movement in VR remains a large challenge. Traditional interfaces, e.g., joysticks, often leave the user feeling disoriented or motion sick because of a sensory mismatch between visual and vestibular cues; room-scale VR has space constraints that do not allow users to virtually travel long distances. One solution is to use subtle, real-world physical motions to provide vestibular cues and match the user's visual experience. We designed two interfaces with the HTC Vive:



1) An office chair that tracks the backrest and head mounted display (HMD) to provide forward, backward, left, and right movement as well as rotations corresponding to user's movements; 2) NaviChair: an ergonomic stool that sits atop a Wii Balance Board and senses user's center of mass shifts to move. Users were tasked to find 8 objects randomly hidden in 16 boxes. After, we interviewed them about their experience. Users found the embodied chair interfaces were easy to learn, natural and comfortable to use, and precise to locomote without significant motion sickness. These results suggest embodied chair interfaces are promising for movement in VR.
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9:20-9:35 AM (164)

Spatial Reference Systems in Spatial Updating and Path integration. TIMOTHY P. MCNAMARA, *Vanderbilt University* — Humans and other animals must update the spatial relations between their bodies and elements of the surrounding environment to stay oriented as they navigate. Spatial updating that relies solely on cues that are not themselves informative about position (e.g., vestibular & proprioceptive information; optic flow) is called path integration. We investigated the relative importance of egocentric and allocentric reference systems in spatial updating and path integration in experiments that manipulated the availability of body-based cues to self-motion, environmental geometry and features, familiarity of the environment, and cognitive strategies. Our results indicated that only two variables affected the spatial reference systems used in spatial updating and path integration: The availability of body-based cues to self-motion and spatial updating strategy. Environmental geometry and features had no influence on the selection of spatial reference systems, in contrast to their powerful effects on spatial memory.
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SYMPOSIUM IV: When Man Bites Dog: What do Developmental Reversals Tell Us About Cognitive Development, Aging, and the Brain

West Meeting Room 109-110, Saturday Morning, 10:00-12:00

Chaired by Vladimir M. Sloutsky, The Ohio State University

10:00-10:05 AM

Developmental Reversals and Cognitive Development. VLADIMIR M. SLOUTSKY, *The Ohio State University* — Introduction.
Email: Vladimir Sloutsky, sloutsky@psy.ohio-state.edu

10:05-10:25 AM (165)

Developmental Reversals in Attention and Memory: How Cognitive Immaturities Support Exploratory Behavior. VLADIMIR M. SLOUTSKY, *The Ohio State University*, — Cognitive immaturities have been historically considered as resulting mostly in cognitive limitations. This talk presents new evidence demonstrating how children's limitations in executive function and cognitive control result in developmental reversals in attention and memory tasks. Additional new evidence links these reversals to exploratory behaviors and reveals the

mechanisms underlying such behaviors. Taken together, this evidence suggests an adaptive nature of cognitive immaturities and argue that they allow maximizing exploration, something that is necessary for successful learning and cognitive development.

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10:25-10:45 AM (166)

Developmental Reversals in False Memory and Reasoning Illusions. CHARLES J. BRAINERD and VALERIE F. REYNA, *Cornell University* — Positive progression – that from childhood to adulthood, memory becomes more accurate and reasoning becomes more logical – is one of our most cherished principles of cognitive development. This makes the developmental reversals that fuzzy-trace theory predicts seem highly counterintuitive. Those predictions fall out of the notion that although verbatim and gist memory both improve with age, they can work against each other in certain types of remembering and certain forms of reasoning. Extensive evidence of such reversals has been reported in two spheres: false memory and the classic reasoning illusions of the judgment-and-decision making literature. False memory for semantically-related word lists, sentences, narrative texts, and live events all exhibit reversals, as do illusions such as decision framing and the conjunction fallacy. In each instance, reversals occur because erroneous inferences reflect advanced semantic capabilities, especially gist extraction and the disposition to rely upon it, whereas primitive verbatim memory governs technically correct performance.

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10:45-11:05 AM (167)

Developmental Reversals in Aging: Costs and Benefits of Cognitive Control. LYNN HASHER, *University of Toronto* — Although the ability to control the breadth of attention provides advantages across a range of tasks that have been at the center of interest to cognitive psychologists, there are other, perhaps less studied tasks which benefit from a less tightly regulated, broader focus of attention. On these latter tasks, older adults have been found to outperform young adults (or at least to do as well as young adults). This talk will highlight the surprising benefits of reduced cognitive control using healthy aging as a model, with a few references to findings on time of testing and mood effects since these too are also associated with differences in reliance on control even in young adults.

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11:05-11:25 AM (168)

Costs and Benefits of Cognitive Control: When a Little Frontal Cortex Goes a Long Way. SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* — Prefrontal cortex is a key component of a system that enables us to regulate our thoughts, behaviors and emotions, and impairments in all of these domains can readily be observed when this cognitive control system is compromised. Here, I explore a somewhat less intuitive hypothesis, namely that cognitive control has costs, as well as benefits, for cognition. I will provide evidence from several experiments in which we manipulated frontally-mediated cognitive control processes using noninvasive brain



stimulation (transcranial direct current stimulation; TDCS) of prefrontal cortex and observed the consequences for different aspects of cognition. Using this experimental methodology, we demonstrate the costs and benefits of cognitive control for language, memory, and creative problem solving. I will suggest that this framework for thinking about cognitive control has important implications for our understanding of cognition in children prior to maturation of prefrontal cortex.
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11:25-11:55 AM

Discussion. NORA NEWCOMBE, *Temple University* — Email: Nora Newcombe, Newcombe@temple.edu

Metacognition I

West Meeting Room 211, Saturday Morning, 10:20-12:00
Chaired by Christopher Hertzog, *Georgia Institute of Technology*

10:20-10:35 AM (169)

Effects of a Distinctiveness Manipulation on Metacognitive Retrieval Monitoring. CHRISTOPHER HERTZOG and TAYLOR M. CURLEY, *Georgia Institute of Technology*, JOHN DUNLOSKY, *Kent State University* — We studied distinctiveness effects on the accuracy of retrieval monitoring. Individuals saw stimuli consisting of four randomly selected noun exemplars from a taxonomic category (e.g., fish). One exemplar was the designated target. Individuals were randomly assigned to a Similarity condition (generate a feature shared by all exemplars) or a Difference condition (generate a feature distinguishing the target from other exemplars). Recall and recognition were tested by category-label cues (e.g., fish) after a 7-day delay. Feeling-of-knowing (FOK) judgments were collected prior to test. Confidence judgments (CJs) were collected after the five-alternative forced-choice recognition test (using two previously presented nouns and two new nouns as lures). Recall and recognition memory were better in the Difference condition, as expected (Hunt & Smith, 1996). The Difference condition also produced better resolution of FOKs for recognition of unrecalled items and better resolution of CJs for recognition of all items. Similarity-condition resolution for both judgments was not reliably greater than zero, with a substantial rate of high-confidence recognition errors. Distinctiveness-based encoding improves retrieval monitoring accuracy.
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10:40-10:55 AM (170)

The Tip of the Tongue (TOT) State and Curiosity. JANET METCALFE and PAUL A. BLOOM, *Columbia University*, BENNETT L. SCHWARTZ, *Florida International University* — Theories of curiosity suggest that people are most engaged with materials that are ‘almost known,’ or are in what is sometimes called the Region of Proximal Learning. Answers that are on the tip-of-the-tongue (TOT) seem, intuitively, to have this characteristic. Overwhelmingly, in Experiment 1, TOT items did evoke participants’ curiosity and their desire to see the answer, regardless of whether the feeling occurred in conjunction with an error of commission, an error of omission or even with the

correct answer. In Experiment 2, in which we provided the correct answers to TOT and non-TOT questions, people were (a) more likely to later recall those answers when they had been in a TOT state, and (b) the TOT feedback items evoked a distinctive event related voltage potential (ERP) pattern related to later memory. We conclude that the TOT state is related to curiosity as well as to enhanced encoding and memory.
Email: Janet Metcalfe, jm348@columbia.edu

11:00-11:15 AM (171)

The Motoric Fluency Effect in Metamemory. JONATHAN A. SUSSER, NEIL W. MULLIGAN and ZACHARY BUCHIN, *University of North Carolina* (Presented by Neil Mulligan) — Predictions of future memory are often influenced by the ease or fluency of processing information. Susser and Mulligan (2015) recently demonstrated that motoric fluency (of writing with the dominant or non-dominant hand) may likewise affect these predictions. In the present study, we report five experiments that specify the locus of this motoric fluency effect. In Experiment 1, we examined whether the effect was driven by differences in effective study time across hand conditions. In Experiment 2, we assessed whether the effect could be obtained without any visual feedback from handwriting. In Experiments 3a and 3b, we investigated the contribution of visual feedback alone. In Experiment 4, we used prestudy JOLs to determine whether participants may develop a belief about handedness in the context of the experiment. Taken together, the results indicate that the motoric act of producing information in a fluent or disfluent manner is sufficient to produce an effect on memory predictions, that visual information from writing does not contribute, and that on-line interaction with the task plays a role. The experience of motoric fluency appears to be another cue that affects metamemory.
Email: Neil W. Mulligan, nmulligan@unc.edu

11:20-11:35 AM (172)

Déjà Vu: An Illusion of Prediction. ANNE M. CLEARY and ALEXANDER B. CLAXTON, *Colorado State University* — Previous work from our lab has shown that spatial resemblance of a novel scene to an unrecalled but previously viewed scene can contribute to reports of experiencing déjà vu. The current study examined whether such reports of déjà vu are associated with any memory-based predictive ability regarding what should happen next within a dynamically unfolding scene, and whether such reports are associated with feelings of knowing what should happen next. Participants viewed videos of navigation through various study scenes from a first-person perspective. At test, they viewed first-person navigation through a new set of scenes that potentially mapped in configuration and navigational path onto earlier studied scenes but that stopped short of the final turn shown in the studied scene. When scene recall failed, participants reported a greater feeling of knowing what the direction of the next turn should be (left or right) when reporting a déjà vu state than when not, even though no such predictive ability was shown. This pattern suggests that déjà vu states can lead to prediction bias. This déjà vu bias may explain the often-reported link between reported déjà vu states and feelings of knowing what will happen next.
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11:40-11:55 AM (173)

Hacking Into Sleep to Enhance Learning. KEN A. PALLER, *Northwestern University* — Most learning takes hold gradually and requires practice (memory reactivation), which need not be intentional. Recent findings suggest that memory reactivation during sleep supports memory consolidation and enduring long-term storage. In particular, Targeted Memory Reactivation (TMR) with subtle sensory stimulation can modify neural activity while avoiding arousal from sleep. Sounds associated with learning can be presented again during slow-wave sleep to promote memory reactivation. TMR can thus systematically and selectively enhance learning, including learning of object-location associations, verbal associations, skills, and habits. Recordings of brain oscillations during sleep can provide evidence about relevant neurophysiological mechanisms, and in this way elucidate critical contributions of sleep to memory consolidation. Furthermore, the TMR approach offers new opportunities for reinforcing learning offline during the many hours we spend sleeping, so we should carefully investigate whether various clinical outcomes can be enhanced using TMR in conjunction with current therapies.

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Working Memory: Storage

West Meeting Room 118-120, Saturday Morning, 10:20-12:00

Chaired by Tom Redick, Purdue University

10:20-10:35 AM (174)

Working Memory Capacity and Reading Comprehension: A Test of the Multifaceted Theory. THOMAS S. REDICK, *Purdue University*, GENE A. BREWER, *Arizona State University*, NASH UNSWORTH, *University of Oregon* — The capability to temporarily maintain and manipulate information in immediate memory is essential for day-to-day functioning, including goal-directed behavior. Yet, we still don't fully understand why this ability, known as working memory capacity (WMC), is positively related to higher-order cognition, such as fluid intelligence, reading comprehension, and mathematical reasoning. The multifaceted theory of WMC (Unsworth et al., 2014) found that three WMC facets, primary memory capacity, attention control, and secondary memory abilities, were necessary and sufficient to account for all of the shared relationship between WMC and fluid intelligence. In addition, the facet approach demonstrated that individuals could be low in WMC for different reasons. In the current study of over 800 young adults, we investigated the relationship among the WMC facets, fluid intelligence, and reading comprehension. As in Unsworth et al. (2014), we identified sub-groups of individuals that were low in overall WMC but exhibited deficits in specific facets.

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10:40-10:55 AM (175)

False Memories at Short-Term Depend on the Retrieval of (Long-Term) Gist Memories. MARLENE ABADIE and VALERIE CAMOS, *Université de Fribourg* (Presented by Valerie Camos) — False memories are well-established

long-term memory phenomena. Recent research reported false recognition also at short term, suggesting that working memory could also give rise to false memories (e.g., Atkins & Reuter-Lorenz, 2008). Alternatively, we hypothesized that the emergence of false memories in working memory depends on the impairment of maintenance, remembering relying then on long-term memory. More specifically, we hypothesized that false memories rely on gist traces when verbatim traces of the same memory items cannot be retrieved. To test this proposal, we reported a series of 4 experiments in which the availability of two maintenance mechanisms, rehearsal and refreshing, was manipulated and the reliance of recognition performance on gist and verbatim traces was assessed. In accordance with our hypothesis, the occurrence of the false memory phenomenon in immediate recognition test was due to the impairment of maintenance mechanisms and the balance between gist and verbatim traces.

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11:00-11:15 AM (176)

No Slave to the Pitch Accent: The Strong Hebb Repetition Learning of Digit Lists. SATORU SAITO and RYOJI NISHIYAMA, *Kyoto University* — Repeated presentation of the same list increases recall performance in immediate serial recall. This Hebb repetition effect is thought to capture a cognitive basis for word-form learning. Consistent with this view, if a list containing a small group of items—similar to a novel word—is presented repeatedly, the item group behaves like a new lexical item. Notably, the Hebb repetition effect disappears if temporal pauses that encourage participants to group items in a certain manner vary in timing in every repetition. In the present study, grouping structures varied by pitch accent on digits. In two experiments, we found stable Hebb repetition effects even when differential pitch accent patterns were allocated to each repetition of the Hebb lists. This suggests that, at least for digit lists, the non-temporal bottom-up grouping structure of the list might not be essential for Hebb repetition learning.

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11:20-11:35 AM (177)

Domain-Specific and Domain-General Storage in Working Memory. PIERRE BARROUILLET and KIM UITTENHOVE, *University of Geneva*, LINA CHAABI and VALERIE CAMOS, *University of Fribourg* — Despite its central role in the cognitive architecture, the nature and structure of working memory (WM) resources remains a matter of controversy. Although some consensus seemed to emerge around the idea that there are central and peripheral components of WM storage (Baddeley, 2000; Barrouillet & Camos, 2015; Cowan, Saults, & Blume, 2014), Fougny, Zughni, Godwin, and Marois (2015) reported evidence that WM storage is intrinsically domain specific. In a series of experiments inspired by Fougny et al., but using recall instead of recognition, we asked participants to concurrently maintain auditorily presented letters with visually presented spatial locations. In line with the hypothesis of the existence of a central storage system, increasing visuospatial WM load had a detrimental impact on verbal recall, and increasing verbal WM load had a detrimental impact on visuospatial performance. A comparison with within-domain interference (letters vs.



digits or spatial location vs. ball movements) revealed that the observed between-domain effects are far from negligible, reinforcing the hypothesis of a central component of WM involved in domain-general storage.

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11:40-11:55 AM (178)

Common Modality Effects in Immediate Free Recall and Immediate Serial Recall. GEOFF WARD, *University of Essex*, RACHEL GRENFELL-ESSAM, *University of Loughborough*, LYDIA TAN, *City, University of London* — Participants were presented with between 2 and 12 words for immediate free recall (IFR) or immediate serial recall (ISR). Auditory recall advantages at the end of the list (modality effects) were observed in both tasks, and the magnitude and extent of the effect was dependent upon the list length. The modality effects were large and limited to the final serial position with shorter, ISR-length lists, and small and extended across multiple end-of-list positions with longer, IFR-length lists. Recall advantages early in the list (inverse modality effects) were also observed in both tasks at early list positions on longer lengths. Presentation modality did not affect where recall was initiated, but modality effects were greatest on trials where participants initiated recall with the first item. We argue for a unified account of IFR and ISR, where the modality effects emerge due to the greater resistance of auditory items to output interference.

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Attention: Visual Search

West Meeting Room 212-214, Saturday Morning, 10:00-12:00

Chaired by Jeremy M. Wolfe, Brigham and Women's Hospital/
Harvard Medical School

10:00-10:15 AM (179)

Modeling "Incidental Finding Errors" in Medical Image Perception...and Failing to Fix the Problem. JEREMY M. WOLFE, HAYDEN SCHILL and ABLA ALAOUI SOCE, *Brigham and Women's Hospital* — When radiologists examine an image for one specific problem (e.g. pneumonia), they also search for other clinically significant findings (e.g. signs of lung cancer). Unfortunately, these "incidental findings" are missed at relatively high rates. We have developed a hybrid search analog of the incidental finding problem that can be used with non-experts. In hybrid search, observers look for an instance of any several candidate targets held in memory. Our observers search for any of three specific (e.g. this picture of this hat) and three categorical (e.g. any animal) targets. Specific targets are the analog of the radiologist's primary task. Categorical targets are the analog of incidental findings. When categorical and specific targets are mixed within a block, observers miss over twice as many categorical targets as they do specific targets. When specific targets are 4X as common as categorical, the categorical miss rate becomes very large (38%), mimicking the pattern of incidental finding errors in radiology. With this model system in place, we have tried to reduce the categorical error rate by

adding periodic reminders about categorical targets. It didn't work. We continue to seek methods to reduce this class of medical error.

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10:20-10:35 AM (180)

Applied Visual Search: Studying Search in Practical Situations. STEPHEN R. MITROFF, STEPHEN H. ADAMO and MICHELLE R. KRAMER, *The George Washington University*, BENJAMIN SHARPE, *Kedlin Company*, DWIGHT J. KRAVITZ, *The George Washington University* — One important goal of cognitive psychology research is to use concepts derived in the lab to guide "real-world" applications. Well-controlled laboratory experiments have yielded fundamental insights into cognitive mechanisms, however generalizing to less-controlled contexts outside the lab remains a critical, yet underexplored arena. Several sub-fields have embraced translational goals, and visual search is one area that has had some success in informing applied practices. This presentation will highlight recent work that has examined visual search in both the lab and "real-world" settings and links the two together quantitatively. We will show how data from a range of participants (students, radiologists, airport security screeners, mobile app players) collectively demonstrate that lab-based findings can inform practical applications. For example, we will discuss recent data showing we can use a simple search task from an app to predict airport security screeners' actual on-job performance. Likewise, we will discuss a new basic-science paradigm that can potentially be used to inform radiological practices in the clinic. Ultimately, testing cognitive theories in and out of the lab can strengthen the theories and advance society.

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10:40-10:55 AM (181)

Distractor Memory During Visual Search is Unaffected by Dwell Time. TRAFTON DREW, *University of Utah*, ANNA VASKEVICH and ROY LURIA, *Tel Aviv University* — If you glance at your wallet while searching for your keys, do you remember seeing the wallet later? We studied this question by asking observers to complete a series of visual search trials where 100 distractor objects were recycled throughout this phase of the experiment. We monitored eye-movements throughout the experiment and aggregated all fixations on each distractor object. There was substantial variability in cumulative dwell time across objects. However, performance on a surprise memory test for all the distractors at the end of the visual search task was not correlated with this metric. Recognition performance for items fixated for 3800ms was no better (76% correct) than items fixated for ~950ms (76%). While previous research has shown that incidental fixations during visual search do not help guide subsequent searches for those items, the current findings extend this work by showing that incidental fixations on objects during search do not influence the likelihood of these objects being encoded into long-term memory. Thus, not only do we have a poor memory for *where* we have looked (as shown by prior research), the current results suggest that we have poor memory for *what* we have looked at as well.

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11:00-11:15 AM (182)

The Highs and Lows of Prevalence in Visual Search: A Meta-Analysis. TODD S. HOROWITZ, *National Cancer Institute* — Most research on prevalence in visual search has focused on low prevalence, a feature of medical tasks such as mammography screening. But high prevalence is also important for medical imaging, e.g. in pathology, particularly biopsy. Meta-analytic results show that basic cognitive psychology and applied medical image perception studies converge on an account of the low prevalence effect: sensitivity (d') is unaffected by prevalence, but criterion (c) becomes more conservative at low prevalence (Horowitz, 2017). Here I use meta-regression to show that these conclusions generalize across a variety of stimulus classes and observer types. Furthermore, I extend the meta-analysis to the high prevalence effect: While sensitivity is constant, criterion becomes more liberal at high prevalence. These findings demonstrate that our field is making real progress in understanding how prevalence modulates search, and that these findings can be usefully applied in a socially important domain.

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11:20-11:35 AM (183)

ERP Evidence Against Inattentive Deafness During High Load Visual Search. DONALD J. TELLINGHUISEN, MARISSA MCGAHAN and PAUL MOES, *Calvin College* — Cross-modal tests of Perceptual Load Theory have yielded mixed findings, particularly for auditory stimuli presented during high load visual searches. Some show the failure to perceive auditory stimuli under high visual perceptual load, a phenomenon termed “inattentive deafness”, supporting the theory (e.g., Macdonald & Lavie, 2011). Others, however, show significant reaction time effects of such stimuli (e.g., Tellinghuisen, Cohen & Cooper, 2016). We report experiments that explored how high load visual searches were impacted by to-be-ignored auditory stimuli that named either possible visual targets or stimuli not in the search array. Event Related Potential (ERP) and RT data did not indicate inattentive deafness for response compatible and incompatible auditory stimuli, yielding effects different than for target unrelated stimuli. Target related stimuli altered P1, N2, and P3 ERP waves in frontal and temporal lobes even in high load conditions. Task relevance was a critical factor determining whether auditory stimuli are processed.

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11:40-11:55 AM (184)

Impaired Distractor Suppression at Non-Optimal Times of Day. JOHN J. MCDONALD, MATEUSZ MICHALIK, ANDREA N. SMIT, ASHLEY C. LIVINGSTONE and RALPH E. MISTLBERGER, *Simon Fraser University* — Individuals often struggle to perform well in real-world tasks at times of day that are misaligned with their own circadian (24-hour) rhythm. Performance impairments at non-optimal times have been attributed to attention lapses, but specific attentional impairments are not entirely clear. Here, morning and evening chronotypes performed in an additional singleton search task at two times of day (morning and afternoon). We tracked target and distractor processing using ERP indices of attentional selection ($N2pc$) and suppression (P_p). We predicted that

evening chronotypes would be impaired in the morning because of a relatively large misalignment with their biological clock. The results showed that evening chronotypes retained the ability to find the target in the morning but not the ability to suppress the salient distractor. These findings indicate that failures to filter irrelevant stimuli at non-optimal times of day may contribute to distracted driving and other performance impairments in the real world.

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Judgment II

West Meeting Room 205-207, Saturday Morning, 10:00-12:00

Chaired by Teresa Treat, University of Iowa

10:00-10:15 AM (185)

Sexual-Judgment Processes in Sexual Aggression: A Performance-Based Characterization of Questionnaire Data. TERESA A. TREAT, *University of Iowa*, RICHARD J. VIKEN, *Indiana University* — The current study examines whether performance-based indices of men's judgments of women's sexual interest, derived from a questionnaire, predict sexual-aggression history and rape-supportive attitudes. Undergraduate males ($n = 1981$) completed the Heterosocial Perception Survey-Revised, which presents three written vignettes in which a man is alone with a woman with whom he wants to have sex. After each vignette, the participant reads seven descriptions of increasingly intimate advances by the man paired with increasingly negative responses by the woman, and judges the justifiability of the man's continued advances. A three-parameter logistic function was fit to the justifiability ratings within a non-linear mixed-effects framework. Sexual-aggression history and attitudes predicted reduced sensitivity to women's affect; more liberal response biases; and greater perceived baseline justifiability ratings of continued advances when a woman responded non-negatively. This work underscores the role of sexual-judgment processes in sexual aggression and illustrates the derivation of performance-based estimates of clinically relevant cognitive processes from responses to a self-report questionnaire.

Email: Teresa Treat, teresa-treat@uiowa.edu

10:20-10:35 AM (186)

Nudging Choice With Color. HUNTER LEISE and MICHAEL C. MOZER, *University of Colorado, Boulder*, KAREN B. SCHLOSS, *University of Wisconsin, Madison* (Presented by Michael Mozer) — We investigated the influence of task-irrelevant color variation on choice. Participants were shown unfamiliar black shape contours and were asked to select which of two pronounceable nonword names best matched the shape. The names were presented in white text on large buttons, one filled with a reference color (red in Experiment 1, cyan in Experiment 2) and the other filled with a color varying subtly from the reference along dimensions of chroma, lightness, and/or hue. We explored a space of 5x5x5 color variations and estimated the selection bias over this space using Gaussian process regression. In both experiments, the probability of selecting a button increased with increased chroma (colorfulness), but the



probability was unaffected by modulations of lightness or hue. Our results are consistent with reports that chroma contrast but not luminance contrast contributes to attentional saliency. Our results have implications for use of incidental color on the web. Email: Michael C. Mozer, mozer@colorado.edu

10:40-10:55 AM (187)

Comparing the Models of Context Effects in Multi-Attribute Choice. NATHAN J. EVANS (Member Select-Speaker Award Recipient), WILLIAM R. HOLMES and JENNIFER S. TRUEBLOOD, *Vanderbilt University* — Understanding cognitive processes involving choices with multiple alternatives and multiple attributes is of interest to a wide range of fields. Early work postulated that multi-attribute choice was the result of independent evaluations of each alternative. However, violations of independence are robustly observed in empirical data, mainly through three key “context effects”: the attraction, similarity, and compromise effects. Our study uses state-of-the-art computational modeling and data from 6 different published studies to compare three previously proposed theories / models of these effects: Multi-alternative Decision Field Theory (MDFT), the Leaky-Competing Accumulator (LCA), and the Multi-attribute Linear Ballistics Accumulator (MLBA). Contrary to previous research, which suggested that MDFT and the LCA could account for all three effects, we find that these models failed to account for the compromise or similarity effects. Conversely, MLBA captured all three context effects successfully, suggesting the hypotheses embedded in MLBA more closely account for observations than those embedded into MDFT and LCA.

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11:00-11:15 AM (188)

Knowledge Representations of Sources of Risk. SUDEEP BHATIA, *University of Pennsylvania* — We outline computational techniques for uncovering what people know and associate with different sources of risk. Our approach applies the insights of vector space semantic models, a class of popular theories of semantic memory that use natural language data to uncover knowledge representations for real-world objects and events. Within psychology, representations obtained from such models have already been found to describe behavior in a variety of psycholinguistic, cognitive, and high-level judgment tasks. In this paper, we show that vector space models can also be used to quantify knowledge representations for real-world risk sources, and subsequently predict the risk perceptions of individuals. Additionally, unlike existing techniques in risk perception research, this approach does not require any specialized participant data, and can be used to make quantitative a priori predictions for novel (out-of-sample) risks. Vector space semantic models are also able to quantify the strength of association between sources of risk and a very large set of words and concepts, and can thus be used to identify the cognitive and affective factors with the strongest influence on risk perception and resulting behavior.

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11:20-11:35 AM (189)

Do People Change Their Judgments in the Manner Predicted by Quantum Interference? ZHENG WANG, *The Ohio State University*, JEROME R. BUSEMEYER, *Indiana University* (Presented by Jerome Busemeyer) — Suppose people are asked to judge issue A, and then judge another issue B, and finally reconsider issue A again. Will they change their mind from the first to the second judgment about A? A general quantum model of judgment predicts that the answer depends on the “compatibility” between questions A and B. The compatibility between questions can be determined by checking for order effects (answering A and then B produces a different result than the opposite order). If order effects occur, then the quantum model predicts answers to A will change. Furthermore, the amount of change is predicted to depend on the correlation between answers to A and B. We present empirical results that test these a priori predictions derived from a quantum model of judgment.

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11:40-11:55 AM (190)

Explaining Quantitative Judgments With a Mixture Model That Combines Exemplar and Cue Abstraction Processes. REBECCA ALBRECHT, *University of Basel*, JANINA A. HOFFMANN, *University of Konstanz*, JÖRG RIESKAMP, *University of Basel*, TIMOTHY PLESKAC, *Max Planck Institute for Human Development*, BETTINA VON HELVERSEN, *University of Zurich* (Presented by Bettina von Helversen) — Research on quantitative judgments from multiple-cues suggests that judgments are simultaneously influenced by previously abstracted knowledge about cue-criterion relations and memories of specific exemplars. However, most modelling approaches assume that judgments either follow a cue abstraction or an exemplar-based process. Here, we propose a new model (CX-COM) that describes how both processes interact in forming a judgment. It proposes that first one exemplar is recalled from episodic memory. Secondly, the retrieved exemplar’s criterion value is adjusted based on a cue abstraction process. We test the model in two studies focusing on qualitative predictions based on its core assumptions: (1) a response is based on one exemplar recalled in a similarity-based retrieval process, predicting systematic changes in variability across items. (2) Exemplar and cue abstraction processes are combined, implying a specific pattern of interpolation and extrapolation judgments. Overall, CX-COM explains human judgments best. It provides the best quantitative fit and participants’ judgment correspond to the predicted qualitative patterns in both studies. In sum, our results suggest that CX-COM is a viable new model for quantitative judgments.

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Psycholinguistics

West Meeting Room 208-209, Saturday Morning, 10:20-12:00

Chaired by Chris Westbury, University of Alberta

10:20-10:35 AM (191)

Schooling Chomsky's Imagination: Unifying Morphology, Semantics, and POS Tagging as Vector Computation. CHRIS F. WESTBURY and GEOFF HOLLIS, *University of Alberta* — In 1956, Chomsky wrote that “Whatever the other interest of statistical approximation [...] may be, it is clear that it can shed no light on the problems of grammar.” Since that time, evidence from a disparate set of approaches has shown that statistical approaches do in fact have the capability of shedding light on syntax and morphology, and indeed may even be central to understanding these processes. We present a new approach to understanding the role of morphology via semantics, as encoded on co-occurrence probabilities, by demonstrating that it is possible to extract a great deal of accurate morphological and part of speech information directly from patterns of word co-occurrence, which have no access to the formal structure of the words.

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10:40-10:55 AM (192)

Separability of Lexical and Morphological Knowledge: Evidence From Russian-Hebrew Bilingual Children. ANAT PRIOR, DAPHNA SHAHAR YAMES and ZOHAR EVIATAR, *University of Haifa* — Lexical and morphological knowledge are correlated with each other, and often difficult to distinguish. Most current assessments of morphological knowledge might be confounded by vocabulary knowledge. In the current study, we investigated Hebrew lexical and morphological knowledge Russian-Hebrew bilingual and native Hebrew speaking 5th grade children. Participants completed a measure of Hebrew productive vocabulary, and four morphological tasks that differ in the degree to which they rely on lexical knowledge. Bilinguals had significantly lower performance in vocabulary and in a task requiring morphological derivation of real words, due to reduced exposure to Hebrew. In contrast, both groups performed similarly in abstract morphological tasks with a lower vocabulary load. These results demonstrate that lexical and morphological knowledge may have separable developmental trajectories, and highlight the importance of distinguishing between these two linguistic components especially when assessing bilingual children.

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11:00-11:15 AM (193)

The P600 For Singular ‘They’: How the Brain Reacts When John Decides to Treat Themselves to Sushi. GRUSHA PRASAD, *Johns Hopkins University*, JOANNA MORRIS and MARK FEINSTEIN, *Hampshire College* (Presented by Joanna Morris) — We examined sentences where the pronoun ‘they’ and the reflexive ‘themselves’ were co-indexed with both singular and plural antecedents. These antecedents varied in gender ambiguity (‘John’ vs ‘the participant’) and in specificity of the antecedent (‘John’ vs ‘every man’). We predicted that we

would find a P600 effect only for singular antecedents with unambiguous gender. In our reflexive data, for all antecedents, the P600 for singular antecedents was greater than that for plural antecedents. In our pronoun data, this pattern was true only for specific antecedents with unambiguous gender (‘John’). We hypothesize that (a) non-specific antecedents though syntactically singular are notionally plural and (b) ‘they’ is easier to associate with singular antecedent than ‘themselves’ because the reflexive carries an overt morphological marker of plurality while the pronoun does not. These data suggest that use of singular ‘they’ requires antecedents with ambiguous gender or notional plurality.

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11:20-11:35 AM (194)

Re-thinking Domain Generality vs. Domain Specificity: The Role of Prior Knowledge in Statistical Learning. LOUISA BOGAERTS, NOAM SIEGELMAN and RAM FROST, *The Hebrew University* (Presented by Ram Frost) -- Statistical learning (SL) is typically considered a domain-general mechanism for extracting regularities. Recent studies showed, however, that individual abilities in visual and auditory SL tasks, although stable over time, are not correlated. This finding is consistent with domain-specificity in SL. But note that whereas most visual SL tasks involve the processing of abstract shapes, auditory tasks are usually based on verbal materials. Here we entertain the hypothesis that verbal materials substantially involve prior knowledge, stemming from linguistic experience. In support of this claim, we show that whereas non-verbal tasks display high between-item correlations, auditory-verbal tasks display item-specific effects. We further show that individual performance in auditory and visual tasks *is* correlated when both tasks employ non-verbal material. We discuss the implications of the unique interaction between modality and material type, focusing on models of domain-generality/specificity and on the relation between SL and linguistic abilities.

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11:40-11:55 AM (195)

Is an Emoji Worth a Thousand Words? Neural Responses to Emoji-Generated Linguistic Irony. BENJAMIN WEISSMAN and DARREN TANNER, *University of Illinois at Urbana-Champaign* (Presented by Darren Tanner) — Emojis are used ubiquitously in daily communication; there are theories that address the linguistic uses of these symbols, yet a severe lack of psycholinguistic research about the on-line processing of emojis in sentence contexts. We used ERPs to measure the brain responses to ironic and non-ironic emojis that appeared at the end of short, positively- or negatively-valenced sentences. Results across two experiments – one that told participants that sentences might be sarcastic and one with no mention of sarcasm – indicate that the wink emoji, when understood ironically, generates the same ERP brain response complex as word-based verbal irony, as found in other discourse irony studies (P200 + P600 effects). This study contributes much-needed psycholinguistic evidence about how linguistic emojis are processed in real time, and provides important constraints on the interpretation of the P600 ERP component.

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**SYMPOSIUM V: 50 Years of Implicit Research: A****Symposium in Honor of Arthur S. Reber****West Meeting Room 109-110, Saturday Afternoon, 1:30-3:30***Chaired by Paul J. Reber, Northwestern University***1:30-1:55 PM (196)**

The Reach of the Unconscious. AXEL CLEEREMANS, *University Libre de Bruxelles* — A great conceptual pendulum oscillates, with a period of about 30 or 40 years, over our understanding of the relationships between conscious and unconscious information processing. Its path delineates the contours of the unconscious mind as well as its contents: Sometimes smart and defining the very fabric of the mind, the unconscious is at other times relegated to taking care of little more than our bodily functions. The pioneering work of Arthur Reber suggested that the unconscious is not only capable of influencing ongoing processing, but also that it can learn! However, even Reber was cautious in this respect, reminding us that the only safe conclusion is that participants' ability to verbalise the knowledge they have acquired always seems to lag their ability to use it. Today, it often feels like we have thrown caution to the wind, with many questioning the very functions of consciousness and arguing that it is but a mere epiphenomenon. Here, I will revisit this long-standing debate and suggest that the pendulum has swung a little too far. A few general principles emerge from this skeptical analysis. First, the unconscious is probably overrated. Second, since awareness cannot be "turned off", it should be clear that any decision always involves a complex mixture of conscious and unconscious determinants. Third, there is a pervasive and continuing confusion between information processing without awareness and information processing without attention. Implicit learning, as a field, remains fertile grounds to explore such issues.

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1:55-2:20 PM (197)

Implicit Learning in Healthy Old Age: The Central Influence of Arthur S. Reber. JAMES H. HOWARD, JR., *The Catholic University of America*, DARLENE V. HOWARD, *Georgetown University* — In his later work Arthur Reber proposed that the implicit learning system was more basic than the often-studied explicit system and thus less sensitive to brain insult. Consistent with the prevailing view of aging at the time, research focused almost exclusively on age-related cognitive declines, as shown for episodic memory and other forms of explicit cognition. Reber's proposal suggested that this was providing an incomplete picture of cognitive aging since implicit learning is essential throughout life for acquiring new skills and adapting to new physical and social environments. Since the mid 1990's our group has investigated the aging of implicit learning, finding that although learning of deterministic relationships is indeed relatively preserved with age, declines do occur when learning probabilistic sequential relationships. Furthermore, this pattern of savings and loss can be related to selective age-related differences in brain function, consistent with Reber's hypothesis.

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2:20-2:45 PM (198)

Implicit Learning and the Multiple Memory Systems Framework. BARBARA J. KNOWLTON, *University of California, Los Angeles* — The idea that complex structure can be acquired implicitly has been important for the view that there are multiple memory systems that depend on different brain systems. Studies showing that patients with amnesia are capable of learning perceptuomotor skills gave rise to the distinction between declarative vs. procedural learning (knowing that vs. knowing how; Cohen & Squire, 1980). However, subsequent studies showing that these patients were able to acquire the structure of an artificial grammar and category prototypes served to broaden our understanding of the capabilities of nondeclarative learning, in that it became clear that patients with amnesia were also able to learn complex information that was not embedded within a learned procedure. Rather, the lack of awareness for what had been learned became a more important diagnostic feature of nondeclarative memory. Studies of implicit learning in amnesia expanded the notion of multiple memory systems beyond the procedural-declarative dichotomy. Recent studies have focused on elucidating the distinct roles of cerebral cortex, basal ganglia and cerebellum in implicitly acquiring structure from input.

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2:45-3:10 PM (199)

A Brief History of Implicit Learning From Language to Memory Systems and Beyond. PAUL J. REBER, *Northwestern University* — The first description of the phenomenon of implicit learning occurred at a time where the science of psychology was just beginning a "cognitive revolution" that allowed for theories that gave serious consideration to knowledge representations within the human mind. Early debates about measuring consciousness and awareness of implicitly learned knowledge showed how challenging it can be to infer representation characteristics solely from behavior. The eventual emergence of cognitive neuroscience and the memory systems framework provided a supporting route for integrating findings from neuropsychology and neurobiology into a coherent view of multiple types of learning and memory. This interdisciplinary approach has allowed the core concept of implicit learning to guide our recent research on cognitive questions outside the laboratory in areas such as intuitive decision making, skill learning and even cybersecurity. These examples demonstrate how the key original insight that there is more than one kind of learning continues to influence an exceptionally broad range of research across psychological science.

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3:10-3:30 PM**Discussion.** ARTHUR S. REBER



Recall

West Meeting Room 211, Saturday Afternoon, 1:30-3:30

Chaired by Edgar Erdfelder, University of Mannheim

1:30-1:45 PM (200)

Storage and Retrieval Contributions to the Sleep Benefit in Episodic Memory: A Model-Based Analysis. EDGAR ERDFELDER, *University of Mannheim*, CAROLINA E. KUEPPER-TETZEL, *University of Dundee*, JULIAN QUEVEDO PUETTER, *University of Mannheim* — After sleep, people recall more previously learned information than after an equally long period of wakefulness. Whereas early accounts attributed this to passive shelter effects of sleep, more recent research suggests active memory consolidation benefits of sleep. A third explanation maintains that phase-shifted circadian rhythms of encoding and retrieval can account for the results. We propose the Encoding-Maintenance-Retrieval model to test these explanations. This model provides uncontaminated measures for encoding of word-pair associations (e), maintenance of associations across the retention interval (m), and retrieval of associations (r). We manipulated time of learning, length of retention, and ease-of-retrieval in two experiments. Results support the validity of our model by showing that ease-of-retrieval affects r selectively. Moreover, they rule out phase-shifted circadian rhythms in e and r . Most importantly, both experiments show that sleep boosts maintenance of associations in memory (m) and, in addition, improves retrieval (r). Theoretical implications will be discussed.

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1:50-2:05 PM (201)

Neural Inhibition Enables Inhibitory Control Over Memory. TAYLOR SCHMITZ, *University of Cambridge*, CATARINA S. FERREIRA, *University of Birmingham*, MICHAEL C. ANDERSON, *University of Cambridge* (Presented by Michael Anderson) — Although inhibitory control is widely discussed in cognitive psychology, the relationship between cognitive and neural inhibition is less clear. Here, we examined whether one example of cognitive inhibition—retrieval suppression—might be implemented in part by neuronal inhibition. Stopping episodic retrieval is known to down-regulate hippocampal activity and induce episodic forgetting of suppressed content. To determine whether neural inhibition mediates these effects, we asked people to view reminders of unwanted memories and to suppress retrieval while being scanned with fMRI. Critically, we also used ^1H magnetic-resonance spectroscopy to measure hippocampal GABA (the chief inhibitory neurotransmitter used by inhibitory interneurons). Strikingly, we found that increasing hippocampal GABA predicted (a) more effective hippocampal down-regulation, (b) greater suppression-induced forgetting, and (c) stronger negative coupling between the dorsolateral prefrontal cortex and the hippocampus during suppression. In contrast, stopping actions did not engage this

pathway or depend on hippocampal GABA. These findings suggest that GABAergic inhibition local to the hippocampus contributes to inhibitory control over memory.

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2:10-2:25 PM (202)

Complementarity in False Memory Illusions. CHARLES BRAINERD, VALERIE F. REYNA and KEN NAKAMURA, *Cornell University* — The DRM illusion is customarily interpreted as a reality reversal, wherein unrepresented words are vividly remembered as what they are not (old) rather than as what they are (new-similar). The evidence that supports this idea is limited by the fact that the memory tests only asked subjects whether test items were old. We removed that limitation by also asking them whether test items were new-similar. In a series of experiments, we found that the DRM procedure actually induces complementarity illusions rather than reality reversals; that is, unrepresented words are simultaneously remembered as being old and as being new-similar at comparable rates. Complementarity illusions also spilled over to old words. The conjoint recognition model posits that complementarity illusions arise from the competing influences of dual recollection processes. One process (context recollection) erroneously perceives new-similar words to be old, whereas the other (target recollection) correctly perceives them to be new-similar.

Email: Charles J. Brainerd, cb299@cornell.edu

2:30-2:45 PM (203)

Remembering the 2016 Election Campaign: Temporal Proximity Predicts Free Recall Order. MITCHELL G. UITVLUGT and M. KARL HEALEY, *Michigan State University* (Presented by Karl Healey) — Recalling one memory is like pulling on one link of a chain; it brings with it many others. A fundamental principle of numerous memory models is that links form between memories that are encoded nearby in time. However, evidence for this *temporal contiguity effect* comes almost exclusively from laboratory list learning tasks. To determine if the effect also occurs outside the laboratory, we asked participants to recall news stories related to the 2016 presidential election shortly following Election Day. Despite the long timescale separating the individual stories and the fact that participants had no expectation that their memory would be tested when they first experienced these events, order of recall was strongly influenced by the order in which the stories had originally appeared in the news. Moreover, this remained true even when we accounted for the fact that stories that occur close together in time tend to be semantically related.

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2:50-3:05 PM (204)

Temporal Grouping Enhances Serial Recall Primarily as a Function of Output Position. JEREMY B. CAPLAN and YANG S. LIU, *University of Alberta* — A major assumption of current models of immediate serial recall is that recall proceeds from one cue to the next, without regard to the outcome of the prior recall (Henson et al., 1996). Participants performed serial



recall of nine-consonant list, either ungrouped or temporally into three groups of three letters. Critically, recall was requested either in the forward or backward direction. At odds with the independent-cueing assumption, the influence of grouping on serial-recall in the backward direction was the mirror-image of that in the forward direction; recall-direction interacted with serial position but not with output position. Results were similar when direction was manipulated between subjects (Experiment 1) and within-subjects, post-cued (Experiment 2). SIMPLE a well developed positional-coding model that assumes independent-cueing, was unable to fit the effects of grouping. The independent-cueing assumption may need to be removed from positional-coding models, and models that assume one item cues the next, such as associative chaining models, need to be reconsidered.

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3:10-3:25 PM (205)

Facilitation and Inhibition in Repeated Part-List Cueing.

LEONEL GARCIA-MARQUES, PEDRO MARQUES and ANA LAPA, *Universidade de Lisboa*, LUDMILA D. NUNES, *Purdue University* — Divergent accounts have been proposed to explain the effects of part-list cueing on the recall of non-cued items. Here, we introduce a new paradigm that may contribute to further test these alternative accounts of this effect and to explore its limits. In our paradigm a list of unrelated, mid-frequency words are presented for study to all Ps once. At repeated testing, in the first 4 tests, Ps either free recall the presented words, receive always the same set of words or received different sets of words (the words are always drawn from the study list) as cues. In one experiment, all words are presented as cues and in another some words are never presented as cues across all conditions. In the last test, all Ps recall the study words with no cues. A disruption of strategy account would predict that performance to be more impaired when cueing is less predictable (different cues condition) whereas occlusion accounts would predict that repeatedly receiving the same cues across tests would increase occlusion. Initial results favor the former account. Furthermore in 5th test (without part-list cues), we propose a parallel between part-list cueing and retrieval inhibition paradigms for the set of words never cued.

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Decision Making II

West Meeting Room 212-214, Saturday Afternoon, 1:30-3:10

Chaired by Ben R. Newell, University of New South Wales

1:30-1:45 PM (206)

The Magnitude of 'Extreme Outcomes' Determines Risk Preference in Experience-Based Choice. EMMANOUIL KONSTANTINIDIS, ROBERT TAYLOR and BEN R. NEWELL, *University of New South Wales* (Presented by Ben Newell) — What governs the tendency to seek or avoid risk? Received wisdom suggests risk aversion in the presence of moderate to large probability gains and risk-seeking in the presence of similar losses: a 'reflection effect' A recent series of studies employing a novel class of experience-based tasks

has challenged this wisdom by demonstrating risk seeking for moderate-probability gains and risk-aversion for moderate probability losses. This 'reversed reflection effect' is attributed to a memory bias guiding choices towards the apparently best available option and away from the worst – an 'extreme-outcome' rule. We demonstrate that extreme outcomes have this effect only when payoffs are small in magnitude. With large magnitudes the standard reflection effect is found, a result which suggests that risk preferences in experience-based decision-making are not only affected by the relative extremeness, but also by the absolute extremeness of past events.

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1:50-2:05 PM (207)

A Race Model for Multiple Stopping Rules in Decision Making.

MARIO FIFIC, *Grand Valley State University* — A parallel race model is proposed for human stopping behavior in decision making. The model is called the Cast-Net as it selects a stopping rule by randomly drawing from a parameter space spanned by a range of possible stopping rule values. It is hypothesized that a decision maker controls the span of the parameter space. The model synthesizes the three major stopping rules (critical difference, runs, fixed-sample size), the sequential sampling, the variable threshold approach, and the parallel processing structure. The model was tested using a deferred decision task in the context of a shopping situation. Subjects are asked to open an optional number of either positive or negative recommendations about the quality of products, and to make the best buying decision. The results indicated that the Cast-Net model provides reasonable theoretical grounds of how different simple stopping rules can be combined within one decision making model.

Email: Mario Fific, fificm@gvsu.edu

2:10-2:25 PM (208)

Exploring the Decision Dynamics of Risky Intertemporal Choice.

EMMANOUIL KONSTANTINIDIS (Member Select-Speaker Award Recipient), *University of New South Wales*, DON VAN RAVENZWAAIJ, *University of Groningen*, BEN R. NEWELL, *University of New South Wales* — Previous research on the effects of probability and delay on decision-making has focused on examining each dimension separately, and hence little is known about when these dimensions are combined into a single choice option. Importantly, we know little about the psychological processes underlying choice behavior with rewards that are both delayed and probabilistic. Using a process-tracing experimental design, we monitored information acquisition patterns and processing strategies. We found that probability and delay are processed sequentially and evaluations of risky delayed prospects are dependent on the sequence of information acquisition. Among choice strategies, directly comparing the values of each dimension (i.e., dimension-wise processing) appears to be most favored by participants. Our results provide insights into the psychological plausibility of existing computational models and make suggestions for the development of a process model for risky intertemporal choice. Email: Emmanouil Konstantinidis, em.konstantinidis@gmail.com



2:30-2:45 PM (209)

Order Matters: Alphabetizing In-Text Citations Biases Citation Decisions. JEFFREY R. STEVENS and JUAN F. DUQUE, *University of Nebraska-Lincoln* — Though citations are critical components for communicating science and are used to evaluate scholarly success, they can be influenced by properties unrelated to the quality of the work, e.g., psychological biases. Using a sample of over 150,000 articles, we tested whether alphabetizing in-text citations biases readers into focusing on articles with first authors whose surnames begin with letters early in the alphabet. We found that surnames earlier in the alphabet were cited more often than those later in the alphabet. Moreover, this effect was stronger when journals ordered citations alphabetically compared to chronologically or numerically. Lastly, this effect was stronger in psychology journals (which have a culture of alphabetizing citations) compared to biology or geoscience journals (which primarily order chronologically or numerically). Therefore, alphabetizing citations biases citation decisions, and we propose that journals using alphabetically ordered citations switch to chronological ordering to avoid this bias.

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2:50-3:05 PM (210)

How Linguistic Metaphor Scaffolds Reasoning. PAUL THIBODEAU, *Oberlin College*, ROSE K. HENDRICKS and LERA BORODITSKY, *University of California San Diego*, STEPHEN J. FLUSBERG, *Purchase College, State University of New York*, TEENIE MATLOCK, *University of California Merced* — Language helps people communicate and think. Precise and accurate language would seem best suited to achieve these goals. But a close look at the way people actually talk reveals an abundance of apparent imprecision in the form of metaphor: *ideas are light bulbs*, *crime is a virus*, and *cancer is an “enemy” in a war*. Recent work in psychology has revealed that metaphoric language can be particularly effective in communication and that it can powerfully shape the way people think, even though it is literally false. In this talk, we discuss how linguistic metaphors help people integrate novel information with prior knowledge from a semantically unrelated domain for reasoning and inference by reviewing recent experiments on the role of metaphor in decision making, language processing, memory, and attention.

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Attention: Control

West Meeting Room 118-120, Saturday Afternoon, 1:30-3:10

Chaired by Corey White, Syracuse University

1:30-1:45 PM (211)

A Spotlight Diffusion Model Analysis of the Attentional Networks Task. COREY N. WHITE, *Missouri Western State University*, RYAN CURL, *Syracuse University* — The Attention Networks Task (ANT) involves flanker stimuli (< < > <) with different types of cues to orienting, alerting, and selective attention. Attention is assessed by RT differences between conditions, but this approach does not explain what cognitive

mechanisms are affected by the cues. To address this, we applied a Spotlight Diffusion Model to data from 164 participants performing the ANT. The model decomposes behavioral data into measures of caution, motor/encoding duration, perceptual strength, and attentional control. The results showed complex effects of alerting and orienting cues: the presence of the cues lead to reduced caution, shorter motor/encoding time, improved perceptual processing, and improved attentional control. Thus the effects of orienting and alerting cues are multifaceted and complex. We recommend that future studies of the ANT employ models like the Spotlight model to improve our understanding of how processing differs across conditions or individuals.

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1:50-2:05 PM (212)

When What You Intend to Do Is Not What You Do: Task Selection and Task Preparation in Voluntary Task Switching.

CATHERINE M. ARRINGTON, *Lehigh University* — “Sometimes I decided to switch tasks, but the number would appear very quickly and I would just do the old task because that was what I was still ready for.” This quote from a participant in an early voluntary task switching (VTS) experiment inspired this study examining the experience of intending to do one task but performing a different task. Participants performed parity and magnitude judgments on single digits under standard VTS instructions to perform the tasks in a random order. Additionally the above scenario was described to participants and they were instructed to indicate with a keypress whether they experienced this in their own responding on any trial. The results indicate that the majority of subjects have this experience on a small number of trials (range 0 to 3%). The results suggest a dissociation of and coordination between task selection and task preparation processes during multitask behavior.

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2:10-2:25 PM (213)

The Attentional Cost of Being a Good Reader. JESSICA GREEN, *University of South Carolina* — The neural correlates of voluntary spatial attention have been well documented – frontal and parietal lobe control processes followed by preparatory modulations of sensory cortex, including both enhancement of the to-be-attended location and suppression of to-be-ignored locations. There can, however, be large variation between subjects in both behavioural and neural measures of attentional control. Here, we show that variability in reading skills accounts for nearly 30% of the variability in basic attention processes and their neural correlates as measured with EEG. Moreover, only high-ability readers show strong suppression of the to-be-ignored left side of space when shifting attention rightward. This suppression makes shifts of attention in the direction of reading more efficient, but comes at a cost – good readers have more difficulty shifting attention back toward the suppressed left side of space.

Email: Jessica Green, jessica.green@sc.edu

**2:30-2:45 PM (214)**

Temporal Negative Priming. TODD A. KAHAN, *Bates College*, LOUISA M. SLOWIACZEK, *Bowdoin College*, MELODY R. ALTSCHULER, *Bates College* — Responses to a target's identity are slower when that item previously appeared as a distractor relative to when that item was not previously ignored (identity negative priming). Similarly, responses to the location of a target are slower when it appears in a location that was previously occupied by a distractor relative to when that location was not previously ignored (location negative priming). These two negative priming effects, one based on a target's identity and the other based on location, have been shown to differ in important ways and may involve different underlying neural structures. In the present experiment we report an entirely new negative priming effect based on WHEN a target appears (temporal negative priming) rather than its identity or spatial location. Temporal positioning is also teased apart from response-based mechanisms. Results indicate that both of these factors contribute to temporal negative priming. Email: Todd Kahan, tkahan@bates.edu

2:50-3:05 PM (215)

Phasic Alertness and Residual Switch Costs in Task Switching. *DARRYL W. SCHNEIDER, *Purdue University* — Residual switch costs are task-switching deficits that occur despite time to prepare for a task switch. In the present study, I investigated whether residual switch costs are influenced by phasic alertness. In two task-cuing experiments, subjects performed numerical categorization tasks on target digits, with and without an alerting signal presented in advance of the target (alert and no-alert trials, respectively). There were switch costs that decreased as the cue-to-target interval became longer (indicating preparation occurred), but large residual switch costs were present. Performance was faster on alert than on no-alert trials (indicating heightened alertness), but residual switch costs were similar for both trial types. These findings suggest that increased phasic alertness does not modulate the cognitive control processes underlying residual switch costs in task switching.

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Cognition: Emotion and Consciousness

West Meeting Room 208-209, Saturday Afternoon, 1:30-3:10

Chaired by Donelson Dulany, University of Illinois at Urbana-Champaign

1:30-1:45 PM (216)

Phenomenal Reporting and Methodology of Competitive Support. DONELSON DULANY, *University of Illinois at Urbana Champaign* — Roles of Conscious States: Attention, learning, to causal inference, decision, self, feelings, and volitional control. Limitations of Prior Approaches: First person data language, Titchener (1912) to Chalmers (1996). Rejection of phenomenal reporting, Watsonian (1924) behaviorism. Phenomenal reporting as non-explanatory, Nisbett & Wilson (1977). Phenomenal reporting as thinking aloud, Ericsson & Simon (1993). Phenomenal reporting as

“heterophenomenology” (Dennett 2003). Need for Reporting of Conscious States Within Theory: Third-person data language. Mental Episodes, propositional states when deliberative and sub-propositional states when associative (Dulany, 1997, 2012). Need for Methodology of Competitive Support: Duhem-Quine thesis (Quine, 1951). Bayesian Inference for comparative credibility of theoretical supports. Logic of theoretical networks for theory and data richness (Carruthers, 2000). Examples: Inferential causal learning (Carlson & Dulany, 1988, Dulany & Carlson, 2012), volitional control, (Wilson & Dulany, 1983.) Explicit and implicit transfer (Dulany & Pritchard, in prep.) Email: Donelson Dulany, ddulany@illinois.edu

1:50-2:05 PM (217)

Jazz Improvisers' Shared Understanding With Listeners. MICHAEL F. SCHOBBER, *New School for Social Research*, NETA SPIRO, *University of Cambridge* — To what extent do musically experienced listeners share understanding with performers, and with each other, of what happens in improvisations? In an online survey, 239 participants listened to audio recordings of three improvisations and rated their agreement with 24 specific statements that the performers and a jazz-expert commenting listener had made about them. Listeners endorsed characterizations that the performers had agreed upon significantly more than they endorsed characterizations that the performers had disagreed upon, even though the statements gave no indication of performers' levels of agreement. Although there was some support for a *more-experienced-listeners-understand-more-like-performers* hypothesis, the findings most strongly support a *listeners-as-outsiders* hypothesis: Listeners' ratings of the 24 statements were far more likely to cluster with the commenting listener's ratings than with either performer's. The evidence demonstrates that it is possible for performers' interpretations to be shared with very few listeners, and that listeners' interpretations about what happened in a musical performance can be far more different from performers' interpretations than performers or other listeners might assume.

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2:10-2:25 PM (218)

Recognizing Emotions-Beyond the Standard View and in Context. HALSZKA K. BĄK (Member Select-Speaker Award Recipient), *Adam Mickiewicz University*, JEANETTE ALTARRIBA, *University at Albany, State University of New York* — It has been suggested that prosody serves as a disambiguating feature in recognizing multimodal emotional stimuli, but when isolated from concurrent cues, it is inherently ambiguous. This study investigated how reliably emotions can be recognized from stimuli where the availability of emotional cues (prosodic, semantic, visual) was manipulated. A group of raters evaluated emotion stimuli within one of three randomly assigned paradigms: (1) scalar evaluation of valence; (2) basic emotion categorization; (3) emotion naming. Across all paradigms, the presence of congruent semantic and visual cues increased inter-rater agreement on emotion evaluation, categorization, and naming. However, in the scalar evaluation of valence, the recognition agreement was not significant for emotions expressed in female speakers expressing happiness unless all



semantic, prosodic, and visual cues were present. Additionally, emotions in male voices were perceived as less ambiguous than in female voices. Emotions are communicated and most reliably interpreted through multiple simultaneously processed channels.

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2:30-2:45 PM (219)

Altered Perceptual Processing in Violent Video Game Players: Evidence From Emotion-Induced Blindness. STEVEN B. MOST, MYUNG JIN, SANDERSAN ONIE and JENNA L. ZHAO, *University of New South Wales, Sydney*, KIM M. CURBY, *Macquarie University* — The violence within many video games has raised questions about their impact on the people who play them. Most research has assessed impacts on aggression and desensitization in the moral domain, but here we find that frequent violent video game play may be linked with individual differences in *perceptual* processing. In an emotion-induced blindness task – wherein graphic images typically outcompete and impair perception of targets that people search for – violent video game players suffered less perceptual disruption following aversive images than non-players did, even though the groups did not differ in performance following neutral images. This difference persisted when controlling for sex and other violent media consumption and despite no group differences in trait aggression, disgust propensity, or disgust sensitivity. Further, the recruitment method ensured that participants did not know the relationship between the experiment and their video gaming history. Although a causal relationship has yet to be established, the findings suggest situations in which desensitization might lead violent video game players to literally see the world differently.

Email: Steve Most, s.most@unsw.edu.au

2:50-3:05 PM (220)

Darwin Revisited: The Vagus Nerve is a Causal Element in Controlling Recognition of Others' Emotions. LORENZA COLZATO, *Leiden University* — Charles Darwin proposed that via the vagus nerve, the tenth cranial nerve, emotional facial expressions are evolved, adaptive and serve a crucial communicative function. In line with this idea, the later-developed polyvagal theory assumes that the vagus nerve is the key phylogenetic substrate that regulates emotional and social behavior. The polyvagal theory assumes that optimal social interaction, which includes the recognition of emotion in faces, is modulated by the vagus nerve. So far, in humans, it has not yet been demonstrated that the vagus plays a causal role in emotion recognition. To investigate this we employed transcutaneous vagus nerve stimulation (tVNS). A sham/placebo-controlled, randomized cross-over within-subjects design was used to infer a causal relation between the stimulated vagus nerve and the related ability to recognize emotions as indexed by the Reading the Mind in the Eyes Test in 38 healthy young volunteers. Active tVNS, compared to sham stimulation, enhanced emotion recognition for easy items, suggesting that it promoted the ability to decode salient social cues. Our results confirm that the vagus nerve is causally involved in emotion recognition, supporting Darwin's argumentation.

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Sensation and Perception

West Meeting Room 202-204, Saturday Afternoon, 1:30-3:30

Chaired by Marc Coutanche, *University of Pittsburgh*

1:30-1:45 PM (221)

Incorporating New Knowledge Into Perceptual and Conceptual Dimensions Through Interacting Regions of the Human Brain. MARC N. COUTANCHE, *University of Pittsburgh* — The brain's ventral stream encodes a range of perceptual and conceptual dimensions of perceived items. How is information represented and integrated across different regions of the visual system for known, and previously unknown, concepts? I will discuss recent functional magnetic resonance imaging studies where participants have been presented with known and unfamiliar concepts that systematically vary across dimensions, such as basic visual properties, real-world size, taxonomic category, and prior knowledge. As well as probing how these dimensions are represented, I have examined how multi-voxel representations are changed with new knowledge. Together, my findings suggest that new knowledge has consequences throughout the ventral stream. Neurally represented dimensions interact, such that certain dimensions are observed in some semantic categories, but not others. Finally, combining multivariate and connectivity methods suggests that multivariate information becomes increasingly synchronized in response to new knowledge.

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1:50-2:05 PM (222)

Prior Experience Informs Ensemble Encoding. L. ELIZABETH CRAWFORD and JONATHAN C. CORBIN, *University of Richmond*, DAVID LANDY, *Indiana University - Bloomington* (Presented by David Landy) — Ensemble encoding research shows that people quickly form summary representations that capture the statistical structure in simultaneously presented objects. We report two experiments showing that ensemble encoding is informed not only by the objects viewed in a given moment, but also by a meta-ensemble, or prototype, capturing the distribution of previously viewed objects. Participants viewed four simultaneously presented squares that varied in shade (Exp. 1) or faces that varied in emotional expression (Exp. 2) and then estimated their average by adjusting a response stimulus. Estimates were biased toward the mean of stimuli from previous trials, consistent with a Bayesian combination of hierarchical sources of information. Paralleling research on individual object estimation, prior information about the distribution of ensembles is used to adjust uncertain ensemble estimates. Because real environments present statistical structure in a given moment as well as over time, ensemble encoding in real-world situations likely takes advantage of both.

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2:10-2:25 PM (223)

The Open-Object Illusion: Size Inflation Effects in Perception and in Visual Short-Term Memory. TAL MAKOVSKI, *The Open University of Israel* — The study presents a new powerful



visual illusion, in which simple open objects, ones with missing boundaries, are perceived as bigger than the same-size, fully closed objects. Specifically, using a continuous-response adjustment procedure, it was found that the lack of vertical boundaries inflated the perceived width of an object, whereas the lack of horizontal boundaries inflated its perceived length. This *open-object illusion* was highly robust and it was replicated across different stimulus types and experimental parameters. Furthermore, the inflation effect was even greater when the test object was no longer in view, but rather held in visual short-term memory. These experiments further revealed that size memory is generally not veridical as even the size of the closed objects was inflated. Together, these inflation effects have significant practical implications as well as important theoretical implications regarding size perception and memory. Email: Tal Makovski, talmak@openu.ac.il

2:30-2:45 PM (224)

Gestalt Demonstrations Don't Tell the Whole Story of Figure-Ground Perception. Part II: Convexity. MARY A. PETERSON and ELIZABETH SALVAGIO, *University of Arizona* — A classic Gestalt demonstration is that ~90% of viewers perceive convex regions as figure when shown 8-region displays with alternating black and white (B&W) convex and concave regions. Consequently, many scientists assume that convexity is a very powerful figural cue. Recently, we showed that convexity alone couldn't account for these responses; homogeneous fill (HF) in the concave regions is necessary. We also found that the probability of perceiving convex regions as figure is low in 2-region displays and increases with region number. Together these results led us to propose that HF in alternating regions is a background prior, and that, as the number of HF regions increases, the probability that they are visible portions of a surface behind interposed figures increases. Our analysis predicted that classic B&W 8-region displays are ambiguous because both convex and concave regions are HF and hence, are good candidates for backgrounds. Recent experiments using both monoptic and dichoptic masks support this hypothesis and suggest that early feedback is necessary to resolve ambiguity in the classic displays. Thus, the mechanisms of figure assignment are more complex than supposed based on classic Gestalt demonstrations.

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2:50-3:05 PM (225)

Affective Mediation of Cross-Modal Music-to-Vision Associations. STEPHEN E. PALMER, THOMAS L. LANGLOIS and JOSHUA PETERSON, *University of California, Berkeley*, KELLY WHITEFORD and NATHANIEL HELWIG, *University of Minnesota*, KAREN B. SCHLOSS, *University of Wisconsin - Madison* — We present several extensions of previous results showing affective music-to-vision cross-modal mediation. Participants picked three colors or three textures that went best with different music. They also rated each musical selection, color, and texture for affective associations (Happy/sad, agitated/calm, angry/not-angry). In each experiment there were highly reliable correlations between music-perceptual dimension (e.g., fast/slow, heavy/light, loud/soft) and the color-perceptual dimensions (light/

dark, saturated/desaturated, red/green, and blue/yellow) or the texture-perceptual dimensions (sharp/smooth, curved/straight, and granular/fibrous) of their cross-modal associates. However, these associations were also consistent with affective mediation (agitated-sounding music was associated with agitated-looking colors and agitated-looking textures). Further, partialling out the variance due to emotional content eliminated virtually all significant cross-modal correlations with lower-level music-perceptual features. Dimensional reduction showed that two latent affective factors—agitated/calm (arousal) and happy/sad (valence)—mediate perceptual correspondences in music-to-vision associations.

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3:10-3:25 PM (226)

How Visual Saltators Affect the Emotional Dimensions of the Cutaneous Rabbit Effect. MOUNIA ZIAT, CHATRINE JOHANNESSEN and KIMBERLY SNELL, *Northern Michigan University*, ROOPE RAISAMO, *University of Tampere* — When participants are exposed to three successive tactile stimuli on the forearm they report sensations similar to a hopping rabbit. Known as the cutaneous rabbit effect (CRE), it is affected by two parameters: Burst Duration (BD) and Inter-Burst Interval (IBI). In two experiments, we modified these parameters while exposing participants to visual saltators: jumping or hopping animals. In Experiment 1, only BD was varied by keeping IBI fixed; while in Experiment 2, BD was maintained fixed and IBI was modified. Participants were asked to rate the valence, arousal, and dominance of the tactile stimulation. Both experiments revealed the valence of the CRE was affected by visual stimuli. In experiment 1, the less pleasurable the animal was the less variation was noticeable between BDs, while the variation was significantly perceptible for pleasant saltators. In Experiment 2, the CRE was judged unpleasant and pleasant if the animal was unpleasant and pleasant respectively.

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Eyewitness Identification

West Meeting Room 118-120, Saturday Afternoon, 3:30-5:30

Chaired by Ira Hyman, *Western Washington University*

3:30-3:45 PM (227)

Crime Blindness: The Impact of Inattentional Blindness on Eyewitness Awareness, Memory, and Identification. IRA HYMAN, ALIA WULFE, AMANDA KEMP and CLAIRE TYLER, *Western Washington University* — Inattentional blindness is a failure to become aware of something obvious when selectively focused on one event in a complex environment. In two experiments, we investigated the impact of inattentional blindness on eyewitness memory. Participants watched a video of a busy scene during which a crime occurs. We manipulated the attentional focus on the participants – some watched for the crime, others watched the video with no attention focus, and some focused on something unrelated to the crime. We found that participants given an unrelated attention focus often experienced inattentional blindness for the crime and failed to identify the culprit. Nonetheless, these individuals displayed



better memory for the focus of their attention. Potential witnesses may be focused on something other than watching for a crime. In such situations, they may experience crime blindness. Eyewitness researchers need to investigate situations in which people are not explicitly watching for a crime or accident.

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3:50-4:05 PM (228)

Using Contextual Information to Assess the Accuracy of Eye Witness Testimony. RALPH R. MILLER, JESSICA S. WASSERMAN, CODY W. POLACK and CRYSTAL V. CASADO, *State University of New York - Binghamton*, MAITE BRUNEL and MOHAMAD EL HAJ, *University of Lille* — Eyewitness testimony can play a crucial role in criminal cases. However, witness memory is fallible. Thus, techniques for assessing witness accuracy are needed. We examined the usefulness of witness recall of contextual information that might be known to the authorities in assessing the likely accuracy of witnesses in describing information unknown and of interest to the authorities. Participants viewed a video of a purse being stolen and were then asked questions about the perpetrator and context of the crime including who (bystanders), when (time of the crime), and where (location of the crime). Participants interrogated soon after witnessing the crime (n=54) exhibited better recall than those not questioned immediately but instead were interrogated for the first time after a 2-day retention interval (n=60). However, interrogation (without feedback) soon after viewing the video reduced forgetting over the 2-day retention interval. Thus, early interrogation can retard subsequent forgetting as suggested by the Testing Effect. Moreover, the quality of recall of the context was positively correlated with recall concerning the perpetrator, and questions concerning bystanders had the highest correlation with perpetrator recall. Email: Ralph R Miller, rmiller@binghamton.edu

4:10-4:25 PM (229)

Eyewitness Identification Accuracy and Confidence: The Perceived vs. Actual Influence of Featural and Familiarity Justifications. CHAD DODSON and DAVID DOBOLYI, *University of Virginia* — Accumulating research shows that individuals discount an eyewitness's identification – even one that is made with high confidence (e.g., “I’m positive it’s him”) – when the eyewitness justifies the identification by referring to an observable feature (“I remember his nose”) than an unobservable feature (e.g., “He looks like a friend of mine”) about the suspect. Is this an optimal strategy for discounting an eyewitness's accuracy? It is unclear, as there is nearly no research on whether the accuracy of an eyewitness's identification varies when it is based on either an observable feature or another justification type. We show that eyewitness identification accuracy is: (a) similar when it is based on either an observable or unobservable feature; but (b) both of these accuracy rates are higher than when the identification is based on the suspect's familiarity.

Email: Chad Dodson, cdodson@virginia.edu

4:30-4:45 PM (230)

Confidence is the Best Predictor of Eyewitness Accuracy. Period. LAURA MICKES, *Royal Holloway, University of London*, STEVEN E. CLARK, *University of California Riverside*, SCOTT D. GRONLUND, *University of Oklahoma* — Eyewitness researchers once viewed the relationship between the accuracy of an eyewitness's initial identification and the confidence that the eyewitness expresses in the accuracy of that identification as weak. But that view is evolving to reflect the overwhelming evidence that the relationship is strong. Wixted & Wells (2017) reviewed the literature and concluded that eyewitness confidence is an informative indicator of accuracy if the conditions are “pristine.” Readers could easily be lured into committing the logical fallacy of denying the antecedent. However, never was the following claim made: that the confidence-accuracy relationship holds if *and only if* the identification procedures are pristine. Nonetheless, that misinterpretation has already begun to appear in manuscripts and reports for the criminal justice system. Our point is that, pristine conditions aside, data from police field and lab studies show that confidence is by far the best predictor of eyewitness accuracy.

Email: Laura Mickes, laura.mickes@rhul.ac.uk

4:50-5:05 PM (231)

Comparing Simultaneous and Sequential Test Procedures in Recognition. JASON R. FINLEY, *Fontbonne University*, VICTOR W. SUNGKHASETTEE, *Washington University in St. Louis*, JOHN H. WIXTED, *University of California, San Diego*, HENRY L. ROEDIGER, III, *Washington University in St. Louis* (Presented by Henry Roediger) — A debate rages in the eyewitness memory literature about whether simultaneous or sequential lineup procedures are more effective in eyewitness identification. In standard eyewitness procedures, only one scene is viewed and tested, and many subjects are tested to provide power (with one observation per subject). We gave subjects many DRM word lists in these experiments, but we tested them using standard lineup procedures (including target present and target absent word “lineups”). In some cases, the critical lures (like *sleep*) could appear along with the target word in target present lineups or in target absent lineups. The other lures were also related to the list words, but more weakly. In both experiments, with all types of target present and target absent lineups, the simultaneous lineup procedure led to better recognition performance than the successive lineup in terms of discriminability. We conclude that the simultaneous lineup procedure permits more effective discriminability relative to the successive lineup procedure.

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5:10-5:25 PM (232)

Models of Lineup Memory. JOHN WIXTED and EDWARD VUL, *University of California, San Diego*, LAURA MICKES, *Royal Holloway, University of London*, BRENT WILSON, *University of California, San Diego* — Competing photo lineup formats are often tested to determine if one format is diagnostically superior to the other (e.g., presenting the lineup photos simultaneously vs. sequentially). However, only recently have such comparisons been made using receiver operating



characteristic (ROC) analysis. ROC analysis not only directly answers the question of interest to policymakers (namely, which procedure is diagnostically superior?), it also provides a rich data set for theoreticians to analyze. We fit 3 quantitative models to ROC data from multiple eyewitness identification studies. The model that most accurately characterizes the ROC data assumes “ensemble encoding,” a principle that naturally applies to the presentation of a set of similar items (such as the faces in a lineup). This model is also consistent with the idea that the simultaneous lineup format is diagnostically superior to other lineup formats because it better enables eyewitness to discount non-diagnostic facial features.

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Reasoning and Problem Solving

West Meeting Room 212-214, Saturday Afternoon, 3:30-5:30

Chaired by Amory H. Danek, University of Illinois at Chicago

3:30-3:45 PM (233)

Closing the Gap Between Cognitive and Affective Components of Insight. AMORY H. DANEK and JENNIFER WILEY, *University of Illinois at Chicago* — The abrupt emergence of a new way of thinking about a problem is a common element in many accounts of insightful problem solving. Further, the subjective “Aha!” experience is taken by many as the defining feature of insightful solutions. The present line of research tested for a relationship between these two components of insight using magic tricks as stimuli. As a way to track representational change, participants made repeated importance-to-solution ratings for verbs, including one describing the correct solution to the trick. The verb ratings showed that solvers and non-solvers exhibited different problem representations. Correct solutions received higher Aha! ratings than incorrect solutions. Further, within correct solutions, sudden changes in verb ratings were linked to higher Aha! ratings than incremental changes. This offers first empirical support for a close relationship between abrupt changes in problem representation and affective appraisal of the solution as resulting from an Aha! experience. Email: Amory H. Danek, amory.danek@googlemail.com

3:50-4:05 PM (234)

Context-Dependent Fixation in Creative Problem Solving. STEVEN M. SMITH and ZSOLT BEDA, *Texas A&M University* — Although incubation effects, that is, insights or solutions realized after a problem has been put aside, have been attributed to unconscious work, the forgetting fixation hypothesis attributes such effects to recovery from fixation when blocks are put out of mind. Historic cases, which include insights by Archimedes (displacement principle), Henri Poincaré (Fuchsian functions), and Kary Mullis (PCR), typically have occurred outside of the workplace. Can new contexts mitigate fixation? After associating blocker words (e.g., *hut*, *chocolate*, *icing*) with photos of environmental contexts, participants tried to solve Remote Associates Test problems (e.g., COTTAGE SWISS CAKE), either in blocker-associated contexts or new

contexts. Consistent with the forgetting fixation hypothesis, fewer solutions occurred for problems tested in blocker contexts than for those tested in new contexts.

Email: Steven M. Smith, stevesmith@tamu.edu

4:10-4:25 PM (235)

Sampling Frames Determine Generalization in Inductive Reasoning. BRETT K. HAYES, STEPHANIE BANNER and DANIEL J. NAVARRO, *University of New South Wales* — Three studies examined how people generalize a novel property following exposure to a sample of instances selected because they belong to the same taxonomic category or because they share a salient property. All studies found that category-based sampling led to broader generalization than property-based sampling. These results were consistent with a Bayesian model which assumes that people are sensitive to the constraints applied to sampled evidence. In line with model predictions, the differences between category-based and property-based sampling were attenuated when a mixture of positive and negative evidence was presented (Experiment 1) and when the base rate of unobserved categories was low (Experiment 2). Experiment 3 showed that the effects of sampling frames on property generalization persist when participants have minimal prior knowledge about the category domain.

Email: Brett Hayes, b.hayes@unsw.edu.au

4:30-4:45 PM (236)

On the Use of Fuzzy Mental Models for Prediction, Decision, and Error Diagnosis in a Weather Prediction Task. SHANE T. MUELLER and BRITTANY NELSON, *Michigan Technological University* — Mental models support many of the central functions of sensemaking, including representing the world, making predictions, considering hypotheticals, detecting and diagnosing errors, supporting mental simulation, and identifying anomalies. We investigated a simulated hurricane evacuation task in which undergraduates were required to estimate the likelihood of an event based on different features, as well as make an evacuation decision, and diagnose whether incorrect information was presented. Results reveal that in a structured probabilistic environment, highly accurate predictions of probability were common, and decisions about evacuation closely followed these probability predictions. Nevertheless, when erroneous feedback was introduced, participants frequently (and erroneously) blamed mis-predictions on themselves, rather than the faulty system (although their attribution depended significantly on the magnitude of the error). This suggests that mental models can be accurate, but they are also fuzzy, consistent with a range of outcomes. We conclude that such fuzzy mental models may permit adaptability and flexibility while reducing over-confidence, but they also represent an attribution bias, especially for novices in a domain.

Email: Shane T. Mueller, shanem@mtu.edu

4:50-5:05 PM (237)

Representation and Computation in Bayesian Reasoning Problems. SANDRA L. SCHNEIDER and ALAINA TALBOY, *University of South Florida* — Bayesian reasoning problems are



notoriously difficult, even when information is transformed from abstract conditional probabilities to more concrete frequencies involving joint probabilities. To examine key sources of difficulty, we created several versions of the problems representing several domains, which required determination of either the positive predictive value or sensitivity of diagnostic tests. Results demonstrate that congruency between the structure of the problem and the focus of the question greatly facilitates both the selection and application of appropriate values for finding the solution. We also found that even the simplest computational requirements prevent many from deriving solutions reported as ratios or percentages, especially when the problem structure highlights a different reference class than required in the solution. Our results highlight the different contributions of information selection, application, and computation in solving these problems, and demonstrate the necessity of clearly communicating the relevant reference class needed to answer the question of interest.

Email: Sandra L. Schneider, sandra@usf.edu

5:10-5:25 PM (238)

Reasoning About Relationships in Evolutionary Trees is Influenced by Gestalt Grouping. LAURA R. NOVICK, *Vanderbilt University*, LINDA FUSELIER, *University of Louisville* — Biology students have difficulty interpreting and reasoning with the relational information depicted in evolutionary trees. We tested Novick and Catley's (2016) hypothesis that the Gestalt principles of grouping (e.g., proximity, connectedness) are a key source of this difficulty because they influence students' interpretations of evolutionary relatedness. After studying evolution, students from non-majors ($n = 52$) and majors ($n = 24$) introductory biology classes and an upper-level biology class ($n = 28$) were asked to make inferences using information in evolutionary trees. We manipulated, within-subjects, whether the less-closely-related taxon was in the same or a different visual group than the taxon for which the inference was to be made. As predicted, students from all classes were more likely to reason based on evolutionary relationship (most recent common ancestry) when that reasoning was consistent with the visual grouping of the taxa (overall M_s of 60% vs. 19%). The results of a subsequent study verified our intuitions about how students group the taxa in these trees. Thus, though conceptually irrelevant, Gestalt grouping plays an important role in guiding students' interpretations of a core biological concept.

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Working Memory

West Meeting Room 211, Saturday Afternoon, 3:50-5:30

Chaired by Lynne Reder, Carnegie Mellon University

3:50-4:05 PM (239)

Manipulation of Stimulus Familiarity: Effects on Working Memory Resources, Performance in Complex Cognitive Tasks, and Knowledge Formation. LYNNE M. REDER and VENCISLAV POPOV, *Carnegie Mellon University* — In several experiments we varied the exposure of previously unfamiliar stimuli and found that stimuli with greater familiarity consume

fewer working memory resources, even when controlling for ease of encoding. Instances from each of two types of stimuli were assigned to be experienced more or less often during training. Those with more exposure delivered better performance in an N-back task, with an increased advantage as the task difficulty increased. Likewise, in an algebraic problem solving task, the latency and accuracy of solutions was better when the equations involved stimuli with greater familiarization and the advantage increased as other aspects of the task required more working memory resources. Ability to learn new facts was more successful when the constituents of that new knowledge had received greater familiarization and when the familiarization task required greater discrimination of the stimuli from other (similar) stimuli. Insights concerning the role of partial matching and excessive demands on working memory resources will be discussed.

Email: Lynne Reder, reder@cmu.edu

4:10-4:25 PM (240)

Action-Based Language Gestalts in Working Memory.

MAGDA L. DUMITRU, *University of Liege* — While evidence is mounting that perceptual grouping cues benefit working memory performance, it is debatable whether this is the main purpose of Gestalt formation. Indeed, recent findings by Dumitru and colleagues demonstrate that people build language Gestalts that encode basic action patterns when reasoning with the connectives 'and' and 'or'. Here we present novel evidence from dual memory tasks that Gestalt formation and maintenance breaks down under high working memory load for two age groups (18 to 30 year olds and 60 to 80 year olds). More importantly, the number of Gestalts evoked by the connectives (one for conjunction and two for disjunction) as well as the age-specific performance levels with visual Gestalts predict the observed effects. Well-established mappings between language and action patterns are thus a driving factor of Gestalt building and management in working memory.

Email: Magda L. Dumitru, magda.dumitru@gmail.com

4:30-4:45 PM (241)

Working Memory Re-Processing in Instruction-Based

Action Control. CHRISTINA U. PFEUFFER (Member Select-Speaker Award Recipient), *University of Freiburg*, KAROLINA MOUTSOPOULOU and FLORIAN WASZAK, *Université Paris Descartes*, ANDREA KIESEL, *University of Freiburg* — Recent evidence suggests that stimulus-response (S-R) associations cannot only be formed by practice but also by mere instruction. Yet, contrary to practice-based S-R associations, instruction-based S-R retrieval effects were thought to depend upon the effortful maintenance of stimulus and response representations in working memory. Using an item-specific priming paradigm, we demonstrate that although instruction-based S-R associations cannot be retrieved when working memory is taxed during S-R retrieval, they can be retrieved when working memory is taxed in between an item-specific prime and probe instance. These findings contradict the prevalent notion that instruction-based S-R associations depend upon active working memory maintenance and instead suggest that instruction-based S-R associations are stored in long-term memory and only require working memory resources for their



retrieval. This implies a working memory-based re-processing of instructed S-R contingencies and has interesting implications for the interplay of long-term memory and working memory in instruction-based action control.

Email: Christina U. Pfeuffer, christina.pfeuffer@psychologie.uni-freiburg.de

4:50-5:05 PM (242)

Can Attention-Based Maintenance Be Used in Visual Working Memory? TIMOTHY J. RICKER, *City University of New York*, EVIE VERGAUWE, *University of Geneva* — Secondary tasks that occupy attention for longer proportions of time during working memory maintenance result in lower memory performance. Researchers largely agree that this effect is due to the use of attention in actively counteracting forgetting processes such as decay or interference. While this has been convincingly demonstrated using verbal and categorical memory stimuli it is an open question whether attention can be used to actively maintain non-categorical information. Here we explore whether attention can be used to maintain the orientation of visual stimuli that vary continuously across a wide range of orientations. During memory maintenance participants perform a concurrent secondary task that varies in attentional demand. Surprisingly, we find that the attentional demand of the secondary task has very little effect on recall of visual items whether they are presented in a continuous or a categorical format. The implications for attention and visual memory are discussed.

Email: Timothy Ricker, Timothy.Ricker@csi.cuny.edu

5:10-5:25 PM (243)

Ranking Tasks Reveal a Sudden Death of Verbal Short-Term Memories. CHRIS DONKIN and MIKE LE PELLEY, *University of New South Wales, Sydney*, ROBERT TAYLOR, *Cambridge University* — Most theories of verbal short-term memory assume a continuous memory strength, with memories either fading due to decay or interference. We will present a set of studies that are difficult to reconcile with such a view. In our tasks, participants were asked to rank three items, one of which was a recently presented target word, in terms of how likely they believe the item was recently presented. Unsurprisingly, we find that over the short-term, memory-strength manipulations have an influence on the probability that target words are given a rank of 1. However, much to our surprise, such manipulations have no influence on whether the target word is given a rank of 2 or 3. This effect does not occur when we run the same experiments with non-words; strength manipulations do affect the way that non-words are given ranks of 2 or 3. So, while the data with non-words are consistent with a continuous memory strength, it may be that words, by their very nature, are quick and easy to temporarily represent in memory, but that such storage may be quite fragile.

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Reward and Motivation in Decision Making and Memory West Meeting Room 208-209, Saturday Afternoon, 3:30-5:10

Chaired by Robert West, *DePauw University*

3:30-3:45 PM (244)

Neural Correlates of Thinking About and Making Unethical Decisions. ROBERT WEST, EMILY BUDDÉ and KAITLYN MALLEY, *DePauw University* — One of the greatest threats to information security is related to agents operating within an organization. Breaches of information security lower consumer confidence, costs trillions of dollars each year, and may even shape national and international politics. In the current study, we used event-related brain potentials (ERPs) to examine neural activity while individuals contemplated ethical decisions related to information security or control decisions. The behavioral data replicated previous research, as individuals were less likely to endorse ethical violations than control scenarios, and took longer to make decisions for minor violations than control scenarios or major violations. The ERP data revealed that the amplitude of the posterior N2 component was attenuated for ethical trials suggesting that considering these dilemmas consumed attentional resources. These data also revealed that making unethical decisions was associated with medial frontal activity suggesting that these decisions were associated with conflict or negative affect.

Email: Robert West, robertwest@depauw.edu

3:50-4:05 PM (245)

A Meta Analytic Review of Two Modes of Learning and the Description-Experience Gap. DIRK WULFF (Member Select-Speaker Award Recipient), MAX MERGENTHALER-CANSECO and RALPH HERTWIG, *Max Planck Institute for Human Development* — People can learn about the probabilistic consequences of their actions in two ways: One is by consulting descriptions of an action's consequences and probabilities. The other is by personally experiencing the probabilistic consequences of an action. In the last dozen years research has demonstrated systematic discrepancies between description- and experience-based choices. This description-experience gap has been attributed to factors including reliance on a small set of experience, the impact of recency, and different weighting of probability information in the two decision types. In this raw-data meta-analysis, we evaluated these and other determinants of the decision-experience gap. We found, first, a robust gap but also a key moderator, namely, problem structure. Second, the largest determinant of the gap was reliance on small samples and the associated sampling error. Third, the gap persisted when sampling error was eliminated. Fourth, the occurrence of recency was contingent on decision makers' autonomy to terminate search, consistent with an optional stopping rule. Finally, we found indications of different probability weighting in experience versus description when the problem structure involved a risky and a safe option.

Email: Dirk U. Wulff, dirk.wulff@gmail.com



4:10-4:25 PM (246)

Reversed Framing Effects Reveal Neural Correlates of Self-Reported Criminal Risk Taking: A Fuzzy-Trace Theory Approach. VALERIE REYNA, REBECCA HELM, REBECCA WELDON, POOJA SHAH, ALEXA TURPIN and SHRAVYA GOVINDGARI, *Cornell University* — According to fuzzy-trace theory, adults rely on gist, but adolescents rely on verbatim representations, producing developmental increases in decision biases. We extend predictions about gist and verbatim representations that explain adolescent risk-taking to uncover neural correlates of developmentally inappropriate adult risk-taking. As predicted, risk-taking was correlated with risk preferences called “reverse framing” (preferring sure losses and risky gains, reversing typical framing biases) linked to risky behavior in adolescents and rarely observed in nondisordered adults. Experiments confirmed processing interpretations. Brain covariation with risk-taking was observed predominantly for reverse-framing choices. Noncriminal risk-taking behavior covaried with emotional reactivity (amygdala) and reward motivation (striatal) areas, whereas criminal behavior covaried with greater activation in temporal and parietal cortices, their junction, and insula. When developmentally typical framing choices were made, reflecting non-preferred gist processing, activation in dorsolateral prefrontal cortex covaried with criminal risk-taking, which may reflect cognitive effort to process gist while inhibiting preferred verbatim processing. Email: Valerie F. Reyna, vr53@cornell.edu

4:30-4:45 PM (247)

Smiling at the Funeral: How Context Modulates Memory for Emotional Faces. RAOUL BELL, LAURA MIETH and AXEL BUCHNER, *Heinrich Heine University Düsseldorf* — Previous studies found a memory advantage for smiling faces, but in these studies the faces were presented in isolation while in real life facial expressions are embedded in social contexts. In the present study, we examined how context affects memory for emotional faces. Smiling and sad faces were shown in congruent or incongruent social contexts (e.g., smiling at a party or at a funeral). Perceived likability of the faces was strongly influenced by context appropriateness: Faces with appropriate facial expressions were rated as more likable than faces with inappropriate facial expressions. This allowed us to separate the influence of likability and facial expression on memory. Overall, smiling faces were better remembered than sad faces, but both recognition and source memory were influenced by the (in-) congruency between facial expression and context. The findings suggest that including context can improve our understanding of the effects of facial expressions on memory. Email: Raoul Bell, raoul.bell@hhu.de

4:50-5:05 PM (248)

The Effect of Extrinsic and Intrinsic Motivation on Delayed Memory. VERED HALAMISH and INBAL MADMON, *Bar-Ilan University* — It is well known that both extrinsic motivation and intrinsic motivation enhance memory. Their combined contribution to memory, however, has been rarely examined. Research in other domains suggested that extrinsic motivation can undermine intrinsic motivation, implying a sub-additive effect on performance. The current research examined the

combined contribution of extrinsic motivation (monetary rewards) and intrinsic motivation (curiosity) to intentional learning and memory. Participants read trivia questions, rated how curious they were to learn each answer, learned the answers for a subsequent memory test, and rated their interest level. Monetary rewards were offered for subsequent recall of half of the answers during learning. Memory performance one week later suggested that both extrinsic motivation (monetary rewards) and intrinsic motivation (curiosity) enhanced learning, with no interaction between these two factors. Furthermore, monetary rewards enhanced subsequent interest in the answers. Results suggest that extrinsic and intrinsic motivation independently and additively enhance memory. Email: Vered Halamish, vered.halamish@biu.ac.il

Letter/Word Processing

West Meeting Room 205-207, Saturday Afternoon, 3:30-5:30

Chaired by Fabienne Chetail, *Universite Libre De Bruxelles - Lcl*

3:30-3:45 PM (249)

Are Graphemic Effects Real in Skilled Visual Word Recognition? FABIENNE CHETAİL, *Université Libre de Bruxelles - Brussels* — In the last decades, repeated evidence for graphemic effects has been reported in skilled readers. For example, a letter is more easily detected in a word when it corresponds to a simple grapheme (e.g., A in PLACE) than when it is embedded in a complex one (e.g., A in BEACH). Such effects have been taken as a demonstration that graphemes are processed as perceptual units by the reading system. However, this conclusion has been recently challenged by studies using different experimental designs. In the present study, we used four experimental situations to get a clearer picture of the reliability of graphemic effects in French. This included a letter detection task (Exp. 1a, 1b), a lexical decision task with mixed case (Exp. 2), a primed lexical decision task (Exp. 3), and a length estimation task (Exp. 4). In each task, the processing of words with complex or simple graphemes was compared. Overall, we found no reliable graphemic effect, favoring the claim that graphemes are not perceptual units in skilled visual word recognition. An alternative interpretation of so-called graphemic effects reported in the past is discussed. Email: Fabienne Chetail, fchetail@ulb.ac.be

3:50-4:05 PM (250)

A Crosslinguistic Investigation of Eye Movements During Reading. DENIS DRIEGHE, *University of Southampton*, JUKKA HYÖNÄ, *University of Turku*, XIN LI, GUOLI YAN and XUEJUN BAI, *Tianjin Normal University*, SIMON LIVERSEDGE, *University of Southampton* — Reading is a complex, visually mediated psychological process, and eye movements are the behavioural means by which we encode the visual information required for linguistic processing. Recently, Frost (2012) argued that establishing universals of process is critical to the development of meaningful, theoretically motivated, cross-linguistic models of reading. To investigate universality of representation and process across languages



we examined eye movement behaviour during reading of very comparable stimuli in three languages: Chinese, English and Finnish. Despite fundamental visual and linguistic differences in the orthographies, statistical models of global reading behaviour (e.g. total sentence reading times) were strikingly similar, and thus might reflect some universality of representation and process in reading (Liversedge, Drieghe, Li, Yan, Bai & Hyönä, 2016). Findings from analyses of local eye movement behaviour on specific target words will be presented showing patterns that differ considerably across languages reflecting differences in terms of linguistic and visual density.

Email: Denis Drieghe, d.drieghe@soton.ac.uk

4:10-4:25 PM (251)

The Perceptual Structure of Printed Words: A Magneto-Encephalography Study. ALAIN CONTENT, MARIAGRAZIA RANZINI, VINCENT WENS, XAVIER DE TIÈGE and FABIENNE CHETAIL, *Université Libre de Bruxelles* — Recent behavioral studies indicated that the way consonant and vowel letters are organized within letter strings determines the perceptual structure of written words, with each group of adjacent vowels corresponding to one perceived unit. The present work examined the neurophysiological correlates of this structure through MEG. One aim was to establish that the extraction of vowel-centered units arises during early stages of orthographic processing. The second objective was to confirm that this vowel-centered structure is represented within the hierarchy of neural detectors subserving word recognition. Participants performed a cross-case matching task in which the structure of mismatching pairs was manipulated by transposing two letters, either preserving vowel-centered structure (FOUVRET-*fovuert*, two vowel groups) or modifying it (BOUVRET-*bovuret*). Preserved-structure mismatches were detected more slowly, and this effect was associated with a significant difference in neural activity from 129 to 239 ms after the stimulation. Source localization indicated an effect in left fusiform regions around 200 ms. The results thus confirm that vowel-centered structure is extracted during early processing and that it is encoded in the VWFA.

Email: Alain Content, alain.content@ulb.ac.be

4:30-4:45 PM (252)

Cascaded Activation With Masked Primes With and Without a Categorization Task. KENNETH FORSTER, *University of Arizona*, XIAOMEI QIAO, *Shanghai University of Finance and Economics* — Previous work has shown that cascaded semantic activation effects can be demonstrated in a semantic categorization task when the target word is preceded by a masked prime that is a distant neighbor of a member of the same category as the target, implying that the semantic properties of the neighbors are activated. However, this effect is absent in a 2-AFC discrimination task, where subjects are required to choose which of two alternatives is closer in meaning to a masked prime. It is shown that the cascaded effect is obtained only when the task requires categorization of the prime, indicating that information about likely category membership is available very early, and independently of detailed semantic information.

Email: Kenneth Forster, kforster@u.arizona.edu

4:50-5:05 PM (253)

Resolving the Dissociation of Word/Nonword Repetition Effects in Lexical Decision. PABLO GOMEZ, ANA MARCET, MARTA VERGARA-MARTÍNEZ and MANUEL PEREA, *Universitat de Valencia* — A number of two-block lexical decision experiments have reported a dissociation of repetition effects for words and nonwords: facilitation for words and inhibition for nonwords (Perea, Marcet, Vergara-Martínez, & Gomez, 2016). Evidence accumulation models can capture this pattern in terms of an increase in wordlikeness for repeated stimuli. However, there are reports of facilitative repetition effects for both words and nonwords—this is typically interpreted in terms of episodic retrieval. To resolve this discrepancy, we examined whether a facilitative repetition effect for nonwords can be obtained when inducing the retrieval of episodic traces (via instructions and background color). Results in our experiments and in the literature are not as robust as we would like them to be, and we examined whether different processing components could explain the dominance of a short-lived facilitative effect vs. a long-term inhibitory effect.

Email: Pablo Gomez, pgomez1@depaul.edu

5:10-5:25 PM (254)

Semantic Retrieval is Under Attentional Control: Evidence From the Stroop Task. SACHIKO KINOSHITA and LUKE MILLS, *Macquarie University*, DENNIS NORRIS, *MRC Cognition and Brain Sciences Unit* — The semantic Stroop effect refers to the interference caused by color-related distractor words not in the response set (e.g., LEMON presented in red) relative to color-unrelated words (e.g., MERCY presented in red). The finding that the size of semantic Stroop effect is not modulated (e.g., by coloring a single letter) has been used to argue that semantic retrieval is automatic and cannot be controlled. Here, we used a manipulation of endogenous attention assumed to modulate task control – namely, the proportion of nonlinguistic neutral trials (###s). The size of semantic interference effect with color-associated words (e.g., LEMON, SKY) was small and did not show a statistically significant interaction with neutral proportion; in contrast, the semantic Stroop effect produced by color words that are not in the response set (e.g., PINK, when pink is not a response color) was modulated by the proportion of neutral trials. We take the results as evidence that retrieval of meaning is controlled by endogenous attention.

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Metacognition II

West Meeting Room 202-204, Saturday Afternoon, 3:50-5:30

Chaired by Melanie Takarangi, Flinders University

3:50-4:05 PM (255)

Experienced Ease of Retrieval Affects How People Appraise Post-Traumatic Stress Disorder (PTSD) Symptom Severity. MELANIE TAKARANGI and TAYLOR SWAIN, *Flinders University* — People are often asked to recall and describe the impact of traumatic experiences (therapy, police interviews, court procedures, etc). We know that judgements about remembered events rely on both accessible *content* and people's



subjective accessibility experience in recalling that content. Would the ease with which details of a traumatic experience come to mind affect how people appraise that experience? We asked participants about their exposure to potentially traumatic events, and then—for their self-nominated worst event—to generate few (3) or many (10) factual details, or details about the event's negative impact. Participants then reported PTSD symptoms resulting from the nominated event. Among participants who experienced a severe (Criterion A) trauma event, recalling many details led to lower symptom ratings than recalling few details. These data suggest that people who experience subjective difficulty in recalling their experience may appraise that experience as less impactful. The results have implications for therapeutic and legal settings, and fit with theoretical predictions that highly accessible traumatic memories are problematic.

Email: Melanie Takarangi, melanie.takarangi@flinders.edu.au

4:10-4:25 PM (256)

Estimating the Influence of Question Difficulty Order on Test Performance and Estimates of Test Performance: A Meta-Analysis. YANA WEINSTEIN, *University of Massachusetts Lowell*, ROBERT B. MICHAEL, *University of Louisiana at Lafayette* — The order in which questions of different difficulty appear on a test has been shown to impact subjective evaluations of test performance, but does not appear to affect actual test performance. That is, when questions are arranged from the easiest to the most difficult, participants evaluate their performance more optimistically than when question are arranged in the opposite order. This effect has been demonstrated in 8 published experiments with a general knowledge quiz paradigm, and 3 published experiments with an eyewitness paradigm. However, our two labs have conducted an additional 7 and 21 experiments respectively with the two paradigms, but have not (yet) published those results. We present here the results of a meta-analysis of question difficulty order in 39 effect sizes across 7,215 participants, focusing on three dependent variables of interest: actual performance, estimates of performance, and bias (the difference between estimates and performance).

Email: Yana Weinstein, yana_weinstein@uml.edu

4:30-4:45 PM (257)

Go If They Know: Metacognitive Confidence Movements in Preschool Children. MICHAEL J. BERAN and BRIELLE T. JAMES, *Georgia State University*, ALEXANDRIA GUILD, *The Citadel*, VICTORIA KELLY, *Georgia State University*, ABIGAIL CAMDEN, *Agnes Scott College*, MELANY LOVE and WILL WHITHAM, *Georgia State University*, ANDREW J. KELLY, *Georgia Gwinnett College*, AUDREY E. PARRISH, *The Citadel* — Recently, chimpanzees showed that they would preemptively move to a reward dispenser, before any feedback from a computerized task, more often when they had correctly completed a memory test than when they had not. We adapted this test for preschool-aged children, and presented them with three computerized tasks – a numeral sequencing task, quantity discrimination task, and serial list memory task. Correct responses led to delivery of a reward in the form of a marble released into a chute that was placed away from the

computer. Children therefore had to walk to that location, and arrive in time to catch the marble or else it was forfeited. Across all three tasks, children moved to the chute earlier, before receiving any feedback from the computer about performance, more often on trials where they were correct than incorrect. Spontaneous verbal reports of confidence often accompanied these movements.

Email: Michael Beran, mberan1@gsu.edu

4:50-5:05 PM (258)

Students' and Teachers' Monitoring of Causal Relations Texts: Do Diagrams Help? ANIQUE BH. DE BRUIN, *Maastricht University*, JANNEKE VAN DE POL, *Utrecht University*, MARIËTTE VAN LOON, *Bern University*, TAMARA VAN GOG, *Utrecht University* — While monitoring accuracy when studying texts is typically low, interventions that aid learners in generating diagnostic cues (e.g., keywords, summaries) are known to improve this. Recently, it was shown that completing an empty diagram about text content improves monitoring of texts on causal relations (e.g., why botox reduces wrinkles, Van Loon et al., 2014). The completed diagrams allowed cue diagnosticity and cue utilization analysis. In the present study, we built upon this work and compared students who completed empty diagrams to those who drew diagrams. We also examined whether teachers' typically low monitoring of students improved when they inspected students' completed versus drawn diagrams. For students, results revealed that completing diagrams improved monitoring accuracy compared to no diagrams. Drawing diagrams did not differ from completing diagrams or no diagrams. For teachers, viewing completed or drawn diagrams of students improved their monitoring of students' learning compared to no diagrams. Cue diagnosticity and utilization data showed that both students and teachers used number of correct relations and number of omissions in diagrams, but not number of omissions as diagnostic cues.

Email: Anique de Bruin, anique.debruin@maastrichtuniversity.nl

5:10-5:25 PM (259)

Estimation in Self-Initiated Working Memory for Spatial Locations. HAGIT MAGEN, *The Hebrew University of Jerusalem*, TATIANA-ALOI EMMANOUIL, *City University of New York* — Working memory (WM) in everyday performance is often self-initiated (SI), meaning that people often memorize information they selected themselves. While prevalent in everyday behavior, research on SI WM is scarce. The current study employed a modified spatial precision memory task, in which participants memorized single locations within a square area that appeared during encoding. The locations were either selected by the participants or were provided to them. The results of two experiments showed that participants most often selected prototypical locations within the square area, namely at its center and at its corners which were closest to the center and the corners of the entire screen. Memory accuracy was superior for self-initiated relative to provided locations, even when the distribution of locations in the two conditions was matched. The results are compatible with models emphasizing the utility of spatial categories in maximizing accuracy in spatial memory. Overall, the current study suggests that participants have access



to metacognitive knowledge about the usefulness of spatial categories in spatial memory, and shows that spatial precision is enhanced when participants reproduce locations they selected themselves.

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Business Meeting

West Meeting Room 114, Saturday Evening, 5:10-6:00

Aaron Benjamin, *University of Illinois Urbana-Champaign*,
Chair, Governing Board

Presentation of the 2017 Best Article Awards, Graduate Travel Awards, and J. Frank Yates Student Travel Awards

Attention

West Meeting Room 118-120, Sunday Morning, 8:00-10:00

Chaired by James T. Enns, *University of British Columbia*

8:00-8:15 AM (260)

Training and the Attentional Blink: Raising the Roof Does Not Remove the Limits. JAMES T. ENNS and PAUL KEALONG, *University of British Columbia*, JENNIFER G. TICHON, *Griffith University*, TROY A.W. VISSER, *University of Western Australia* — The attentional blink is among the most widely studied task in human attention. We ask a deceptively simple question — can the attentional blink be eliminated with extensive training? — which has not received a satisfactory answer to date because previous studies have not avoided ceiling effects. Here we do so with an adaptive procedure as participants undergo hundreds of training trials on an attentional blink app installed on their smartphones. While training increases the rate at which rapid sequential information can be processed, it does not remove the second target deficit, which is the hallmark of the attentional blink.

Email: James T. Enns, jenns@psych.ubc.ca

8:20-8:35 AM (261)

Visual Memory: The Price of Encoding Details. MARK R. NIEUWENSTEIN and MARIA KROMM, *University of Groningen* — Studies on visual long-term memory have shown that we have a tremendous capacity for remembering pictures of objects, even at a highly detailed level. What remains unclear, however, is whether encoding objects at such a detailed level comes at any cost. In the current study, we examined how the anticipated level of pictorial detail required for a visual object-recognition test influences the dynamics of attention and visual working-memory consolidation for objects shown as a first target in an attentional blink task. Memory for the objects was tested at a categorical, exemplar, or state level. Results show that the anticipation of a more detailed memory test increases both the allocation of attention during perceptual processing as well as the duration of working-memory consolidation. Taken together, these findings highlight the adaptive malleability of visual memory encoding in anticipation of a more or less detailed memory test.

Email: Mark Nieuwenstein, m.r.nieuwenstein@rug.nl

8:40-8:55 AM (262)

The Neglected Contribution of Memory Encoding in Spatial Cueing: A New Theory of Costs and Benefits. BRAD WYBLE,

Penn State University, HUI CHEN, *Zhejiang University* — Spatial cueing is thought to reflect resource limits of visual attention, since cues seem to direct attention to one location at the expense of all others. However, findings that challenge this account include cueing benefits without invalidity costs, and benefits that are similar in magnitude whether one or two locations are cued. An alternative account of cueing posits that a clearly visible cue often generates a memory trace. The encoding of this memory trace may affect the deployment of attention, as suggested by theories of the attentional blink. The memory encoding cost (MEC) theory explains spatial cueing effects as a combination of attention and memory encoding with the crucial implication that attention limits are not the cause of invalidity costs. MEC generates predictions along three convergent lines of evidence that implicate encoding of the cue as a factor in spatial cueing effects. Furthermore, MEC suggests a common mechanism underlying cueing costs and the attentional blink, which is supported by simulations from an existing attentional blink model. The MEC theory thus simplifies our theoretical understanding of attentional effects by linking the attentional blink and spatial cueing costs to a common mechanism.

Email: Brad Wyble, bwyble@gmail.com

9:00-9:15 AM (263)

Two Types of Bias Reflect Processing Differences in Visual Comparisons. KYLE R. CAVE, *University of Massachusetts - Amherst*, ZHE CHEN, *University of Canterbury* — Our first

experiment shows that the spatial congruency bias found by Golumb et al. (2014) extends to letter strings: subjects are more likely to respond “same” when comparing two strings if they both appear at the same location. On top of this pattern, we found a different type of bias that varied with the processing demands of the visual comparison. If the task required comparison of individual letters within the string, there was a bias to respond “different”. The proportions of “same” and “different” stimulus pairs had little effect on this bias. If the task allowed a more holistic comparison of one complete string against the other, the “analytical bias” disappeared. The presence of this bias suggests a basic difference between holistic processing of broad configurations and more analytic processing of individual components within configurations. This bias may be a useful tool for exploring differences between global and local processing.

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9:20-9:35 AM (264)

Spatial Plasticity: Extending and Reshaping the View of a Scene. CAITLIN SERVA, IREM YILDIRIM and HELENE

INTRAUB, *University of Delaware* (Presented by Helene Intraub) — Boundary extension (BE) diminishes as views become more wide-angled. Alternative explanations were tested by teasing apart object size and object-boundary proximity. Three versions of 12 three-object scenes were created: a) close-up view (adjacent objects), b) wide-angle view (adjacent objects), and c) wide-angle view with the objects separated so



that outer objects were as near the left-right boundaries as in the close-up. Whether scene version varied between-participants (Experiment 1) or within-participants (Experiment 2), left-right boundary memory for adjacent-object scenes conformed to prior research: BE for close-ups, little/no BE for wide-angle views. In contrast, wide-angles with separated objects yielded the same robust left-right BE as the close-ups. They also, when presented alone (Experiment 1), elicited a distorted aspect ratio — vertical space was truncated. We propose that the way spatial attention surrounds objects and object clusters may contribute to the close-wide BE effect and to reshaping remembered space in these real-world views.

Email: Helene Intraub, intraub@psych.udel.edu

9:40-9:55 AM (265)

Eye Movement Coordination and Language Production in Typing. TOM FOULSHAM and CHRISTOPHER BARRY, *University of Essex* — Compared to handwriting, less is known about the processes involved in typing, and almost nothing is known about eye movement coordination in typing. We investigated how eye and cursor movements reflect language production in two experiments. Participants used an on-screen keyboard to produce simple words while their eyes were tracked. The results showed that eye fixations preceded typing actions in a highly systematic way, revealing the sequential planning of individual letters making up the required output. Typing responses, and eye movement patterns, reflected both the particular demands of the task (picture naming, dictation or copying) and linguistic factors (such as the word's orthographic predictability). We discuss these findings with reference to studies of eye movements in sequential tasks as well as theories of language production.

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Bilingualism II

West Meeting Room 208-209, Sunday Morning, 8:00-10:00

Chaired by Elisabet Service, McMaster University

8:00-8:15 AM (266)

Working Memory for Instructions in a Dominant and Non-Dominant Language. ELISABET SERVICE and EDALAT SHEKARI, *McMaster University* — Previous research has suggested that performing a task using a fluent but non-dominant language depletes working memory resources more than performing it in one's best language (Service & al., 2002). Other research has shown that remembering a set of simple instructions is impaired by concurrent tasks requiring attentional working memory resources (Yang, Allen, Gathercole, 2015). The present study investigated the hypothesis that memory for instructions as measured by either verbal repetition or action depends on the familiarity of the language they are presented in. Persian-English bilinguals with a high level of proficiency in second-language English were asked to repeat or carry out sequences of simulated office-related instructions on a computer screen. Memory for Persian instructions was better than for English instructions on both

measures. Moreover, individuals with better first-language operation spans did better. The results have implications for working practices in multi-lingual environments.

Email: Elisabet Service, eservic@mcmaster.ca

8:20-8:35 AM (267)

Does Being Bilingual Entail Advantages in Working Memory? A Meta-Analysis. CLAUDIA C. VON BASTIAN, *Bournemouth University*, CARLA DE. SIMONI, *University of Zurich*, MICHAEL J. KANE, *University of North Carolina at Greensboro*, NICHOLAS P. CARRUTH and AKIRA MIYAKE, *University of Colorado Boulder* — The question of whether being bilingual yields non-linguistic cognitive benefits is highly controversial. Even though a large body of literature suggests such bilingual advantages, a growing number of more recent studies reported contradictory findings. We therefore conducted a meta-analysis on potential bilingual benefits in working memory. The literature search yielded 104 comparisons matching our inclusion criteria, allowing for the analyses of several potential moderators of the bilingual advantage such as sample characteristics (e.g., sample age, within-group language homogeneity) and methodological features (e.g., verbal vs. non-verbal task material). Analyses yielded a small, but significant positive effect across comparisons, which however exhibited considerable heterogeneity. This variability in the effect was best explained by whether a study focused on working memory as their primary outcome or instead reported it alongside other outcomes.

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8:40-8:55 AM (268)

Temporal Dynamics of Rehearsal and Recall in Monolinguals and Bilinguals. WENDY S. FRANCIS, MARCELA M. ARTEAGA, AMARIS SOLTERO and JUAN CARLOS ETIENNE, *University of Texas at El Paso* — Rehearsal and recall patterns indicate that temporal associations formed at encoding are weaker for low- than for high-frequency words. We hypothesized that new temporal associations would also be weaker for L2 than for L1 words, which would help to explain why recall is typically worse in L2. 80 English speakers and 80 Spanish-English bilinguals completed 16 study-test cycles with high- and low-frequency word lists in English and Spanish. Participants rehearsed aloud at study and free recalled at test. In rehearsal, the strength of temporal associations is indicated by the number of rehearsals and by how far rehearsals continue through the study sequence. In recall, the lag-recency function summarizes the tendency for items studied in close temporal proximity to be recalled consecutively. We predicted that high-frequency and L1 words would be rehearsed more times, rehearsed further into the study sequence, and elicit a steeper lag-recency function than low-frequency and L2 words. *Supported by NIH Grant 1R15HD078921-01A1.*

Email: Wendy S. Francis, wfrancis@utep.edu

9:00-9:15 AM (269)

A Cross-Sequential Study of Blocked Cyclic Object Naming in Spanish-English Bilingual Children. ZENZI M. GRIFFIN, LISA M. BEDORE, ELIZABETH D. PEÑA and J. GREGORY



HIXON, *The University of Texas at Austin* — As part of a larger project, 240 typically developing children were tested on a blocked cyclic object naming task once a year, for up to 4 years, starting in kindergarten, 2nd, or 4th grade. Separate sets of objects were tested in English and Spanish. Within each language, objects from 4 semantic categories were named 6 times each in blocks composed of same or mixed categories. Analyses focus on how cumulative experience with a lexical item results in facilitation or interference as a function of within- and between-child differences in experience with each language.

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9:20-9:35 AM (270)

Building Blocks for a New Lexicon. EVA VIVIANI and DAVIDE CREPALDI, *SISSA, Trieste* (Presented by Davide Crepaldi) — Abundant evidence suggests that visual word identification is based on the analysis of the internal structure of words, at different linguistic levels (e.g., orthography, morphology, semantics; Whiting et al., 2015). How these mechanisms apply to a reader's second language is much less clear (e.g., Heyer & Clahsen, 2015; Diependaele et al., 2011), possibly because participants in these experiments were never tested deeply for their individual linguistic profiles. In this work, we show that the mechanics of visual word identification change dramatically with increasing proficiency, with L2 readers going from a stage where it's all about orthography, to a stage where morphological knowledge establishes. Critically, even the highest-proficiency participants in our sample failed to show morpho-orthographic effects, despite being sensitive to more general indexes of form-to-meaning mapping, namely, OSC (Marelli et al., 2015).

Email: Eva Viviani, eviviani@sissa.it

9:40-9:55 AM (271)

Language Development in Non-Native-English-Speaking Teaching Assistants. SUSAN E. BRENNAN, JIWON HWANG, SOYON KIM and AGNES HE, *Stony Brook University* — In the U.S., many international graduate students in STEM fields serve as teaching assistants (ITAs), playing an important role in educating undergraduates. However, those who speak English as a second language vary in English proficiency. What factors are associated with proficiency, and how do ITAs' language skills develop over time? We followed 25 Chinese ITAs new to the US over a two-year period, with measures at five points: shortly after they arrived on campus for graduate study, and at the ends of their first, second, third, and fourth semesters. Measures included VERSANT subscales probing syntax, vocabulary, fluency, and pronunciation; speech recordings; and self-reports of ITAs' own language proficiency, background, and multicultural experiences. Our findings include that ITAs with more accurate metacognition about their own language skills (who were neither over- nor under-confident) had higher VERSANT scores, and that stable improvements in proficiency did not emerge until after the first year.

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Enhancing STEM Learning Using Spatial Thinking West Meeting Room 211, Sunday Morning, 8:00-10:00

Chaired by Heather Burte, *Tufts University*

8:00-8:15 AM (272)

Three Years of Think3D! Impacting Elementary Students' Math Learning Through Embodied Spatial Training. HEATHER BURTE and HOLLY A. TAYLOR, *Tufts University*, ALLYSON HUTTON, *Think3d!* — Future growth in science and technology requires a college-level STEM-educated workforce, improving STEM learning before college would likely bolster the pool of STEM majors. Over the course of three years, the Think3d! program aimed to improve elementary students' spatial visualization skills through origami and paper engineering lessons to impact their mathematics learning. To test Think3d!'s effectiveness, four measures of spatial and mathematical reasoning were either developed or modified for use with elementary students: Make-A-Dice, Paper Folding test, Purdue Spatial Visualization test, and the Visualizer-Verbalizer Cognitive Strategy Questionnaire. In three implementations, elementary students completed spatial thinking and math tests before and after participating in Think3d! or an active control. Spatial and math performance increased from pre- to post-test, and spatial performance predicted math test performance. This work provides insights into how embodied spatial training, such as the Think3d! program, can impact students' spatial and mathematical reasoning.

Email: Heather Burte, heather.burte@tufts.edu

9:00-9:15 AM (275)

Augmenting and Enacting: Spatial Reasoning With Molecular Models in Organic Chemistry. ANDREW T. STULL and MARY HEGARTY, *University of California, Santa Barbara* — Spatial representations are essential in many STEM disciplines. In organic chemistry spatial representations include 3D molecular models, which enable chemists to represent molecular structures and enact chemical processes. Models can also facilitate learning of organic chemistry, by enabling students to off-load cognition onto the world and support the internalization of concepts and processes. Students solve spatial problems more effectively if they are provided with models and use the models to enact the spatial transformations necessary to solve the problems. In contrast, students receive no benefit from models if they merely view them. Moreover, students learn more from lectures in which the instructor uses models to demonstrate spatial concepts if they are given a concrete model and enact the spatial transformations along with the instructor. We propose that enactment supports integration of multimodal (i.e., sensorimotor, visual, and auditory) encoding of to-be-learned concepts with prior knowledge, enhancing memory retrieval and transfer.

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9:20-9:35 AM (276)

The Role of Gesture and Visual Attention in Math Instruction. MIRIAM A. NOVACK, *Northwestern University*, ELIZA CONGDON, *Bucknell University*, ELIZABETH WAKEFIELD, *Loyola University*, STEVEN FRANCONERI, *Northwestern*



University, SUSAN GOLDIN-MEADOW, *The University of Chicago* — Gestures - hand movements that accompany speech - are spatial tools that support mathematics teaching. Here, we use eye tracking to explore how gesture changes visual attention to enhance math instruction. Fifty 8-year-old children were given *Speech Alone* or *Speech+Gesture* instruction on how to solve missing addend equivalence problems (e.g., $3+4+5 = _ + 5$). Children who saw *Speech+Gesture* instruction performed significantly better on a posttest than children who saw *Speech Alone* instruction. Eye tracking data collected during instruction revealed that children in the *Speech+Gesture* condition allocated their attention differently than children in the *Speech Alone* condition, spending significantly more time looking to the problem and following along better with spoken instruction. Importantly, the degree to which children followed along with spoken instruction positively predictive posttest scores only for children in the *Speech+Gesture* condition, indicating that gesture interacts with looking patterns to support learning. Email: Miriam Novack, mnovack1@gmail.com

9:40-9:55 AM (277)

Individual Differences in STEM Cognition: Neural and Behavioral Evidence. DAVID J.M. KRAEMER, JOSHUA S. CETRON, ANDREW C. CONNOLLY, JAMES V. HAXBY, VICKI V. MAY and SOLOMON G. DIAMOND, *Dartmouth College* — Research on conceptual knowledge about physical objects has revealed distributed networks of brain activity supporting retrieval of object features. This feature knowledge relies at least in part on regions of sensorimotor cortex, including those active during initial perception of those features. For example, object color knowledge is tied to ventral visual cortex, and the action network supports knowledge about tool use. Here, I will discuss new and ongoing work from my lab and others that extends this research to central concepts in STEM learning. Specifically, if physical experience shapes conceptual representations, then how does one's experience in physics learning environments shape one's understanding and neural representations of physical (i.e., Newtonian) force? To address this question, we use fMRI and multivariate pattern analysis to examine differences in conceptual representations between novices and advanced engineering students. Results demonstrate different learning trajectories observable both in behavior and in informational networks of brain activity. Email: David J.M. Kraemer, david.j.m.kraemer@dartmouth.edu

Learning and Memory

West Meeting Room 212-214, Sunday Morning, 8:00-10:00

Chaired by Mark L. Howe, City, University of London

8:00-8:15 AM (278)

Reconsolidation or Interference? Aging Effects and the Reactivation of Novel Episodic Memories. MARK L. HOWE, SHAZIA AKHTAR, CASSANDRA E. BLAND and MARIA V. HELLENTAL, *City, University of London* — We examined aging effects in reconsolidation and interference in episodic memory by reactivating memories for well learned, novel pairs prior to altering associations between the pairs. Younger and older adults learned pairs of novel nonsense words and

nonsense images to a strict criterion. After 24-hours, half of the images were reactivated and new nonsense names were learned to the same criterion for the original nonsense images. Following a 1-week delay, we tested recognition and source monitoring for both sets of pairings. The results showed that for older adults more trials were needed to learn the new pairings for the reactivated images compared to those not reactivated. In addition, we showed that both older and younger adults were better at recognizing the source of the original pairings compared to the new ones. These results are inconsistent with leading theories of reconsolidation and are instead, consistent with interference theories.

Email: Mark L. Howe, drmarkl.howe@gmail.com

8:20-8:35 AM (279)

Unimanual Dexterity Positively Predicts Children's Episodic Memory: A Behavioral and Neuroimaging Investigation. KEITH LYLE, MARCUS LEPPANEN and BRENDAN DEPUE, *University of Louisville* — In young and middle-aged adults, manual behavior is a marker for individual differences in memory. Bimanual coordination and inconsistent hand preference have both been found to positively predict episodic memory. It is unknown how manual behavior relates to memory among children. Here, in a sample of children aged 6-15 years, we examined episodic memory as a function of manual dexterity utilizing the Children's California Verbal Learning Test and the Purdue Pegboard Test. Unimanual left-hand dexterity and unimanual right-hand dexterity were found to be independent, positive predictors of episodic memory. Unlike in young adults, bimanual coordination did not predict episodic memory. A subset of children also underwent structural neuroimaging, which revealed multiple relationships between brain morphometry and memory, and one relationship between brain morphometry and manual dexterity. Our findings shed light on the developmental trajectory of the manual-memory relationship and reveal behavioral and neuromorphometric markers of individual differences in children's memory. Email: Keith Lyle, keith.lyle@louisville.edu

8:40-8:55 AM (280)

The Speed of Memory Errors Shows the Influence of Misleading Information. JEFFREY STARNES, *University of Massachusetts Amherst*, CHAD DUBE, *University of South Florida*, MATHEW FRELINGER, *University of Massachusetts Amherst* — In a recognition memory task, increasing memory strength produces more accurate responding and shorter response times (RTs). Sequential-sampling models such as the diffusion model naturally produce this pattern in terms of their evidence accumulation process, but discrete-state theorists have recently provided evidence that the RT effect is based on mixing responses from different states with no relationship between strength and RT within a given state. We test these models with experiments in which participants performed "old"/"new" recognition trials as well as forced-choice trials. For the latter, all of the words that participants previously misclassified in the "old"/"new" trials were paired with a word that was correctly classified with the same response. We found that forced-choice accuracy was lower for trials that included words with fast versus slow errors on the previous old/new decision, suggesting



that fast errors are often the result of retrieving misleading information from memory. This pattern was predicted by the diffusion model but not the discrete-state model.

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9:00-9:15 AM (281)

Implications for the Spacing Effect of Temporal Memory During Face Recognition. PETER F. DELANEY and AGUSTIN J. DE LEON GUERRERO, *University of North Carolina at Greensboro*, TODD C. JONES, *Victoria University of Wellington* — People can indicate when they saw a word in a long sequence of words, which is evidence that context information is stored with items. Some theorists suggest the spacing effect often emerges from context information. Although faces show a spacing effect, it is different in several ways than spacing effects for words. In a series of experiments, we found that the typical person was almost at chance at judging when in the sequence a recognized face was seen. However, when temporal memory from the whole group was averaged together, a “wisdom of the crowds” effect emerged. People with good item recognition for faces also tended to have good source memory for faces, and consequently people with better memory were more likely to contribute to the group’s guess about source. Implications for theories of spacing and forensic applications are discussed.

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9:20-9:35 AM (282)

Losing Memories With Targeted Memory Reactivation. KATHERINE CNS SIMON, REBECCA GOMEZ and LYNN NADEL, *University of Arizona* (Presented by Lynn Nadel) — Targeting memories during sleep opens powerful and innovative ways to influence the mind. This presentation will describe a study using targeted memory reactivation aimed at inducing forgetting during sleep. We modified targeted memory reactivation (TMR), which to date has been used to strengthen learned episodes, to instead induce forgetting (TMR-forget). Participants were first trained to associate the act of forgetting with an auditory tone cue. In a second, separate, task they learned object-sound-location pairings. Shortly thereafter, some of the object sounds were played during slow wave sleep, paired with the forget tone cue to induce forgetting. One week later, participants were tested for recall. At recall, participants demonstrated lower recall of reactivated versus non-reactivated objects and impaired recognition memory and lowered confidence for the spatial location of the reactivated objects they failed to spontaneously recall. We show that it is possible to target memories during sleep for selective weakening. The ability to induce forgetting during sleep has implications for developing novel therapeutic techniques for psychological disorders such as PTSD and phobias.

Email: Lynn Nadel, nadel@u.arizona.edu

9:40-9:55 AM (283)

The Roles of Semantic Context and Disjunctive Syllogism to Fast Mapping. IRENE P. KAN, ANNA B. DRUMMEY, EMILY O’GORMAN and KATHRYN CUSHING, *Villanova University* — In the word learning literature, “fast mapping” (FM) refers to the rapid acquisition of novel label-object pairings. In the

standard FM paradigm, a novel label is presented alongside a novel object and a familiar object, and subjects are asked to identify the item that corresponds to the label. Memory for novel label-object pairings is subsequently assessed. It has been proposed that both the presence and active rejection of the familiar context item (a process called disjunctive syllogism, DS) are crucial to FM (e.g., “I know this is an apple, so “talmac” must refer to the other thing.”). We investigated these two processes in FM and found that: (a) compared to when the novel label-object pairing was presented alone, the FM procedure did not bestow any additional learning benefits, and (b) although semantic relatedness between the context and novel items did not influence learning, context item familiarity (familiar vs. unknown) did.

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Sensation and Perception

West Meeting Room 205-207, Sunday Morning, 8:00-9:40

Chaired by Terry D. Blumenthal, *Wake Forest University*

8:00-8:15 AM (284)

Prepulse Inhibition of Startle Depends on Amount, not Direction, of Change. TERRY D. BLUMENTHAL, HOPE A. PETERSON, *Wake Forest University* — The human startle eyeblink response can be inhibited by a change in the stimulus environment (a prepulse) briefly before the startling stimulus, with more inhibition from more intense prepulses. This study (N = 35 college students) examined whether a decrease in sound energy compared to a steady background of noise (a gap prepulse), would follow this same pattern of inhibition. Embedded in a 65 dB steady background noise were 100 dB white noise startle stimuli preceded by 120 ms on some trials by sounds at 5, 10, or 15 dB above (prepulses) or below (gaps) background. Inhibition was graded by amount of change relative to background, irrespective of whether the change was an increase or decrease of energy. These results demonstrate that the neural centers responsible for startle inhibition are responsive to both prepulses and gaps, and are sensitive to amount of change, not simply whether a change occurs.

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8:20-8:35 AM (285)

Temporal Visual Attention Windows are Larger in Deaf Children. MATT DYE, BRENNAN TERHUNE-COTTER, SARAH KIMBLEY and PETER C. HAUSER, *Rochester Institute of Technology* — We report data from an RSVP task designed to assess the effect of deafness on the magnitude of temporal visual attention windows. Fifty-three deaf and 23 hearing children (aged 7-11 years) participated in an RSVP task where an adaptive staircase procedure determined the rate at which visual stimuli could be presented while preserving an observer’s accuracy at detecting a target. The results revealed that deaf children had lower thresholds than hearing children ($F(1, 73) = 6.56, p = .012, \eta^2 = .07$, with age as a covariate: ($F(1, 73) = 13.13, p < .001, \eta^2 = .14$)). Deaf children needed a slower presentation rate ($M = 8.90$ items/sec) to achieve the same level of accuracy as typically hearing children (10.73 items/sec). For the deaf children, performance was not related to unaided dB



HL in their better ear ($r = -0.06$, $p = .672$). The data suggest that audition has an impact of temporal processing in the visual modality, but one that is not easily captured by audiometric measurements.

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8:40-8:55 AM (286)

Disembodying Touch With the Mirror Box Illusion. JARED MEDINA and SAMUEL D. KATZ, *University of Delaware* — Can someone embody a “disembodied” hand, and feel touch outside of their body? We used the mirror box illusion to create a spatial mismatch between visually- and proprioceptively-defined limb positions. In the large mirror condition, the participant could see a reflection of their entire hand and forearm. In the small mirror condition, only their hand reflection was visible with empty space where their forearm should be. Bimanual synchronous finger-tapping in this condition created illusory embodiment of the mirror-reflected hand sans-forearm, and (at times) the sense that their forearm was in empty space. During this illusion, we then touched the hand behind the mirror. Participants dissociated where they felt touch versus embodied their hand and/or forearm, suggesting separable mechanisms for these processes. At times, participants reported feeling touch in the empty “forearm” space, suggesting that body schema constraints (“a forearm should be here”) can override visual information, leading to out-of-body touch.

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9:00-9:15 AM (287)

Distinguishing Perception From Related Mental States. ADAM REEVES, *Northeastern University*, BIRGITTA DRESPLANGLEY, *University of Strasbourg* — The eighteenth-century Scottish ‘common sense’ philosopher Thomas Reid argued that perception can be distinguished on several properties from several other categories of experience, such as sensation, illusion, hallucination, mental images, and pure imagination, or what he called ‘fancy’. We extend his approach to eleven mental categories, and discuss how these distinctions, often ignored in the empirical literature, bear on current research. We also score each category on five properties abstracted from Reid (1764) to form a 5x11 matrix, and thus can generate statistical measures of their mutual dependencies and extract principle components, the first of which is a measure of realism. We hope that this approach will have general interest as illustrating what we can call ‘computational philosophy’.

Email: Adam Reeves, reeves@neu.edu

9:20-9:35 AM (288)

A Color Inference Approach to Interpreting Messages Encoded in Colors. KAREN B. SCHLOSS and LAURENT LESSARD, *University of Wisconsin - Madison*, CHARLOTTE S. WALMSLEY, *Brown University*, KATHLEEN FOLEY, *University of Wisconsin - Madison* — People infer complex meaning from colors. They infer which fruits are unripe/ripe/rotten, which sports fans are rooting for their team/rival teams, and which bins are for discarding trash/recyclables based on color. The Color Inference Framework proposes that people form color inferences using two sources of information:

(1) color-entity associations learned from experiences and (2) perceptual/semantic context. This framework makes several predictions, which were tested and supported in three experiments on color-coding in recycling bins. First, people correctly infer where to discard objects based solely on color (no labels) if bin colors are strongly associated with colors of to-be-discarded objects. Second, people infer objects should be discarded in bins with weak color-entity associations if that maximizes overall color-entity associations, given the full set of colors and to-be-discarded objects. Third, optimizing recycling bin colors involves simultaneously maximizing color-entity associations within color-bin assignments while minimizing color-entity associations between colors and non-assigned bins.

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Statistics and Methodology

West Meeting Room 202-204, Sunday Morning, 8:00-9:40

Chaired by Zachary Estes, Bocconi University

8:00-8:15 AM (289)

Replicability: Boring Unpublished Research on the Surprisingness of Published Research. ZACHARY ESTES, *Bocconi University*, JAMES S. ADELMAN, *University of Warwick* — Replicability is crucial for a stable base of scientific knowledge, so identifying predictors of replicability is an important goal of the sciences. The Open Science Collaboration (2015) recently showed that more surprising effects may be less likely to replicate successfully. However, that finding is limited to a measure of surprisingness that is susceptible to biases and has not yet been replicated in an independent dataset. We therefore develop a simple and objective measure of surprisingness, using latent semantic analysis to estimate the contextual similarity of an article’s abstract to the word “surprising”. Using the two largest and most systematic replication projects in psychology, we demonstrate that objective surprisingness predicts replicability above and beyond subjective surprisingness in the Reproducibility Project, and in fact objective surprisingness (but not subjective surprisingness) partially explains the lower replicability of social than of cognitive results. Moreover, objective surprisingness also predicted replicability in the Many Labs Project. Thus, the present research provides the strongest evidence to date that more surprising results are less replicable.

Email: Zachary Estes, estes@unibocconi.it

8:20-8:35 AM (290)

Modeling the Visual Search Literature I: An Empirical Estimate of a Priori Power. DWIGHT J. KRAVITZ and STEVE R. MITROFF, *The George Washington University* — Increasing calls for and evidence suggesting the necessity of publishing null results and pre-registering experiments (e.g., Nosek et al., 2015) heightens the importance of a priori power estimation. Interpreting null results, particularly the absence of an effect, requires confidence in the a priori ability to detect that effect (as does pre-registration). Unfortunately, current estimates of power may not be sufficient, as they are both simplistic and assumption heavy. The current study used a massive visual search dataset (>11 million participants, >3 billion trials; *Airport Scanner*, Kedlin Co.) to produce



empirical estimates of *a priori* power. Dividing the dataset into numerous independent replications of various designs allows for estimating the minimum effect size each design can reliably (>95%) detect (*a priori* power). Under these analyses, null results now provide evidence that the effect is no larger than minimum effect size. Similar analyses found false positive rate estimates are particularly high for experiments with few trials but many participants.

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8:40-8:55 AM (291)

Computational Psychometrics Integrating Eeg, Nirs, and Virtual Reality. PIETRO CIPRESSO and GIUSEPPE RIVA, *Istituto Auxologico Italiano and Catholic University* — Although the neuroscience studies contain many examples of the use of computational models to describe processes and biological patterns, there are fewer reports of their use in modeling cognition and behavior during realistic situations. Human behavior is too complex, nonlinear, and unpredictable due to the irrationality of even healthy humans. Even with very efficient models it is impossible to predict the influence of irrationality on human behavior. Moreover, to study realistic situation in vivo is very complex. A solution is the use of simulated environments by the means of virtual reality (VR) to get a real immersion in prototypical situations to be represented in clinical and experimental setting. The huge advantage of using VR environments and simulations is the capability of a platform to collect and integrate a huge variety of events. I present a tested VR platform to connect an electroencephalogram (EEG) and a near infrared spectroscopy (NIRS) in a virtual environment, in order to trigger events in specific situations elicited through the VR.

Email: Pietro Cipresso, p.cipresso@auxologico.it

9:00-9:15 AM (292)

The P Curve Is Not What You Think It Is. RICHARD D. MOREY, *Cardiff University* — In recent years, a number of statistical techniques have been claimed to support the detection or correction of publication bias. The “p curve” (Simonsohn, Nelson, & Simmons, 2014; Simonsohn, Simmons, & Nelson, 2015) is a set of graphical and statistical methods that are supposed to detect deviations in significant effects from the uniform distribution that would be expected under the null hypothesis, thus accounting for publication bias. Unfortunately, the method falls far short of the claims made on its behalf. I will show that the statistical basis for most of these tests is flawed; that the hypotheses tested are not interesting; and that the way the test is constructed throws away important information regarding the studies. Furthermore, interpretation of the results of a p curve analysis is difficult because it is not clear what one should infer, given that the set of studies is constructed by the p curve analyst. I will make a number of recommendations for modifications to p curve methods and their interpretation.

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9:20-9:35 AM (293)

Arithmetic Retrieval-Induced Forgetting in Chinese Adults. YALIN CHEN and JAMIE I.D. CAMPBELL, *University of Saskatchewan* — Retrieval practice of arithmetic facts (e.g., 2×3) can interfere with retrieval of other, closely related arithmetic facts (e.g., $2 + 3$), increasing response time (RT) and errors for these problems. Here we examined retrieval induced forgetting in native Chinese participants, which previous research indicated may not be susceptible to the RIF effect for a particular subset of small addition problems ($\text{sum} \leq 10$). We found that the Chinese adults showed RIF for tie problems (e.g., $2 + 2$, $3 + 3$, etc.) but no RIF for small non-tie addition problems. The results indicated that there might not be strong memory retrieval competition between addition and multiplication facts for non-tie problems in Chinese adults.

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Cognitive Control

West Meeting Room 118-120, Sunday Morning, 10:20-12:00

Chaired by Sebastien Helie, *Purdue University*

10:20-10:35 AM (294)

The Effects of Typical Aging and Parkinson's Disease on Trial-By-Trial Switching Between Categorization Systems. SEBASTIEN HELIE and MADISON FANSHER, *Purdue University* — The multiple systems framework of category learning through different procedural and declarative memory systems has received substantial support. However, a paucity of empirical work has studied the interaction between the categorization systems. The neurochemical changes associated with Parkinson's disease lead to cognitive deficits that impair learning about category membership, which may also affect the ability to switch between categorization systems. We studied the effects of typical aging and Parkinson's disease on categorization system-switching by comparing the performances of young adults, older adults, and people with Parkinson's disease in a categorization experiment requiring system-switching. The results show that trial-by-trial system-switching is possible for older adults and people with Parkinson's disease. However, trial-by-trial switching is impaired by the natural aging process and the proportion of participants that can switch is lower in people with Parkinson's disease. These results may account for some perseverative tendencies observed in people with Parkinson's disease.

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10:40-10:55 AM (295)

Competitive Task Switching: Balancing Model-Based and Memory-Free Action Selection. ATSUSHI KIKOMOTO and ULRICH MAYR, *University of Oregon* (Presented by Ulrich Mayr) — Most competitions that require fast-paced decisions are won by the player who not only skillfully executes action plans, but does so in the least predictable manner. How is such unpredictable behavior achieved in the face of known constraints on action selection? We hypothesize that in repeated, zero-sum game situations, people switch between (1) a model-based strategy that is based on a representation of one's own and the



opponent's previous moves, and (2) a memory-free strategy that generates random moves. Which of these two strategies is used on a given trial, is based on a simple win/loss heuristic: Wins on the preceding trial trigger model-based moves, losses trigger memory-free moves. Results across five experiments, using a competitive task-switching situation and both computer and human opponents, are consistent with our strategy-switching account. In the final experiment, we also present trial-by-trial EEG results showing that following loss trials, the internal task model is in fact suppressed. We suggest that the mixed strategy allows near-optimal competitive behavior by negotiating two conflicting goals: (1) exploiting the opponent's deviations from randomness while (2) being unpredictable towards the opponent.

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11:00-11:15 AM (296)

Breaking the Rules: Cognitive Conflict During Deliberate Rule Violations. ROLAND PFISTER, ROBERT WIRTH, ANNA FOERSTER, KATHARINA A. SCHWARZ and WILFRIED KUNDE, *University of Wuerzburg* — Research on deliberate rule violations has typically adopted a motivational perspective, asking whether or not agents decide to violate rules based on contextual factors and moral considerations. We complement such approaches by providing a cognitive perspective on the processes that mediate rule violation behavior. In a series of behavioral experiments we show that committing a rule violation bears cognitive conflict for the rule breaker: The rule representation seems to continually be active during the entire course of action thus leaving a trace on observable behavior. These findings open up a new theoretical approach to violation behavior that shifts the focus from precursors of this ubiquitous behavior to the actual cognitive processes that occur right at the moment a rule violation takes place.

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11:20-11:35 AM (297)

Does Lemon Facilitate Language Switching? CHUCHU LI and TAMAR H. GOLLAN, *University of California, San Diego* — The current study investigated if cognates (e.g., lemon-limón) facilitate language switches. Spanish-English bilinguals were cued to switch languages while repeatedly naming pictures with cognate vs. non-cognate names in separate or mixed blocks. In both conditions, on the first presentation of each picture, cognates elicited significantly smaller switch costs, and were produced faster than non-cognates only on switch trials. However, cognate switch-facilitation effects were eliminated or reversed in mixed blocks with repetition, largely due to the increasingly slower responses for cognates on switch trials. Cognates may facilitate switches due to increased dual-language activation, which is largely suppressed on non-switch trials. With repetition, dual-language activation may feed back up to the lexical level, increasing competition for selection. When naming pictures in a cognate block, bilinguals may avoid these discrimination problems by adaptively focusing less on

phonology. Cross-language overlap in phonology appears to influence language selection at both phonological and lexical levels.

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11:40-11:55 AM (298)

The Roles of Intention and Reward in Human Action Control. BERNHARD HOMMEL, DOMINIQUE LIPPELT and ERMINE GURBUZ, *Leiden University*, ROLAND PFISTER, *University of Wurzburg* — Cognitive approaches to human action control consider actions to aim at the realization of intended sensory events while motivational approaches emphasize the importance of expected reward. We used a game-like experimental setup to directly compare the roles of expected sensory and affective action effects in selecting and performing reaching actions in forced- and free-choice tasks. Findings suggest that the two kinds of action effects impact action control independently. Action selection and execution in the forced-choice task were strongly impacted by the spatial compatibility between actions and the expected sensory action effects, whereas the free-choice task was hardly affected. In contrast, action execution, but not selection, in both tasks was strongly impacted by the spatial compatibility between actions and highly valued action effects. This pattern suggests that sensory and affective action effects serve different purposes: The former dominates rule-based action selection, whereas the latter serves to reduce remaining action uncertainty.

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Decision Making

West Meeting Room 211, Sunday Morning, 10:20-12:00

Chaired by David Budescu, Fordham University

10:20-10:35 AM (299)

Optimizing Aggregation of Forecasts by Coherence-Weighting of Judges. DAVID V. BUDESCU and YUYU FAN, *Fordham University*, DAVID R. MANDEL, *Defence Research & Development, Canada*, MARK HIMMELSTEIN, *Fordham University* — Numerous studies find that aggregating judges' judgments can lead to better subjective probability estimates and forecasts. We study whether judges' level of coherence in their judgments provides a meaningful measure of general individual forecasting ability and, as such, can be used to weight judges' contributions to an aggregated estimate. We extended previous research on coherence-weighting strategies in three important ways: first, by testing their efficacy under direct and relative probability elicitation methods; second, by testing whether such strategies are beneficial when applied to unrelated "test" judgments, and (3) by extending such tests to tests items that represent genuine forecasts. We find that coherence weighting improved the estimation of subjective probabilities for both elicitation methods, although the benefits were attenuated for test items, and especially forecasting items. Results also show that the optimal coherence measure depends on the elicitation method and judgment task.

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**10:40-10:55 AM (300)**

Worldview-Motivated Rejection of Science and the Norms of Science. STEPHAN LEWANDOWSKY, *University of Bristol*, KLAUS OBERAUER, *University of Zurich* — Scientifically well-established propositions, such as the fact that greenhouse gas emissions are affecting the Earth's climate, are sometimes rejected by segments of the public. Public-opinion surveys have repeatedly shown that the rejection of scientific evidence across a broad range of domains is associated with rightwing or libertarian political views. To date there is little evidence of any association between leftwing political views and rejection of scientific evidence. We report a preregistered large-scale (N>1000) representative survey of the American public that sought to explain this apparent political asymmetry. We focused on Merton's (1942) analysis of the norms of science, such as communism and universalism, which continue to be internalized by the scientific community but which are not readily reconciled with conservative values. We show that people's political and cultural worldviews are associated with their attitudes towards those scientific norms, and that those attitudes in turn predict people's acceptance of vaccinations and climate science. The norms of science may thus be in latent conflict with a substantial segment of the public.
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11:00-11:15 AM (301)

Investigating the Cognitive Processes in Cancer Image Identification. JENNIFER S. TRUEBLOOD and WILLIAM R. HOLMES, *Vanderbilt University*, QUENTIN EICHBAUM, *Vanderbilt University Medical Center* — The ability to make timely and accurate decisions is critical for cancer detection in diagnostic pathology. In this talk, we describe a joint experimental and computational modeling approach for determining the impact of three factors on the identification of blast cells versus leukocytes (and other blood cell lineages) in clinical samples: (1) image complexity, (2) time pressure, and (3) externally imposed bias. Our study also examines how performance on accurate identification of blast cell images is related to general object recognition ability (as measured using the Novel Object Memory Test, Richler et al., 2017). We used a non-expert, student population to demonstrate how these three factors influence decision processes (quantified using the diffusion decision model). We also showed a strong relationship between performance on the cancer image identification task and general object recognition ability.
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11:20-11:35 AM (302)

Misremembering Decision-Related Information After Choice. FABIO DEL MISSIER, *University of Trieste*, LINDA MARTINA SALOMONSSON, *University of Trento*, MIMÌ VISENTINI, *University of Trieste*, TIMO MÄNTYLÄ, *University of Stockholm* — Despite the importance of past decisions for future ones, only a limited number of studies have focused on memory of information after choice. Starting from a taxonomy based on a new literature review, we carried out a study with the aim of providing empirical support for the existence of four types of misremembering after choice (forgetting, misattribution,

false memory, fact distortion). A second aim of the study was to appraise if misremembering after choice has a self-serving nature (i.e., it favors the chosen option) or not. Participants (n = 155) had to make five choices between two options in five different scenarios and they underwent a surprise free recall test after delays of 2', 20', or two days, followed by a recall cued by attributes names. All four kinds of misremembering took place after choice (as shown by 95% CIs) and memory for decision-related information significantly worsened over time partly due to reduced accessibility of memory traces at retrieval. We did not find any evidence of self-serving distortions. The findings show the need to consider different kinds of misremembering in decision-making models and call for a better definition of the boundary conditions of self-serving memory biases after choice.
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11:40-11:55 AM (303)

The Role of Dispatch Information in Police Shooting Decisions. DAVID JOHNSON, *Michigan State University*, TIMOTHY PLESKAC, *Max Planck Institute for Human Development*, JOSEPH CESARIO, *Michigan State University* — There has been increasing public concern that racial bias amongst police officers has led to increased shootings of Black Americans. Researchers have used simplified shooting tasks to test this question in the laboratory. Such studies typically reveal a bias shoot unarmed Black men more than unarmed White men. However, such studies have major shortcomings in that they do not include several important features of the real world decision environment. I conducted two studies that tested whether dispatch information, information about a suspect given to police by dispatch, influenced shooting decisions and racial bias. Untrained civilians and trained officers made better decisions when information was correct, and dispatch information eliminated racial bias in shooting decisions. I used the drift diffusion model to test how dispatch information, race, and expertise influence shooting decisions at the process level. The model showed these factors influence how individuals collect information relevant to the decision, rather than creating a prior bias to favor the decision to shoot. I discuss how dispatch information reduces racial bias, as well as implications of this work for police recruitment and training.
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Cognition

West Meeting Room 205-207, Sunday Morning, 10:00-12:00

Chaired by John G. Neuhoff, College of Wooster

10:00-10:15 AM (304)

Converging Evidence for an Evolutionary Bias in Perceiving Looming Sounds. JOHN G. NEUHOFF, *The College of Wooster* — In a natural listening environment, a sound source that approaches a listener can present a threat or opportunity that requires a rapid behavioral response. Physical changes in acoustic cues accurately specify the arrival time of looming sounds. However, almost all listeners exhibit a perceptual bias to hear looming sounds arrive when they are in fact still some



distance away. I argue that this “auditory looming bias” is an evolutionary adaptation that provides a selective advantage by giving advanced warning of approaching sound sources and thus, more time than expected to prepare for the arrival of the source. Such adaptive hypotheses about human behavior are often controversial and require rigorous converging evidence. I will discuss how evolved perceptual and cognitive biases can sometimes be more advantageous than accurate perception and present behavioral, developmental, comparative, neurophysiological, and sex differences data that all support an evolved perceptual bias in perceiving looming sounds.

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10:20-10:35 AM (305)

The Geography of Sport: Evidence for the Domain-Specificity of Cultural Mindsets. DANIEL CASASANTO, AMRITPAL SINGH and QI WANG, *Cornell University* — Sports are a microcosm of society. A nation’s sports reflect its people’s values, and contribute to their social identity. Here we investigated whether countries previously identified as “individualistic” versus “collectivistic” tend to excel in individual sports versus team sports, respectively. Individual sports like golf require athletes to focus on personal goals, whereas team sports like hockey require players to cooperate and to focus on collective goals. We analyzed the rate of Olympic medals won in individual versus team sports by 11 countries: 5 Western countries identified previously by sociological and psychological research as individualistic, and 6 East Asian or Eastern European countries identified as collectivistic. Paradoxically, results showed that individualistic countries won a greater proportion of medals in team sports, whereas collectivistic countries won more medals in individual sports. Findings support the view that cultural mindsets and value orientations are domain-specific, not monolithic.

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10:40-10:55 AM (306)

Music-Related Abilities Among Dyslexic Readers. LEAH FOSTICK, ANAEL BEKHOR and SAPIR HILLEL-BEN-LULU, *Ariel University*, JOHN G. NEUHOFF, *The College of Wooster*, ANDREA R. HALPERN, *Bucknell University* — Rhythm and timing, as well as pitch and harmony, are basic foundations of music. Studies report mixed results regarding musical abilities of dyslexic readers. Findings show that dyslexic readers experience difficulties in perceiving rhythm and timing, but seem to be better than normal readers in identifying pitch. In the present study, we tested whether the perception of pitch and spectrum is better than rhythm among dyslexic readers, and as compared to normal readers. Fifteen dyslexic reader students participated in the study. Dyslexic readers exhibited better spectrum perception than normal readers. Normal readers had better rhythm and pitch perception than dyslexic readers. No differences were found between groups in Bucknell Auditory Imagery Scale (BAIS), and the ability to identify slow changes in speaker’s frequency.

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11:00-11:15 AM (307)

Neural Reward Correlates of Serial Changed Humor Appreciation for Four-Frame Comic Strip (Manga). MARIKO OSAKA, *Cinet NICT*, KEN YAOI, *Kyoto University*, TAKEHIRO MINAMOTO and MIYUKI AZUMA, *Cinet NICT*, NAOYUKI OSAKA, *Kyoto University* — Neural bases of humor appreciation evoked by a four-frame comic strip, having introduction- (the first), development- (the second), turn- (the third) and conclusion- (the fourth) frame, were investigated. An fMRI activation was serially measured during funny and no-funny manga conditions based on a preliminary investigation. fMRI data in the funny condition were compared with those no-funny condition. Results showed significant increase of activation in the funny condition in temporo-parietal junction (TPJ) under the second frame, followed by activation of the temporal and frontal areas in the third frame. For the fourth frame (punch line), strong increased activations were confirmed in the medial prefrontal cortex (MPFC) and cerebellum. These findings suggest that humor comprehension evokes activation TPJ and expands to the MPFC and cerebellum. Because of these regions are related to reward system of brain, the effect of humor comprehension on cognitive task performance such as working memory is also discussed.

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11:20-11:35 AM (308)

Interactions Between the Default Mode Network and Executive Network in Older Adults. HIDEYA KOSHINO, *California State University, San Bernardino*, MARIKO OSAKA, TETSUYA SHIMOKAWA, TAKEHIRO MINAMOTO and MIZUKI KANEDA, *NICT*, KEN YAOI, *Kyoto University*, MIYUKI AZUMA, *NICT*, KATSUKI HIGO, *Ritsumeikan University*, NAOYUKI OSAKA, *Kyoto University* — Research has shown that older adults exhibit decreased activity in the Default Mode Network (DMN) at rest and weaker deactivation during tasks. However, it may also depend on regions, as the anterior regions may show greater activation, whereas the posterior regions might exhibit decrease of activity. Previously, we reported the Executive Network (EN) and DMN showed coactivation during task preparation whereas the DMN exhibited deactivation during task execution in working memory tasks. Here, we investigated whether age-related cognitive decline is related to a reduced relationship between the EN and DMN using fMRI. Older adults showed reduced DMN activity during task preparation and reduced deactivation during task execution, especially in the posterior cingulate cortex. However, the older adults exhibited higher activity in the EN during task execution. The results suggest that performance decline in older adults might be related to reduced connectivity within the DMN and between the EN and DMN.

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11:40-11:55 AM (309)

Representational Momentum and Anisotropy in Nearby Visual Space. TIMOTHY L. HUBBARD, *Arizona State University*, SUSAN E. RUPPEL, *University of South Carolina, Upstate* — Possible anisotropies linked to representational momentum were examined. Experiments 1 and 2 presented a moving target, and after the target vanished, participants



indicated the location of the leading or trailing edge of the target. Memory for both edges was displaced forward, and displacement was smaller for the leading edge. Experiments 3 and 4 also presented stationary objects in front of and behind the target. Memory for the near or far edge of objects in front of the target was displaced backward, and memory for the near or far edge of objects behind the target was displaced forward; the magnitude of displacement was larger for objects in front of the target and if the edge was farther away. The findings (a) suggest representational momentum is associated with anisotropy extending across and outward from the target and (b) are consistent with previous findings regarding estimates of time-to-contact, anorthoscopic perception, and memory psychophysics.

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Language Comprehension and Production
West Meeting Room 208-209, Sunday Morning, 10:20-12:00

Chaired by Jean Saint-Aubin, *Universite De Moncton*

10:20-10:35 AM (310)

The Missing-Phoneme Effect in Aural Prose Comprehension is Indistinguishable From the Missing-Letter Effect in Reading. JEAN SAINT-AUBIN, *Universite de Moncton*, RAYMOND M. KLEIN, *Dalhousie University*, VALERIE GERAGHTY, *Universite de Moncton* — When participants search for a target letter while reading, they miss more instances if the target letter is embedded in frequent function words than in less frequent content words. This phenomenon, called the *missing-letter effect*, is used to study the cognitive mechanisms involved in visual processing of written language. Saint-Aubin et al. (2016) extended this effect to oral language by asking participants to search for a phoneme when listening to a narration. Here, we isolated the influence of word function and of word frequency. Participants either read texts and searched for a letter or listened to the narration of the same texts and searched for the target letter's corresponding phoneme. Whether reading or listening both word frequency and word function contributed to misses. Item-based correlations between the reading and listening tasks were high. We concluded that both tasks involve the same cognitive processes rooted in psycholinguistically driven allocation of attention.

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10:40-10:55 AM (311)

Morphological Information in Cross-Situational Word Learning. SARA FINLEY, *Pacific Lutheran University* — Results from a cross-situational word learning experiment are presented. Adult, English-speaking participants were exposed to six words from each of three categories (animal, fruit, vehicle). In the Experimental condition, the endings of the words always corresponded to a specific category (e.g., /-bu/ for animals, /-ke/ for fruits). In the Control condition, the endings were assigned at random. In Part 1 of the experiment, referential uncertainty was low; target words were shown more frequently than non-target words. In Part 2, referential uncertainty was high; target words were presented as frequently as non-target words.

Participants in both the experimental and control conditions successfully learned the 18 target words after six exposures in Part 1, but only participants in the experimental condition successfully learned the words in Part 2. These results suggest that morphological cues such as noun class categorization can be used to infer word meaning when referential uncertainty is low.

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11:00-11:15 AM (312)

From Sounds to Words in 90 Milliseconds: The Time-Course of Spoken Word Recognition. JOSEPH C. TOSCANO, *Villanova University*, EMMA FOLK, *Indiana University* — How long does it take to access lexical representations? Previous data suggest that listeners initially encode acoustic cues at early stages of processing (ca. 100 ms post-stimulus onset) and then access lexical representations (200-400 ms post-stimulus). We investigated this using component-independent ERP experiments to determine the earliest time when effects emerge across different levels of linguistic organization. Listeners heard minimal pair stimuli that were cross-spliced to control for low-level acoustic differences and varied across three contrasts: (1) lexicality (words vs. non-words); (2) syntactic class (nouns vs. verbs); and (3) semantic class (animate vs. non-animate). Lexicality effects first emerged consistently ($p < .05$ for 30 ms) approximately 90 ms after the word/non-word distinction in the signal, followed by syntactic effects (116 ms) and semantic effects (266 ms). These results suggest that listeners rapidly activate lexical representations concurrently with low-level acoustic cue encoding, offering new insights into the organization of spoken word recognition.

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11:20-11:35 AM (313)

The Cat in the Hat: Speakers Cue Musical and Linguistic Metric Structure in Child-Directed Poetic Speech. MARA BREEN and AHREN FITZROY, *Mount Holyoke College* — Seventeen speakers read Dr. Seuss's *The Cat in the Hat* aloud. We modeled intensity and duration of ~25000 one-syllable words in the corpus using hierarchical models of musical meter (6/8 structure; Drake & Palmer, 1993) and linguistic meter (Fabb & Halle, 2008). In both cases, position in the metric hierarchy provided explanatory power beyond that observed for a variety of linguistic control factors. In the best-fitting intensity model, intensity increased with increases in metric strength in a 6/8 beat structure, syntactic boundary strength, and font emphasis (CAPS), and decreased with lexical frequency. In the best-fitting model of duration, word durations increased with increases in height in a hierarchical metric structure, word length, syntactic boundary strength, and font emphasis, and decreased with lexical frequency. These results demonstrate that speakers provide metric cues to listeners through child-directed poetic speech in ways that support efficient speech segmentation and phonological learning.

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11:40-11:55 AM (314)

How Does Mindfulness Affect Word Retrieval Performance?

LORI E. JAMES, ADAM I. SILVER and BROOKE SMALL, *University of Colorado Colorado Springs* — Most research on how mindfulness affects cognitive processing has focused on attention or memory, but the effect of mindfulness on language production remains unexplored. This pair of studies tested whether mindfulness relates to word retrieval processes. In Study 1, participants reported tip-of-the-tongue (TOT) states during a definition-naming task and also completed the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). Neither TOTs nor correct responses correlated with MAAS scores, suggesting that being generally high in the trait of mindfulness does not improve word retrieval. In Study 2, participants performed a picture-naming task after being randomly assigned to a 10-min guided mindfulness meditation or a control condition. Participants in the mindfulness condition named more pictures correctly than participants in the control condition. Again, self-reported mindfulness on the MAAS did not correlate with word retrieval performance. Together, these findings support the surprising conclusion that being mindful in one's general approach to life does not benefit word retrieval, but a brief mindfulness intervention can improve word retrieval performance, at least temporarily.

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Human Learning and Instruction III

West Meeting Room 202-204, Sunday Morning, 10:00-

11:40

Chaired by Edward T. Cokely, *University of Oklahoma, National Institute for Risk & Resilience*

10:00-10:15 AM (315)

Working Memory and Decision Making: An Investigation of the Predictive Power of Numeracy. EDWARD T. COKELY, *University of Oklahoma*, SAIMA GHAZAL, *University of the Punjab*, JINAN ALLAN, *University of Oklahoma*, DAFINA PETROVA, *University of Granada*, ADAM FELTZ, *Michigan Technological University*, ROCIO GARCIA-RETAMERO, *University of Granada* — A 2012 validation report on the Berlin Numeracy Test suggested that practical mathematical skill (i.e., numeracy) may be the strongest single predictor of individual differences in general decision making quality. Hundreds of subsequent studies with diverse participants from 50+ countries have further documented numeracy's unique and robust predictive power across numerical and non-numerical decision tasks (Garcia-Retamero & Cokely, 2017). Here, we report results from three large-scale studies of decision making and cognitive abilities involving 1000+ diverse adult participants who completed 1-5 hours of cognitive testing. Structural modeling converged, indicating that numeracy more than doubled the predictive power of general cognitive abilities including fluid intelligence and working memory. In accord with Skilled Decision Theory (Cokely et al., 2017), results suggest that skilled decision makers may generally use simple heuristic strategies (Gigerenzer et al., 1999) and knowledge-

based long-term memory processes to circumvent working memory limitations and support effective reasoning (Ericsson & Kintsch, 1995).

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10:20-10:35 AM (316)

Both Encoding Specificity and Optimality Predict Facial Recognition Under Different Lighting Variations.

DAWN R. WEATHERFORD and STARLA A. BLAKE, *Texas A&M University - San Antonio*, CURT A. CARLSON, *Texas A&M University - Commerce*, SHANNON C. FREASIER, *Texas A&M University - San Antonio* (Presented by Curt Carlson) — Although approximately 78% of non-violent crimes occur after 6pm, lighting as an estimator variable has received little empirical attention. We explored how encoding specificity (i.e., matching lighting between study and test) and the optimality hypothesis (i.e., normal lighting provides the most complete facial information) influence facial recognition. Participants studied 30 faces under different lighting (dark, normal, bright) and then completed a test (30 studied/30 new) under lighting that either matched or mismatched study. Receiver operating characteristic curves supported an interaction between study and test conditions. Bright and normal study lighting produced the highest accuracy when matched at test. However, dark study lighting produced the highest accuracy with normal lighting at test. Overall, our results support both the encoding specificity and optimality hypotheses. This study may inform how police implement effective lineup creation techniques that take the conditions of the crime event into account.

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10:40-10:55 AM (317)

The Role of Attention and Memory in Prospective Person Memory. KARA MOORE, *Knox College*, JAMES MICHAEL LAMPINEN, *University of Arkansas* — I studied the role of attention, by having participants interact with the confederate, and strategic monitoring (i.e., retrieval mode and searching for cues) in searching for a missing person. Participants saw a mock missing person alert that featured a confederate (i.e., target alert) or a description-matched foil. Participants encountered the confederate during a scavenger hunt that was staged as a separate experiment. If participants reported the encounter they won a prize. Half of participants received a reminder to search while in the vicinity of the confederate (i.e., strategic monitoring). Participants who saw the target alert were more likely to make a sighting than participants who saw the foil alert. Participants who strategically monitored were more likely to make a sighting than participants who did not. When participants did not strategically monitor those who had their attention drawn were more likely to make a sighting than those who did not.

Email: Kara Moore, moorekara12@gmail.com

11:00-11:15 AM (318)

Templates for Rejection are Strategic. NANCY B. CARLISLE, *Lehigh University* — Most theories of visual attention instantiate top-down control through feature enhancement of a known target. Although suppression of distractors is also a part of



attention, it is unclear whether attentional suppression is under top-down control. Recent evidence using visual arrays with two colors separated by hemifield suggests active templates for rejection are possible (Arita, Carlisle & Woodman, JEP:HPP, 2012), while a failure to replicate with mixed colors suggests it is not possible (Beck & Hollingworth, JEP:HPP, 2015). The Beck & Hollingworth design may have reduced the perceived benefit of the template for rejection. In this study, I increased the perceived benefit of templates for rejection by including $\frac{2}{3}$ separated arrays and $\frac{1}{3}$ mixed arrays. Here, the mixed arrays showed clear evidence of templates for rejection — equivalent in magnitude to the evidence shown in the separated arrays. This suggests theories of attention should be updated to include active suppression.

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11:20-11:35 AM (319)

Wait for It...Performance Anticipation Imposes a Cost on Memory. NOAH D. FORRIN, BRANDON C.W. RALPH, BURGHLEY LI, DANIEL SMILEK and COLIN M. MACLEOD, *University of Waterloo* — Conventional wisdom suggests that there is an encoding decrement prior to performing in front of others. The classic illustration is remembering few details from the conference presentation immediately preceding your own. We investigated this everyday phenomenon—the “next-in-line” effect (Brenner, 1973). In an initial experiment, participants took turns reading words aloud in an online chatroom; they had impoverished memory for words that they heard shortly before their own turn to read. In the next experiment, individual participants read a series of words silently to themselves before reading words aloud. Despite the absence of a social context, participants’ memory for silent words decreased as they got closer to “performing” by reading aloud. In subsequent experiments, we investigated whether this apparent anticipatory memory decrement arises because individuals are engaging in task-related mind-wandering regarding their subsequent performance. Implications for memory phenomena such as the production effect will be considered.

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Event Cognition

West Meeting Room 212-214, Sunday Morning, 10:20-

11:40

Chaired by Beverly Roskos, University of Alabama

10:20-10:35 AM (320)

That’s not the Movie I Saw! Measuring Differences in Movie Interpretations. BEVERLY ROSKOS, JESSICA S. MENDOZA and ZAC CRAWFORD, *University of Alabama - Tuscaloosa*, DAVID R. EWOLDSSEN, *Michigan State University* — Movies are interpreted differently by different viewers; specifically, the characters and their relationships are interpreted differently. Across two studies we investigated participants’ perceptions of character relationships during and after the movie. Separate groups of participants were stopped one-quarter, one-half, or three quarters through the movie, or at the end of the movie to rate perceived similarities among the characters. At the end of the movie all participants rated the extent to which they agreed

with different interpretations of the movie. Based on these interpretations, participants were separated into two groups. Using multi-dimensional scaling we tracked the changes in judgments of similarities across time, depending on the interpretation (group). The differences in the MDS solutions (across time) for the two groups was dramatic. In one group the relationships were constant across time; in the other, the relationships varied depending on the point in time during the movie. This methodology provides insight on how people understand stories.

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10:40-10:55 AM (321)

A Model of Event Knowledge. KEN MCRAE, *University of Western Ontario*, JEFFREY L. ELMAN, *University of California, San Diego* — It has long been recognized that people’s knowledge of real-world events and situations plays a critical role in planning actions, and understanding and anticipating the actions of others. What has not been clear is the form and structure of this knowledge, how it is learned, and how it is deployed in real time. Despite important theoretical proposals such as schema, scripts, and frames, a model that addresses these three questions has proven elusive. We present a connectionist model of event knowledge that attempts to fill this gap. It simulates a range of observed human behaviors that are influenced by event knowledge. It exhibits flexibility and robustness in the face of novel situations that resembles human behavior. Furthermore, it makes testable novel predictions. Most importantly, the model’s ability to learn event structure from experience, without prior stipulation, is a novel solution to the question “What is the form of event knowledge?”

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11:00-11:15 AM (322)

Pott-Obiographical Memory: Evidence for a Core Event-Processing System. NORMAN R. BROWN and LIANGZI SHI, *University of Alberta* — We assume that a core set of processes creates, revises, and structures event memories, regardless of whether the events are experienced directly or vicariously and regardless of whether they refer to actual, imagined, or fictional occurrences. This is the premise of the present study, which employed autobiographical memory methods (e.g., timed word-cued & event-cued retrieval, retrieval-strategy menus, event-pair relation menus) to explore how people access and organize events they learned about by reading or viewing the HARRY POTTER (HP) series. Consistent with prior autobiographical memory research (e.g., Brown & Schopflocher, 1998; Uzer & Brown, 2017), HP-knowledgeable participants ($n=138$) directly (and rapidly) retrieved HP events in response to 53% of neutral cues (e.g., TABLE), 91% of content-relevant cues (e.g., WAND), and 82% of event cues; also, cueing and cued events were often (69%) drawn from the same plot line. These data indicate that fictional and autobiographical events are similarly processed.

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11:20-11:35 AM (323)

Replay of Episodic Memories in the Rat. DANIELLE E. PANOZ-BROWN and JONATHON D. CRYSTAL, *Indiana University* (Presented by Jonathon Crystal) — Vivid episodic memories in people have been characterized as the replay of unique events in sequential order, which has not been demonstrated in nonhumans. Here we show that rats remember a stream of unique events in sequential order. Rats were presented with a variable length list of trial-unique items (odors). If the rat can replay episodic memories, it can search its memory to find items that occupied specific positions within the list (a capacity it demonstrated by selecting the 2nd last item in one context and the 4th last item in a second context, while avoiding other items [foils], Exp 1). Because the correct choice could be based on familiarity (memory trace strength) of 2nd and 4th last items, we dissociated familiarity and sequential information by doubling the amount of time between list items. Rats chose the correct sequential item when familiarity and sequential information were dissociated (Exp 2). High accuracy was also observed: when both correct and foil were 2nd and 4th last items (Exp 3); after a 60-min delay (Exp 4); and when other items were remembered after list encoding (Exp 5: foils from list; Exp 6: foils from interference task). We conclude that rats remember a stream of events using episodic replay.
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POSTER SESSION I

Thursday Evening

West Ballroom BCD

Viewing 4:00-7:30, Author Present 6:00-7:30 PM

HUMAN LEARNING AND INSTRUCTION I

6:00-7:30 PM (1001)

Using Gestures to Signal Lesson Structure and Foster Meaningful Learning. LOGAN FIORELLA, *University of Georgia*, CELESTE PILEGARD, *University of California - Riverside* — This study tested the hypothesis that an instructor's gestures can be used to signal the prose structure of a lesson, thereby facilitating meaningful learning. 125 undergraduates watched an instructional video comparing eastern and western steamboats in which the instructor produced structural gestures, iconic gestures, structural and iconic gestures, or no gestures. Structural gestures indicated the comparison structure of the lesson (i.e., the instructor moved her hands to the left or right side of her body when describing attributes of eastern or western steamboats, respectively). Iconic gestures represented specific features of steamboats (e.g., moving hands apart or together to indicate a deep or shallow hull, respectively). Students who viewed structural gestures outperformed the other groups on a subsequent inference test. All groups performed similarly on summary and matching tests. These findings suggest that structural gestures help students organize and integrate the instructor's words into a coherent mental model.

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6:00-7:30 PM (1002)

Gesturing in Virtual Reality Helps Low Spatial Individuals in a Procedural Learning Task. CHERYL I. JOHNSON, SHANNON K.T. BAILEY and MATTHEW D. MARRAFFINO, *Naval Air Warfare Center TSD*, BRADFORD L. SCHROEDER, *StraCon Services Group, LLC* — Although virtual reality (VR) has been touted as a revolutionary technology for training and education, there is scant systematic research to support these claims. To this end, we examined: 1) whether VR was more effective than less-immersive desktop computer-based training, and 2) within VR, what type of interaction facilitated better learning outcomes. To address these questions, we compared students' recall of a trained maintenance procedure (i.e., alternator replacement) across three informationally-equivalent training conditions: a computer-based simulation, VR with gesture-based interactions, and VR with voice-based interactions. Overall, there were no differences by training type on recall, but VR with gesture did boost recall scores for low spatial individuals to the level of high spatial individuals. These results may be explained by the enactment effect, such that performing gestures may help lower spatial individuals overcome deficiencies in the mental animation process.

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6:00-7:30 PM (1003)

When Seeing What's Wrong Makes You Right: The Effect of Incorrect Examples on 3D Diagram Learning. THOMAS F. SHIPLEY, ALLISON J. JAEGER and JOANNA A. MARZANO,

Temple University — In science, technology, engineering and mathematics (STEM), diagrams are used to illustrate 3D relationships, yet are often challenging for students. Not understanding diagrams can harm success because scientific practice requires comprehending and generating diagrammatic representations. Previous research has demonstrated that understanding 3D diagrams in geology can be improved by making predictive sketches (Gagnier et al., 2016). Additionally, math education research suggests that explaining why incorrect answers are wrong is as, or more, effective as learning from correct examples (Booth et al., 2013). The current study combined these findings, testing which method was more effective for helping students understand 3D geologic diagrams. Results demonstrated that both generating predictive sketches and correcting incorrect examples improved diagram comprehension, while simply copying correct sketches did not. Additionally, students in the correcting condition completed more items in less time, suggesting that this is an especially efficient and effective tool for improving 3D diagram comprehension.

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6:00-7:30 PM (1004)

Should Students Mix Flashcards on Different Topics? COURTNEY M. CLARK, ELIZABETH L. BJORK and ROBERT A. BJORK, *University of California, Los Angeles* — Mixing flashcards on different topics increases the spacing between successive cards on a given topic, which might be a good thing, given the widespread evidence that spacing can enhance long-term retention of studied materials. Contrary to this prediction, Hausman and Kornell (2014) found that mixing flashcard practice of Indonesian and anatomy terms did not have such benefits. In the present research, we explored whether mixing flashcards might help learning if the to-be-learned topics were more closely related to one another. We used two very similar African languages that required differentiation, and sometimes participants were required to learn a translation in each African language for a single English term. We found that studying languages one at a time led to better performance during acquisition, but blocking and mixing produced very similar retention on a final test.

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6:00-7:30 PM (1005)

How Survival Processing Provides an Effective Mnemonic for Second-Language Acquisition. STEPHANIE A. KAZANAS, *Tennessee Technological University*, JEANETTE ALTARRIBA and EMILY O'BRIEN, *University at Albany, State University of New York* — The current study examines second-language acquisition through an evolutionary paradigm (Nairne, Thompson, & Pandeirada, 2007; Schwartz & Brothers, 2014). English-speaking monolingual participants were asked to learn a set of new word translations to improve their chances of



survival or to improve their study-abroad experience. Animate and inanimate words were included in this task, to further examine the role of word type in this paradigm (VanArsdall, Nairne, Pandeirada, & Cogdill, 2015). Across sentence-completion, matching, and picture-naming tasks, learning was facilitated by the survival context, relative to the study-abroad context and an intentional learning condition. Scenario ratings indicated that this survival advantage could be a function of higher imageability and distinctiveness ratings for the survival context than for the study abroad context. Surprisingly, inanimate words were better remembered than animate words, across all three tasks, though survival processing facilitated language-learning on both animate and inanimate categories: birds, insects, weapons, and fruits.

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6:00-7:30 PM (1006)

The Effect of Walking on Encoding and Recall of Information. WILFORD MIRANDA, ALEXIS KOOB, LEANNE BOUCHER and MATTHEW COLLINS, *Nova Southeastern University* — Research has demonstrated the benefits of moderate aerobic exercise on cognitive function (Coles & Tomporowski, 2008; Skriver et al., 2014). Here, we examine the relationship between aerobic exercise, encoding rate, and forgetting. In the current study, participants either watched a movie or performed an acute bout of aerobic exercise for 30 minutes. Participants then completed a paired-associate-learning task, which involved learning word pairs and then recalling one word of the pair when presented with the other to measure the rate of learning. Two days later, participants returned and were given a surprise recall task to measure forgetting. In addition, participants completed a working memory task and several other questionnaires. Preliminary results indicate that participants in the exercise group learned the word pairs faster and recalled more words at follow up.

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6:00-7:30 PM (1007)

Classroom Structure and its Impact on Note-Taking and Learning. BENJAMIN D. ENGLAND, ASHLEY SYLVARA and AARON C. DRAKE, *Missouri Western State University*, FRANCESCA R. ORTEGREN, *University of Southern Indiana* — While research has identified several factors that improve student learning, students frequently misidentify those factors. This can include believing factors benefit learning when they are ineffective or, worse, when they instead harm learning. One factor, is the influence of verbatim – instead of gist – note taking on learning. As such, in the current project we further examined whether the ability to pause a lecture and use notes on a test alters note taking and test performance. The ability to use notes during testing improved both factual and conceptual test performance. Alternatively, pausing the lecture affected note taking more than it benefitted test performance. This may be due to the positive correlation between number of pauses and the number of key terms in their notes, supporting the idea

that more verbatim notes may not benefit test performance. We also discuss whether these patterns hold in an online-learning environment, and across two separate videos.

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6:00-7:30 PM (1008)

Student-Generated Forecasts Within a Multimedia Learning Environment Improve Understanding. FRANCESCA R. ORTEGREN, *University of Southern Indiana* — Multimedia learning theory suggests that the presentation of both visual and verbal information simultaneously should boost both memory for and understanding of cause-and-effect information (compared to either alone; cf. Mayer, 2009). However, while the memory advantage of multimedia materials is robust, those materials do not consistently improve students' understanding of the causal relationships described within the text (e.g., Serra, 2010). One reason for those disparate effects may be due to the need for—but lack of—active engagement during learning. To that end, the present study examined whether prompting student-generated forecasts (with or without multimedia) prior to each step in a causal sequence increased learning by activating prior knowledge and increasing active learning. Multimedia expectedly improved memory—but not understanding—performance compared to text-only. Conversely, participants who made forecasts performed higher on understanding measures than those who did not, but there was no difference in memory performance across those groups.

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6:00-7:30 PM (1009)

The Effects of Highlighting on Mind-Wandering and Memory. ELIZABETH LIGON BJORK and ERIN M. SPARCK, *University of California, Los Angeles* — The effectiveness of highlighting as a study technique is a topic of debate within the science of learning, but at least some evidence indicates that highlighting leads to better retention than passive reading on some recall tasks (e.g., Fowler & Barker, 1974). The present research investigated the possible role of mind-wandering—the unintentional shift in attention from external stimuli to internal thoughts shown to be associated with impaired learning (Szpunar, 2017)—in mediating such observed positive effects of highlighting on later test performance. In two experiments (self-paced vs. experimenter-paced), participants only read or highlighted-as-they-read a 1400-word passage, being probed at five-minute intervals to assess mind-wandering, followed by a fill-in-the-blank test after a 10-minute delay. Highlighters correctly recalled more of the passage and self-reported significantly less mind-wandering than read-only participants, suggesting that one factor underlying findings of improved retention with highlighting might be its ability to reduce mind-wandering during reading.

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6:00-7:30 PM (1010)

Getting the Gist: Developing a Visual Cognition Model of Judgments of Learning With Learning Analytics. HALIMAT I. ALABI, MAREK HATALA and BRIAN D. FISHER, *Simon Fraser University* (Sponsored by Brian Fisher) — The unskilled



and unaware effect is a common problem for collegiate learners, who often overestimate their learning and underestimate the study required to achieve their goals. We posit that the provision of learning analytics – which may help or hinder learners' decision-making – is mediated by individual difference in ability and disposition. In the model ability is defined as learners' numeracy, and spatial reasoning ability. Disposition is represented by motivation, achievement goal orientation, and cognitive reflectivity. The model was evaluated in two online course discussions; we analyzed interaction patterns, the quality, and quantity of messages posted between participants and the control. Evidence of the unskilled and unaware effect was obtained; our results suggest that social regulation of behaviors may supersede disposition in times of uncertainty. We discuss the implications of our findings on learners' decision making, and design methods for increasing reflexive thinking with learning analytics.

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6:00-7:30 PM (1011)

Simultaneous and Interleaved Training in Inductive Category Learning. JONAS S.-H. LAU and HAL PASHLER, *University of California, San Diego* (Sponsored by Hal Pashler) — The great majority of studies of perceptual category learning have presented learners with category members one at a time. In two experiments, we explore whether simultaneous presentation of stimuli belonging to different categories can lead to superior learning. Learners were trained either with sequential or simultaneous presentations, and tested either with sequential or simultaneous schedules. Experiment 1 used relatively simple, artificial stimuli, and Experiment 2 used real images of skin moles (some showing cases of melanoma, others not). When the final test involved sequential presentation of novel stimuli, neither simultaneous nor sequential training was superior. However, when the transfer test involved simultaneous presentation of stimuli, some significant differences were observed. We discuss practical and theoretical implications.

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6:00-7:30 PM (1012)

Blocked vs. Interleaved Study Sequences Differentially Impact the Retention of Generalized Knowledge and Specificity. SHARON MINA NOH (Graduate Travel Award Recipient) and ALISON R. PRESTON, *The University of Texas at Austin* (Sponsored by Alison Preston) — We examined the degree to which generalized knowledge and specificity is preserved over time as a function of training with different study sequences. Participants were trained to identify paintings by different artists for which half of the artists were studied in a blocked sequence (i.e., all paintings of the artist were presented sequentially), and the remainder were interleaved (i.e., paintings for multiple artists were intermixed). Participants then completed generalization and detailed memory tests, both immediately after training and after a 1-week delay. For generalization, interleaving led to superior performance (relative to blocked) immediately after training, but this difference was attenuated as the blocked condition showed improvements after a delay. For detailed memory, the pattern was reversed—blocking showed

better memory initially, but this difference disappeared when both conditions dropped to chance performance over time. These results suggest that although specificity declines over time, generalized knowledge is preserved and even improved.

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6:00-7:30 PM (1013)

We Repeat: Repeated and Spaced Retrieval Practice Improves Performance in a College Course. JOSEPH W. PIROZZOLO and DONALD J. FOSS, *University of Houston* (Sponsored by Donald Foss) — Motivated by Cepeda, Vul, Rohrer, Wixted and Pashler (2008) we manipulated the repetition and spacing of test items in a full-semester college course. Students in an Introduction to Methods in Psychology course received three unit exams throughout the semester. Some items were repeated on a) all three exams, b) exams two and three (short gap), or c) exams one and three (longer gap). In addition, some items d) only appeared on exam two, e) only on exam three or f) were novel at the final test. A surprise cumulative exam on the penultimate class day was used as the main outcome measure. Results show that students performed better on items that were repeated two or three times compared to those only taken once or were novel questions. Superior performance was also observed on items with a larger gap (exams one and three) than on those with a shorter gap (exams two and three). Our results provide evidence that repeated and spaced retrieval practice improve test performance in an authentic learning environment.

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6:00-7:30 PM (1014)

Semantic Processing Interferes With the Benefits of Talker Variability in Vocabulary Learning. NICHOLE RUNGE, MITCHELL S. SOMMERS and JOE BARCROFT, *Washington University in St. Louis* (Sponsored by Kristin Van Engen) — Previous studies using picture-word pairings have found a benefit of talker variability in vocabulary learning (e.g. Barcroft & Sommers, 2005). The present experiments investigated if this benefit extends to vocabulary learning involving written definitions. In Experiment 1, participants saw definitions (e.g. unlawfully attained loot) and heard novel first-language words (e.g. pelf) that were either spoken by the same person six times or six different talkers once each. At test, word recall did not differ by condition. One potential explanation for these results is that semantic processing of the written definitions interfered with the benefits of form-based (talker) variability. To investigate this possibility, in Experiment 2, we replicated Barcroft & Sommers' (2005) second-language vocabulary learning study using written definitions during study rather than pictures. No effect of talker variability on word recall was found, suggesting that the additional semantic processing required for written definitions eliminates the benefit of talker variability.

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6:00-7:30 PM (1015)

Comparing the Benefits of Taking (and Studying) Notes by Longhand, Laptops, or Ewriters. KAYLA MOREHEAD, JOHN DUNLOSKY and KATHERINE RAWSON, *Kent State*



University (Sponsored by John Dunlosky) — Almost every student reports taking notes in class (Palmatier & Bennett, 1974), so how should they take notes? Prior research has reported that using a laptop to take notes is detrimental to learning (Mueller and Oppenheimer, 2014), which has led some teachers to ban laptops from their classrooms. In two experiments, we replicated Mueller and Oppenheimer (2014) and extended their work by including (1) a group who took notes using an eWriter, (2) a delayed test, and (3) an opportunity to restudy notes. Without a chance to restudy notes, performance on immediate and delayed tests was best for those taking notes longhand; however, after restudy, performance was best for those using a laptop. Thus, taking notes on a laptop may benefit students if they restudy their notes prior to exams.

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6:00-7:30 PM (1016)

Immersive Virtual Reality Increases Liking, But Not Learning. JOCELYN A. PARONG and RICHARD E. MAYER, *University of California, Santa Barbara* (Sponsored by Richard Mayer) — The goal of the study was to compare the instructional effectiveness of immersive virtual reality (VR) versus a desktop slideshow as media for teaching scientific knowledge. Based on the cognitive theory of multimedia learning, it was predicted that students who learned with a well-designed slideshow would score higher on a post-test, but may not report higher levels of interest and motivation, than those who learned in VR. College students were shown a biology lesson in either immersive VR or a self-directed PowerPoint. Those who viewed the PowerPoint slideshow did significantly better on the post-test than those who viewed the immersive VR simulation, but did not find it as engaging, interesting, or motivating as VR. The results support the cognitive theory of multimedia learning and suggest that there is not strong research evidence to warrant investing in the costly job of converting conventional science instruction into simulations in immersive virtual reality.

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6:00-7:30 PM (1017)

Medial Prefrontal Cortex Compresses Concept Representations Through Learning. MICHAEL L. MACK, *University of Toronto*, ALISON R. PRESTON, *The University of Texas at Austin*, BRADLEY C. LOVE, *University College London* — Much of learning can be described as data reduction: less critical features of incoming information are compressed to emphasize encoding of goal-relevant knowledge. This view parallels prominent theories of medial prefrontal cortex (mPFC); yet, support for mPFC's role in learning is lacking. Here, we directly assess the data reduction hypothesis with fMRI. Participants learned to classify the same multidimensional stimuli across three problems, each defined by rules requiring 1-3 stimulus dimensions. This manipulation of conceptual complexity allowed us to test the prediction that brain regions that learn to compress will represent simpler problems with fewer dimensions. We measured learning-related compression of fMRI activation patterns with principal component analysis. Throughout the brain, only mPFC showed the predicted relationship: Greater neural compression was

found for problems with lower dimensional concepts. Further, computational modeling revealed that learners with greater problem-specific neural compression showed more optimal attention to stimulus dimensions. These findings support the view that mPFC is critical for transforming information into low-dimensional representations useful for the task at hand.

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LEARNING: REWARD, MOTIVATION, AND EMOTION

6:00-7:30 PM (1018)

Effects of Encoding by Rating of Emotional Valence for Emotional Stimuli: Comparing With Self-Referent and Physical Processing. TETSUYA FUJITA and MIZUKI KATO, *Hosei University* — In the present study, we investigated that not only emotional valence as attributes of emotional stimuli but also the effects of encoding, if any, on ratings of emotional valence. We studied that how the rating of emotional valence by emotional stimuli has the effect of encoding relative to self-referent processing and physical processing (rating of brightness) condition. We presented the emotional stimuli and asked for rating of emotional valence, brightness, or self-referent processing, then tested free recall performance for participants. Results showed that the memory for recall after the rating of emotional valence condition was as well or more than self-referent processing condition. On the other hand, there was higher memory for recall after the rating of emotional valence condition than physical processing condition. Thus, we found that rating of emotional valence had either equaling or surpassing effects of encoding on memory performance than self-referent processing.

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6:00-7:30 PM (1019)

Effects of Monetary Incentives on Memory and Response Bias Beyond Reward Anticipation. HOLLY J. BOWEN and ELIZABETH A. KENSINGER, *Boston College* — An adaptive memory system should enhance memory for rewarded events, and inconsequential events that gain importance later. We tested whether memory can be modulated by rewards introduced *after* encoding. Participants encoded images of indoor and outdoor scenes and made a recognition judgment at retrieval. In Expt 1, participants were informed before encoding which category of images (i.e., indoor/outdoor) would be worth a high or low reward if recognized on the memory test. In Expt 2, participants were informed *after* encoding of the performance-based rewards. In Expt 3, participants were informed of performance-based rewards before being tested 24 hours after encoding. Hit rate and response bias were influenced by reward value, but only during Expts 1 and 3. Participants did not show effects of reward value in Expt 2. The results suggest that rewards can influence memory beyond anticipation, depending on consolidation, providing insight into the reconstructive nature of memory retrieval.

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**6:00-7:30 PM (1020)**

Testing the Effect of Regulatory Fit on Memory Performance. MATTHEW S. BRUBAKER and ALEXANDRA S. MORENO, *Springfield College* — Regulatory focus theory suggests that matching a person's motivational state or goal orientation with how they go about achieving that goal produces regulatory fit, which increases confidence in the task and creates a more cohesive sense of "feeling right". The current study examined whether regulatory fit can affect memory performance. Across four study-test blocks, participants' task reward incentives were manipulated to induce either a promotion focus or a prevention focus, and participants' physical postures were manipulated to induce either approach or avoidance behaviors. Based on the regulatory focus theory, we expected to see better memory performance when the physical postures matched the motivational state (e.g. approach/promotion condition; avoidance/prevention condition). However, preliminary results yielded no significant differences across conditions. Possible explanations will be discussed within the regulatory focus framework.

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6:00-7:30 PM (1021)

Word Knowledge Worth Waiting For: Confidence Drives Curiosity and Strategic Exploration for Synonymy Learning. LINUS HOLM and GUSTAF WADENHOLT-ÅDÉN, *University of Umeå*, PAUL SCHRATER, *University of Minnesota* — Curiosity is often thought to reflect anticipation of an information gain. To test, participants ($n = 54$) could choose to pay waiting time to reveal the correct answer in a 5AFC word synonymy task. Individual assessments of participants' prior word knowledge was used to approximate expected information gain on reveals. We found strong support for the hypothesis that expected information gain drives reveal actions (6.0 times more likely to reveal per bit). Moreover, reveal actions were additionally predicted by word difficulty, suggesting a strategic learning policy for exploration. Consistently, learning scaled with information gain on the reveal, as assessed by a surprise memory test one day later. Moreover, our results were incompatible with model-free reinforcement learning which could not predict reveal choices. Our findings suggest curiosity is not merely anticipation for information but reflects a drive for improving predictive models.

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6:00-7:30 PM (1022)

Beyond Reading in Educational Contexts: Spending More Time on Practice Activities Predicts Better Learning Outcomes. PAULO F. CARVALHO and KENNETH R. KOEDINGER, *Carnegie Mellon University* — Learning by doing refers to learning practices that involve completing activities as opposed to explicit learning (e.g., reading). Although the benefits of learning by doing have been described before, it is still relatively uncommon in instructional practice. We investigated how much students employ learning by doing and self-quizzing in online courses, and whether it is associated with improved learning outcomes. Spending more time completing activities had a larger impact on learning outcomes

than spending more time reading, even in the case of mostly declarative content, such as in a Psychology course. Moreover, this positive effect of practice activities was seen not only for multiple-choice quizzes and exams but also for open-ended essay questions. Importantly, learning by doing is more efficient: grade improvements of 1 standard-deviation require 10-20% less time in learning by doing than reading. Finally, we contrast this evidence with students' a priori intuitions on best study strategies for their online course. Students overestimate the value of explicit learning through reading, and underestimate the value of active learning and quizzing.

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6:00-7:30 PM (1023)

Reward History Associated With Acoustic Dimensions Impacts Auditory Category Learning. CASEY L. ROARK and LORI L. HOLT, *Carnegie Mellon University* (Sponsored by Lori L. Holt) — Reward can highlight features of visual objects, but it is not yet known if reward history impacts auditory processing. In the current study, we trained participants to implicitly associate a high (100 points) versus low (20 points) reward history with variation across one of two acoustic dimensions (center frequency, duration). Participants next engaged in a category-learning task whereby the highly rewarded dimension was either relevant, or irrelevant, to categorization. Categorization accuracy across training and decision bound models of category learning revealed facilitation of category learning across a highly-rewarded dimension compared to when the same dimension carried a low reward value or both dimensions had equivalent value. These results are the first to establish reward-mediated attention to acoustic dimensions and demonstrate, for the first time in any modality, that reward-mediated or value-driven attention can impact category learning.

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6:00-7:30 PM (1024)

Beyond Semantics: Exploring the Role of Semantic Memory in Attitude Judgments. DAVID J. HALPERN and PEDRO L. RODRIGUEZ, *New York University* (Sponsored by Gregory Murphy) — How are we able to efficiently use our knowledge to make evaluative judgments on everything from music to politics? Inspired by models of attitude judgments (Zaller and Feldman 1992) and semantic memory retrieval (Abbott et al. 2015) we propose a theory where evaluative judgments are formed by retrieving a limited number of relevant concepts from semantic memory. This suggests that differences in semantic memory retrieval should predict differences in attitudes. We test this empirically in the political domain by leveraging measurement models of retrieval (Jun et al. 2015). Using category fluency data on politically relevant cues, we demonstrate that we can predict party affiliation and attitudes towards policies related to the cue. While our data are best fit by a dynamic local-to-global search strategy (Jones et al. 2012), the results are robust to different search algorithms. We discuss some implications for the organization of semantic memory.

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**6:00-7:30 PM (1025)**

Age-Related Memory Positivity in Semantic and Episodic Retrieval. KATHRYN CUSHING, ANNA B. DRUMMEY and IRENE P. KAN, *Villanova University* (Sponsored by Irene Kan) — A well-replicated finding in the aging literature is a memory positivity effect (i.e., better memory for positive than negative and neutral information), and this pattern is often explained in terms of motivated cognition. That is, as we age, we become increasingly motivated to maintain emotional well-being, and this may be achieved by prioritizing emotionally positive information (Mather & Carstensen, 2005). If memory positivity indeed reflects a global shift in processing priorities, then it should be observed across all memory domains. Although memory positivity has been demonstrated in episodic and autobiographical memory, it has rarely been examined in semantic memory. Here, we investigated memory positivity in semantic and episodic retrieval in younger and older adults (60+). We replicated the age-related episodic memory positivity effect, however, we found no evidence of semantic positivity in either group. Our findings suggest a potential boundary condition for memory positivity and its relationship with emotion regulation.

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6:00-7:30 PM (1026)

Persistence of High-Value Items in Memory After an Immediate Forget Cue. JOSEPH P. HENNESSEE, ALAN D. CASTEL and BARBARA J. KNOWLTON, *University of California, Los Angeles* (Sponsored by Barbara Knowlton) — Memory is enhanced for valuable items, and the current study examined how value influences directed forgetting. Participants studied words associated with different point-values they would earn for later recognition. Items were followed by a cue to either “Learn” or “Forget” the word. This cue was presented either immediately or after a 5 s delay. On the recognition test, subjects were instructed to recognize all presented words. Recognition was greater for items that had been cued to be learned. The recognition of low-value items was sharply reduced after the immediate compared to the delayed forget cue, suggesting that maintenance rehearsal during the delay enhanced recognition of these items. In contrast, recognition of high-value items was not reduced when the forget cue occurred immediately compared to after the delay. These results suggest that high-value items persist in memory without benefit of maintenance rehearsal as the result of an automatic process.

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6:00-7:30 PM (1027)

Individual Differences in Value-Directed Encoding. BLAKE L. ELLIOTT, SAMUEL M. MCCLURE and GENE A. BREWER, *Arizona State University* (Sponsored by Gene Brewer) — The ability to selectively encode important or valuable information is an essential aspect of human memory. Individual differences in this ability may derive from variability in stimulus valuation, memory encoding, or from variability in strategic abilities related to strategy selection and maintenance in working memory. The possibility that individual difference may segregate along these different dimensions is suggested by the fact that

the brain reward system consists of multiple parallel networks (e.g. mesolimbic, mesocortical, and mesiotemporal pathways) that converge to support action control. We collected cognitive ability measures reflecting working memory capacity, episodic memory, and value-directed remembering from a large sample of participants (n=230). Individual differences methodology can be used to assess these dimensional contributions to value sensitivity in value-directed remembering tasks. Our results suggest that episodic memory ability, but not working memory capacity, was predictive of value-dependent memory. These results suggest that brain reward networks may be differentially related to value-based memory encoding.

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6:00-7:30 PM (1028)

Learning in a Virtual Environment: Effects on Performance, Mood, and Engagement. DEVON ALLCOAT and ADRIAN VON MÜHLENEN, *University of Warwick* (Sponsored by Adrian von Mühlennen) — Recent advances in virtual reality (VR) technology allow for potential learning and education applications, though little research has currently been conducted. For this study, 99 participants were assigned to one of three learning conditions: traditional (textbook-style), video, and VR. The learning materials used the same text and 3D model for all conditions. Each participant was given a pre-test and post-test, with performance measured by improvement. Participants in the video condition performed the worst, with those in the traditional and VR conditions showing a significantly larger improvement. Emotion scales before and after the learning phase showed that participants in both the traditional and video conditions showed a significant decrease in positive emotions, whereas participants in the VR condition showed a significant increase in positive emotions, and a significant decrease in negative emotions. An evaluation scale also showed that VR participants reported higher motivation and engagement than those in the other conditions.

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6:00-7:30 PM (1029)

The Effect of Incentives on Pupil Dilation During Recognition Memory. LISA A. SOLINGER and IAN G. DOBBINS, *Washington University in Saint Louis* (Sponsored by Jeff Zacks) — During eye tracking studies of recognition memory, “old” judgments yield greater pupillary dilation responses (PDR) than “new” judgments. Here we test the hypothesis that the old/new PDR reflects the attentional salience of recognition evidence. We used performance-based rewards to systematically incentivize either “new” or “old” recognition responses. In the absence of incentives (baseline), we replicated the classic old/new PDR. However, when “new” conclusions were incentivized the old/new PDR was eliminated, whereas when “old” conclusions were incentivized it was amplified relative to baseline. Thus, the old/new PDR does not track memory retrieval per se. Instead, consistent with the attentional orienting account, it tracks the degree to which recognition evidence is motivationally significant. Pupil dilation also dissociated low- versus high-confident responses (regardless of incentives), and, in addition, dilation increased post-response for incentivized conclusions.



Overall, our findings support the attentional orienting account and reveal additional decision components present during recognition.

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6:00-7:30 PM (1030)

What's in it for Me? Motivating On-Task Thought and Lecture Comprehension in the Lab. AMY A. PACHAI, WID YASEEN, JACK LEGERE and JOSEPH A. KIM, *McMaster University* (Sponsored by Joseph Kim) — Learning requires focused attention, but mind wandering (MW) episodes shift cognitive resources toward internal thoughts. In the lab, MW occurs at high levels, hindering learning. However, these participants do not encounter authentic classroom motivators. We manipulated motivation in the lab to approximate classroom learning, where grades provide motivation. Participants watched a video lecture before completing a comprehension test. Before the lecture, half of the participants were told \$0.50 would be awarded per correct response. We examined reports of deliberate and unintentional MW during the lecture (Wammes, Seli, Cheyne, Boucher, & Smilek, 2016). In Experiment 1, rewarded participants reported similar levels of unintentional MW as controls, but less deliberate MW. Experiment 2 replicated these findings, and demonstrated that reduced deliberate MW is maintained in a second session even when rewards are removed. Different MW rates in the classroom and lab may be driven by reduced deliberate MW with external motivation to learn.

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6:00-7:30 PM (1031)

What Is the Role of Motivation in Knowledge Transfer? An Examination of Self-Efficacy. KELLY K. BODEN, ERIC KUO, TIMOTHY NOKES-MALACH and TANNER WALLACE, *University of Pittsburgh*, MUHSIN MENEKSE, *Purdue University* (Sponsored by Timothy Nokes-Malach) — Transfer, the ability to use knowledge acquired in one situation to solve new problems in another, is a fundamental goal of education and has been studied extensively in cognitive psychology. However, there is still much we do not know about the factors that promote transfer and why it sometimes fails. The present work aims to integrate prior work on cognition and motivation in order to test whether students' motivation predicts different types of transfer during standard classroom instruction. Specifically, we measured multiple aspects of student motivation vis-à-vis self-report surveys and examined their performance on both near and far transfer problems in four sixth grade science classrooms. Results revealed that students' self-reports of their self-efficacy (i.e., beliefs about their competency for science) were a positive predictor of far, but not near, transfer. We discuss the results in regards to implications for theories of motivation, instruction, and knowledge transfer.

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RECALL I

6:00-7:30 PM (1032)

Selective Directed Forgetting Persists After Rewarding Participants for Recall in the Final Recall Test. CARMEN AGUIRRE, *University of Granada*, CARLOS GÓMEZ-ARIZA, *University of Jaen*, TERESA BAJO, *University of Granada* — It is widely known that people can forget previously learned information when cued to do so. With an adapted list-method directed forgetting procedure, Delaney et al. (2009) demonstrated that DF can also be selective. SDF effect has been found with slightly different procedures, although several failures to replicate the effect have been reported (Storm et al, 2013). Previous research has shown that SDF seems to rely on executive processes and that it is not consequence of selective rehearsal of the cued-to-remember items. However, an explanation regarding motivation could also account for the lower recall of the items cued to forget: participants in the forget group might not spend enough effort in trying to recall. Results in our study showed that offering participants a monetary reward in the final recall test does not eliminate the SDF effect. Implications for the mechanisms underlying the effect are discussed.

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6:00-7:30 PM (1033)

Sequence Effects in Aesthetic Judgments. MEL WIN KHAW, *Columbia University* — Despite our understanding of how rewards are processed by the brain, little is known about how neural dynamics govern our appreciation of artistic arrangements. As might be implied by neural phenomena such as reward prediction error and repetition suppression, we investigate if aesthetic perception is affected by surprise and repetition. To this end, we measured aesthetic judgments of movement sequences constructed with specific transition probabilities. We find that repetition and variety selectively suppress and promote aesthetic ratings (relative to ratings measured in an isolated baseline condition). Furthermore, these effects are stronger for real world (human poses) relative to abstract (fractals) stimuli. These results offer insight on how pervasive organizational norms in art (e.g., plot and song structures) capitalize on our natural capacities of being entertained.

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6:00-7:30 PM (1034)

Searching Memory in Time and Space. ADAM BROITMAN, *Cornell University*, MICHAEL KAHANA, *University of Pennsylvania* — In the verbal free recall task, people study a list of sequentially presented items and then attempt to recall them without regard to their order of presentation. We compared this classic memory task, in which items unfold in time only, to a version in which items are experienced as unfolding in both time and space. In our virtual-navigation free recall task, subjects travel along a highway and words appear on billboards. Following list presentation, subjects perform a mental-arithmetic distractor task in which math problems appear as the subject moves through a darkened tunnel. In both task variants,



subjects are given 30 seconds to vocally recall as many items as they can remember. In the spatial free recall task, the background scenery changes across lists, creating a more variable context for the studied items. Both variants exhibit standard temporal and semantic clustering effects, as well as a temporally-graded distribution of prior-list intrusions. A significantly lower rate of prior-list intrusions emerged in the virtual navigation free recall task, consistent with the idea that items are encoded in relation to their spatial context, and contextual variation across lists thus reduces the effect of proactive interference.

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6:00-7:30 PM (1035)

Stimulus Onset Asynchrony Changed List and Item Level Proportion Congruence Effects in the Same Way. NART BEDIN ATALAY and MERVE KINIKLIOĞLU, *TOBB University of Economics and Technology* — One can process or suppress the irrelevant information selectively by adopting a strategy list-wide, and this has been investigated with the list-level proportion congruence (LLPC) manipulation. The strategic control account of the LLPC effect was challenged with the observation of the item-specific proportion congruence (ISPC) effect (Jacoby, Lindsay, & Hessels, 2003). According to the item-level explanation, the LLPC effect can be explained with item-level processes, such as associative learning or item-level control. Our aim in this study was to investigate item- and list-level mechanisms underlying the LLPC and ISPC effects by manipulating the stimulus onset asynchrony (SOA) between the target and the flanker letters in a Flanker task. We observed the same pattern of change with the LLPC and ISPC effects as a function of the SOA. When the LLPC manipulation created contingencies between the target and the flanker letters, item-level processes dominated the response selection.

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6:00-7:30 PM (1036)

Differences in Visuospatial Ability Predict the Successful Usage of Visual Mnemonics For Recall. CHRISTOPHER A. SANCHEZ, *Oregon State University* — It is well known that the appropriate use of visual mnemonics can significantly increase recall of target to-be-remembered information. However, are such mnemonics of equal utility for all individuals? Specifically, do those who vary in visuospatial aptitude have equivalent success in using such visually based mnemonics? The current study asked participants who varied in visuospatial abilities to remember lists of words while either using a visual mnemonic or not. Results indicated that those higher in visuospatial abilities were able to more successfully use the mnemonic to enhance recall, and also rated the overall task as easier. This suggests that while such memory strategies do have some functional utility, this utility does interact with relevant individual difference characteristics.

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6:00-7:30 PM (1037)

Is Emotional Interference Semantic in Nature? TANYA R. JONKER, *University of California, Davis*, ILKE OZTEKIN, *Koc University*, CHARAN RANGANATH, *University of California, Davis* — It is well-known that emotional materials are better remembered. One possibility for this phenomenon is that emotional items are less susceptible to interference. However, some evidence suggests that emotional materials are more similar to each other, which could lead one to expect greater interference. To resolve this discrepancy, we tested 1) whether shared emotional features such as arousal and valence lead to interference, and 2) whether this interference is due to semantic relatedness of emotional stimuli. We manipulated the presence of interference in a free recall task by introducing one or two study lists consisting of emotional, unrelated neutral, or related neutral words. During a test, participants were asked to recall words from only one list. Participants were slower and produced more intrusions when both lists were emotional compared to unrelated neutral, suggesting that emotion produces interference. However, this interference was not semantic in nature because neutral semantic lists resulted in semantic clustering whereas emotional lists resulted in temporal clustering. These results suggest that emotional interference is qualitatively different from semantic interference.

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6:00-7:30 PM (1038)

Me vs. We: Examining the Role of Culture in the Survival Advantage. STEPHANIE A. KAZANAS, *Tennessee Technological University*, ALLISON M. WILCK and JEANETTE ALTARRIBA, *University at Albany, State University of New York* — Previous research has found a robust memory advantage for stimuli processed for their survival-relevance (Nairne, Thompson, & Pandeirada, 2007). Additional investigations have demonstrated the replicability of this effect across a number of individual differences variables, including age and spoken language (see Kazanas & Altarriba, 2015 for a review). The current study continued this line of investigation using measurements of culture pertaining to self-rated individualism and collectivism (Triandis & Gelfand, 1998). Survival, moving, and self-reference scenarios were modified to compare the memorability of self-focused and family-focused processing. Across these scenarios, survival-self and survival-family promoted the largest proportion of recall, followed by the other family-focused scenarios. These results are validated by a significant negative correlation between recall performance and individualism scores. Replicating previous work in our laboratory, survival scenarios garnered the highest interesting, imageability, and distinctiveness ratings, and the lowest plausibility and familiarity ratings.

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6:00-7:30 PM (1039)

Disentangling Interactions Between Repetition Effects and Context Switches. LYNN J. LOHNAS and LILA DAVACHI, *New York University* — Improved memory for spaced over massed repetitions is a well-established finding. Intriguingly, encoding contexts modulate repetition effects, as free recall is



greater for massed but not spaced items that are repeated in different contexts. Here we consider the role of context switches, because they modulate memory and attention yet have not been considered in the aforementioned result. Subjects ($N=20$) were presented with, and then performed free recall and source recognition of, twelve word lists while undergoing fMRI. Each presented word had an associated task context and could be presented once, twice massed or twice spaced. Repeated words could be presented with the same or different task contexts. For a massed item presented with different contexts, the second presentation always immediately follows a context switch, but this has not been true of spaced items in past studies. We thus introduced a matched control for spaced items, such that half of the spaced items repeated in different contexts had the second presentation immediately following a context switch, or two items after the switch. The presented results reflect how switches in encoding contexts modulate fMRI activity and behavior to promote successful encoding.

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6:00-7:30 PM (1040)

Second Guesses: Assessing the Role of Prior Knowledge and Random Guessing in Long-Term Memory. KIMELE PERSAUD (J. Frank Yates Student Travel Award Recipient) and PERNILLE HEMMER, *Rutgers University - New Brunswick* (Sponsored by Pernille Hemmer) — An important question of long-term memory is what happens as memories fade or are no longer retrievable. While some research suggests that observers recall target information with noise, misattribute target and cue information, or guess randomly (Lew, Pashler, & Vul, 2015), other research suggests that prior meaningful information is used to fill in noisy memory and improve average accuracy—without resorting to random guessing (Persaud & Hemmer, 2016). We sought to reconcile these findings in a series of experiments where we systematically varied the strength of target/cue associations (i.e. objects and locations). We assessed cued recall for associated objects in meaningful locations, associated objects in random locations, and random objects in random locations. We found that memory was less fragile for prior meaningful associations. We fit the Missassociations model (Lew et al., 2015) and found that a larger portion of errors in memory resulted from misassociations and prior knowledge, *not* random guessing, — finding that there is no random guessing in LTM for semantically associated, ecologically valid stimuli, and that standard findings have been an artifact of experimental design. Implications for models of LTM are discussed.

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6:00-7:30 PM (1041)

Elementary-School Children's Memory for Past Errors. ABBEY M. LOEHR and LISA K. FAZIO, *Vanderbilt University* (Sponsored by Lisa Fazio) — Adults are good at discriminating previous correct and incorrect responses (Butler et al., 2011; Robinson & Kulp, 1970), but children may exhibit poorer memory for errors relative to previous correct responses (Peeck et al., 1985). For example, children overestimate the accuracy of their past responses after studying correct-answer

feedback (Finn & Metcalfe, 2014). The current study examines a potential recollection bias children may experience when the presentation of the correct answer interferes with recall of past responses (Pohl, Bayen, & Martin, 2010). Forty-two 11-year-olds studied and were tested on their memory for math definitions. After receiving correct-answer feedback, children recalled their initial test answers. Children accurately recalled 88% ($SD = 15\%$) of their initially correct responses but only 25% ($SD = 17\%$) of initial errors. Further, children incorrectly reported the correct answer for 21% ($SD = 17\%$) of initial errors. Thus, children demonstrated poor memory for past errors and correct-answer feedback seemed to interfere with error recall.

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6:00-7:30 PM (1042)

Interference From Deleting: An Extension of the Phenomenon of Saving-Enhanced Memory. YANNICK RUNGE, CHRISTIAN FRINGS and TOBIAS TEMPEL, *University of Trier* (Sponsored by Tobias Tempel) — Can storing information on digital devices help us to beneficially off-load memory onto the environment? Storm and Stone (2015) recently reported that external saving of encoded items enhances later recall of items encoded subsequently to saving. The present study replicated this effect of saving-enhanced memory. In addition, we found a related benefit of abstaining from deletion. The instructed deletion of files containing encoded items impaired later recall of subsequently encoded items compared to trials where initial files could be kept for later relearning. We assume that the deletion of formerly stored information produces interference. Intentionally keeping files in no-deletion trials reduces this interference, in an equivalent manner as benefits of directed forgetting. In addition deletion might impair subsequent encoding immediately because of higher memory load. These results support and extend the benefits of storing information on an external platform for subsequent performance.

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6:00-7:30 PM (1043)

Source Animacy Improves Recall. DANIEL SILLIMAN, JOSEPH CLARENCE WILSON, KENNETH J. HOUGHTON and SEAN SNODDY, *Binghamton University* (Sponsored by Deanne Westerman) — According to the adaptive view of memory (Nairne, 2010), memory is tuned for survival-relevant information. One consequence of this is a sensitivity to living things. The animacy effect reflects enhanced recall of animate words (e.g., cat) relative to inanimate words (e.g., lamp) (Nairne, VanArsdall, Pandeirada, Cogdill & LeBrenton, 2013). The present study explored the animacy effect with an auditory presentation of words and evaluated whether the animacy of the presentation source would facilitate recall. Participants studied animate and inanimate words presented by human and computer-voiced sources. In addition to replicating the standard animacy effect for words, we found that human-generated words were better recalled than those spoken by a computer voice. Our analysis suggests that this effect is not explained by differences in pleasantness or clarity between the voices. Nairne, J. S. (2010). Adaptive memory: Evolutionary constraints on remembering. *Psychology of Learning and*



Motivation, 53, 1-32. Nairne, J. S., VanArsdall, J. E., Pandeirada, J. N., Cogdill, M., & LeBreton, J. M. (2013). Adaptive Memory The Mnemonic Value of Animacy. *Psychological Science*, 24(10), 2099-2105.

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6:00-7:30 PM (1044)

Stealing Memories: Egocentric Source Monitoring Biases Following Collaborative Remembering. ALIA WULFF, *Tufts University*, MADELINE C. JALBERT, *University of California*, IRA E. HYMAN, *Western Washington University* (Sponsored by Ira Hyman) — Collaborative remembering helps people come to an agreed upon version of the past. However, source monitoring errors often occur after collaborative recollection. These errors are often egocentric, meaning people adopt other's memories and claim them as their own. We had dyads view different versions of six pictures that contained some overlapping and some unique items. The participants then had the opportunity to collaboratively recall the items they saw. We found that subsequent source monitoring tests showed a clear egocentric bias. However, we also collected data from single participants who were given lists of items that a partner might have seen rather than allowed to collaborate with another participant. These participants showed no signs of an egocentric bias. This indicates that in order for collaboration to have an egocentric effect on source monitoring, there must be face-to-face collaboration.

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TEST EFFECTS I

6:00-7:30 PM (1045)

Social Pressure Affects Expert Face Recognition. PETER JAMES HILLS, *Bournemouth University*, AIMEE LEE ROBERTS, *Anglia Ruskin University*, DANIEL DICKINSON and CHARLOTTE BOOBYER, *Bournemouth University* — We have recently found that being observed during face recognition tasks is detrimental to accuracy. This is an important result since face recognition, when done in forensic settings, is completed whilst under observation. In old/new recognition paradigms, we have found that being observed affects the encoding of upright own-ethnicity faces but not inverted faces, other-ethnicity faces, nor objects. This indicates that being observed affects expert face processing selectively. We tested this by exploring how being observed affects performance on the Parts and Wholes test and Composite Face Effect, and eye movements when viewing faces. Results indicated that being observed influenced participants' engagement of configural processing forcing participants to engage in more featural exploration of faces. These results indicate that the learning of faces is affected by the belief that one is being observed. We discuss these results within a framework of social pressure interfering with expert processing.

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6:00-7:30 PM (1046)

The Negative Testing Effect: Cognitive Ability and Complex Material. KATHRYN T. WISSMAN and DANIEL J. PETERSON, *Skidmore College* — Although retrieval typically enhances later memory, some research suggests that retrieval can produce lower recall relative to restudy under certain contexts (referred to as the *negative testing effect*). Interestingly, recent research established that cognitive ability moderates the effect. The goal of the current research was twofold: (1) replicate the negative testing effect in a new student population and (2) investigate whether the negative testing effect extends to more complex material. In Experiment 1, participants learned rhyming word pairs followed by restudy or retrieval practice. Participants then completed a free recall test followed by measures of cognitive ability. Outcomes replicated the negative testing effect. In Experiment 2, participants learned a sequence of steps involved in changing brake pads followed by restudy or retrieval practice. Participants then completed a cued recall test or an order reconstruction test. Outcomes suggest the negative testing effect may not extend to more complex material.

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6:00-7:30 PM (1047)

Students' Self-Regulated Use of Retrieval Practice Predicts Academic Performance. ROBERT ARIEL, LUDMILA D. NUNES and JEFFREY D. KARPICKE, *Purdue University* — Retrieval practice is a highly effective learning strategy but little is known about students' self-regulated use of retrieval practice, especially in academic settings. We measured students' self-regulated learning decisions in an undergraduate cognitive psychology course by providing students with computer-based learning modules to prepare for their exams. Students made decisions about when to study lecture material, practice retrieval of it, or drop it from learning. A consistent pattern emerged across 4 exams. Students who engaged in more repeated retrieval practice when using the learning modules performed better on both the lecture topics presented in these modules and on non-presented material that appeared on each exam. However, the majority of students did not use retrieval practice effectively because they dropped material from learning too soon. These results suggest that self-regulated use of retrieval practice improves academic performance but training is necessary to teach students how to use retrieval practice more effectively.

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6:00-7:30 PM (1048)

Do Stimuli With Different Properties Benefit Differentially From Testing? WILLIAM R. AUE and JEFFREY D. KARPICKE, *Purdue University* — When people learn during testing, what aspects of the encoded information benefits? For a word list experiment, there are many properties upon which words can be classified. Word frequency has a well documented and robust effect on memory performance. Context variability, or the number of different contexts associated with a word, also impacts memory performance. Yet the two properties seemingly tap distinct aspects of item characteristics. To the best of our knowledge, no one has attempted to use word properties



to investigate mechanisms of the testing effect. Testing could interact with word frequency, indicating that testing affects the semantic/lexical encoding of words. Testing could also interact with context variability, indicating that testing impacts item to context associations. We observed a more complicated story. When context variability was held constant within a list, high frequency words benefitted more from testing if the list was low variability. One potential explanation is that high frequency, low variability words benefitted more due to the testing facilitating better item to context associations. Results and implications for explanations of the testing effect and computational models of memory are discussed.

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6:00-7:30 PM (1049)

Testing Potentiates New Learning Because It Reduces the Buildup of Proactive Interference. KRISTA D. MANLEY and JASON C.K. CHAN, *Iowa State University* — Interpolated testing can potentiate new learning. In two experiments, we investigated whether this forward benefit of testing persists when the interpolated tests ceased. We examined this question using a list learning paradigm. Subjects either took a recall test after every list (always tested: T-T-T-T-T), took no recall test until the final list (control: S-S-S-S-T), or took a recall test after each list until the two lists prior to the final list (tested early: T-T-T-S-T). Subjects in the always tested condition exhibited greater correct recall and fewer intrusions during the final list test. However, subjects in the tested early condition produced similar intrusion levels relative to control (although they still showed greater correct recall). We obtained similar results regardless of whether subjects studied four or six lists. These results are consistent with the idea that testing potentiates new learning because it prevents the buildup of proactive interference.

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6:00-7:30 PM (1050)

Retrieval Benefits Spill Over Onto Episodically Related Information: Evidence From Behavior and fMRI. TANYA JONKER, MAUREEN RITCHEY, HALLE DIMSDALE-ZUCKER and CHARAN RANGANATH, *University of California, Davis* — Retrieval of prior experience plays a critical role in strengthening memory. Importantly, retrieval enhances memory both for the practiced information and for related information that was not practiced (Chan, McDermott, & Roediger, 2012), positioning retrieval as an incredibly efficient method for memory enhancement. However, to date, the mechanisms underlying the beneficial effects of retrieval are not known. We hypothesize that retrieval reactivates context features and strengthens item-context bindings, a hypothesis derived from the episodic-context account (Karpicke, Lehman, & Aue, 2014). In a series of behavioral experiments and an fMRI experiment, we examine whether episodic reactivation during retrieval moderates long-term memory benefits. We provide converging evidence that retrieval benefits extend across episodic representations.

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6:00-7:30 PM (1051)

The Effects of Divided Attention and Experimentally-Induced Anxious Mood on Test-Enhanced Learning of General Knowledge Facts. CHI-SHING TSE and HIU-MING CHAN, *The Chinese University of Hong Kong*, WAI-SHING VINCENT TSE, *Tung Wah College*, WAI-HO SAVIO WONG, *The Education University of Hong Kong* — Testing effect refers to the finding that a practice test on the study materials leads to better memory performance in a final test than restudying them with the same period of time. Experiments were conducted to examine how full vs. divided attention (Experiment 1) and neutral vs. anxious mood, as induced by music + picture (Experiment 2) in the practice phase modulated the testing effect on the acquisition of general knowledge facts. When divided attention was manipulated, participants restudied and/or recalled the missing information in response to visually-presented general knowledge facts, while verifying whether each of the auditorily-presented items was from a pre-specified category, in the practice phase. When anxious mood was manipulated, participants were asked to view negative pictures with anxious music background. All participants were given both immediate and two-day delayed final tests. In both types of final tests, the testing effect was not separately affected by divided attention or anxious mood. We are now investigating whether combining both anxious mood and divided attention in the practice phase would influence the testing effect (Experiment 3). The implications of these findings will be discussed.

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6:00-7:30 PM (1052)

Criterial Learning is not Enough: Retrieval Practice is Necessary for Strengthening Memory Against Stress. AMY M. SMITH, *Tufts University*, F. CAROLINE DAVIS, *U.S. Army Natick Soldier RDEC*, L. MICHAEL ROMERO and AYANNA K. THOMAS, *Tufts University* — In a recent study, having participants make three retrieval attempts (i.e., retrieval practice) when learning information strengthened memory against the detrimental effects of psychological stress. We aimed to determine whether learning to criterion, in which only one successful retrieval attempt is made, would similarly buffer memory against stress, or whether multiple retrieval attempts are necessary to achieve that effect. In Experiment 1, participants learned to criterion and then engaged in additional re-studying (SP) or retrieval practice (RP). Twenty-four hours later, stress was induced and no differences in recall performance were observed between any of the groups. Experiment 2 was identical but introduced a one-week delay between encoding and retrieval. Recall performance was impaired under stress, but the RP group demonstrated less impairment than the SP group. Thus, criterial learning may protect memory against stress in the short-term, but additional retrieval practice is necessary to achieve this effect in the long-term.

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6:00-7:30 PM (1053)

Retrieval Affects the Shape of Forgetting Curves. JAMES WARD ANTONY and KENNETH A. NORMAN, *Princeton University* — Retrieving information from memory typically



improves long-term retention relative to restudying the information. However, the precise nature of forgetting over time has not been rigorously examined. In a meta-analysis of ten experiments including at least three retention intervals, we modeled forgetting for retrieved and restudied information using numerous two-parameter functions, including exponential and power. In accord with conventional findings, restudied information best followed the power function. Strikingly, however, retrieved information best followed an exponential function, and exponential fits improved with increasing retrieval trials. The delays used in these studies parallel delays used to study systems consolidation between the hippocampus and neocortex. Intriguingly, in another study, exponential fits for retrieved information substantially improved when new information related to pre-existing knowledge structures compared to when no such structure existed. Altogether, these findings support a recent model we developed suggesting retrieval supports accelerated memory consolidation via interactions between hippocampus and neocortex during learning.

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6:00-7:30 PM (1054)

The Testing Effect Under Divided Attention. ZACHARY L. BUCHIN and NEIL W. MULLIGAN, *University of North Carolina-Chapel Hill* (Sponsored by Neil Mulligan) — Memory retrieval often enhances later memory compared to restudying (i.e. the testing effect), indicating that retrieval does not simply reveal but also modifies memory. Dividing attention (DA) during encoding greatly disrupts later memory performance while DA during retrieval typically has modest effects – but what of the memory-modifying effects of retrieval? If these effects are similar to study-based encoding, they should be greatly disrupted by DA, a possibility consistent with elaborative and effortful accounts of the testing effect. Alternatively, the mnemonic consequences of retrieval may be largely resilient to distraction, like retrieval itself. In two experiments, participants studied words (phase 1) then engaged in restudy of some words and retrieval of others (phase 2), followed by a final free recall test (phase 3). Phase 2 restudy and retrieval occurred under full attention (FA) or DA. The final test revealed an interaction between the two factors, such that the negative effect of DA on final recall was substantial in the restudy condition but quite modest in the retrieval condition. The encoding effects of retrieval seem resilient to distraction which has implications for theories of the testing effect.

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6:00-7:30 PM (1055)

Improving Study Strategies Through Testing Experience. MARISA E. CRISOSTOMO, *West Texas A&M University*, DANIEL R. KIMBALL, *University of Oklahoma* (Sponsored by Daniel Kimball) — Prior research on the testing effect has shown that testing previously learned material can result in better long term memory performance than if the material was restudied (Roediger & Karpicke, 2007). Although testing can be used as a potent learning event rather than only for assessment, students seldom use testing as a main study strategy. In our

studies, we attempted to determine if students' study decisions can be influenced by experience of two different study strategies, one more optimal than the other, such that students will choose to retrieve more often than to restudy. Participants either retrieved or restudied cue-target word pairs then made a future study decision about whether to retrieve or restudy items. The results suggest that experiencing differing study strategies is not necessary to improve study decisions and that study decisions may be resistant to change.

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6:00-7:30 PM (1056)

Optimizing Trial Timing in Self-Paced Retrieval Practice. JARRETT T. LOVELETT and TIMOTHY C. RICKARD, *University of California - San Diego* (Sponsored by Timothy Rickard) — Memory is generally better for tested information than for restudied information. Recent work from our lab has extended that *testing effect*, well established for fixed-pace training, to self-paced designs. In our experiments, in which *total* training time is fixed, time saved on shorter self-paced trials may be directly applied to new items or (once all items have been sampled) repeated items. One potential advantage of self-pacing is thus a higher average rate of repeated testing relative to the typical fixed-pace design. However, evidence from our lab suggests that in purely self-paced training, some subjects may waste considerable time on trials where they struggle to retrieve a response, even though (1) the probability of success is low and (2) that time could instead be invested in additional trials. To mitigate this problem, a maximum trial duration may be imposed. We present evidence that the use of a trial duration cap can improve both learning rate and delayed recall, and we report findings on the effectiveness of a selection algorithm that adaptively adjusts each subject's trial cap over the course of training.

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FALSE MEMORY I

6:00-7:30 PM (1057)

Exploring the Impact of Fear, Anxiety, and Empathy on Visual Spatial Abilities. MARY JANE SPILLER and MARLEON HEFER, *University of East London*, EMMA CREEGAN, *Seattle University*, DESIREE BRATHWAITE, *University of East London* — Emotions can impact everyday task performance. The current studies have explored the impact of fear on visuo-spatial abilities. Previous research has shown that fear can facilitate mental rotation ability, which is mediated by anxiety. As adolescence is a period marked with heightened reactivity of the amygdala, we tested a sample of adolescents' mental rotation ability after priming with fearful or neutral stimuli. Participants with low levels of anxiety showed the fear facilitation effect, whereas those with high anxiety ratings did not. A second study explored the mediating role of empathy with an adult sample, as empathy may have an effect according to the embodied cognition approach. The results show the fear facilitation effect is more evident with participants in the high than low empathy group. Both studies highlight the importance



of individual differences when studying the impact of emotion on cognition, and possible explanations for these findings will be discussed.

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6:00-7:30 PM (1058)

The Effects of Repetition and Elaboration on Suggestions of Non-Occurrence. MARIA ZARAGOZA, *Kent State University*, D. STEPHEN LINDSAY, *University of Victoria* — We examined whether suggestions of non-occurrence – the suggestion that event details did not occur when they actually did – would lead participants to claim that witnessed events never happened. Participants viewed a video and then read an accompanying narrative. Participants then completed two elaboration tasks. The suggestions of non-occurrence sometimes appeared either once (in the narrative *or* elaboration tasks); other times, they were repeated three times across the narrative and elaboration tasks. Some event details also served as control, wherein they were only broadly described. Relative to the control, the results showed that although suggestions of non-occurrence had no effect on memory when provided only once, when suggestions of non-occurrence were repeated three times, there was a significant increase in participants' claims that the witnessed event detail was 'not in video'.

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6:00-7:30 PM (1059)

Effects of Sleep on False Memory for Negative and Neutral Scenes. KELLY A. BENNION, MADISON M. CHENEY and JOURDAN R. JACKSON, *California Polytechnic State University, SLO*, JASON A. MICHAELS, *Georgetown University*, MARY CZARINA ORDANZA and ALEXANDRIA J. PIVETTI, *California Polytechnic State University, SLO* — The present study investigated how sleep affects true and false memory for scenes, and how these effects differ based on whether the content is negative or neutral. Participants encoded negative and neutral scenes composed of four exemplars superimposed onto a corresponding background (e.g., sleeping bag, tent, campfire, squirrel; forest background) in the morning (Wake group) or evening (Sleep group). Recognition testing twelve hours later showed that sleep enhanced true memory for both negative and neutral exemplars separately. While sleep also enhanced false memory for these exemplars when collapsed across valence (measured by incorrectly "remembering" lure objects consistent with a studied scene; e.g., lantern), this was driven by increased false memory for the neutral exemplars. This suggests that sleeping after witnessing a crime may not be particularly detrimental to the accuracy of eyewitness testimony (versus memory for neutral information), which may be partly due to emotion enhancing memory for detail.

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6:00-7:30 PM (1060)

The Effect of Reality Monitoring on False Memory in the Drm Paradigm. MATIA OKUBO, *Senshu University* — We examined effects of reality monitoring on false memory using the DRM paradigm. Participants observed ten lists of semantically related words. Differently from the conventional

DRM paradigm, some critical lures were included in the word lists and were presented to the participants. After observing each list, participants took a recognition test, where half the participants rated their confidence on the response while the remaining half performed reality monitoring as the secondary task. False recognition of critical lures did not differ between the secondary task conditions (i.e. confidence rating vs. reality monitoring). For the reality monitoring condition, critical lures were evaluated as "generated it in mind during learning" when the critical lures were falsely recognized or correctly rejected. Such evaluations were not found for presented and non-presented list words. These results suggest that representations of critical lures were different from those of list items with regards to meta-cognitive processes like reality monitoring.

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6:00-7:30 PM (1061)

Eliminating the Detrimental Impact of Multifaceted Questions on Eyewitness Accuracy After Exposure to Misleading Post-Event Information. QUIN M. CHROBAK, KYRA BOWE, BLAIR BRAUN, KYRA PIETTE and JOSIE RIBLEY, *University of Wisconsin Oshkosh* — Previous research has demonstrated that multifaceted questions (which contain both true and false propositions in the same question) disproportionately reduce accuracy for participants that have been previously exposed to misleading information about an initial witnessed event (Chrobak, Rindal, & Zaragoza, 2015). Subsequent research demonstrated that these findings cannot be eliminated even when participants are specifically instructed to assent only when all parts of the question were true. Importantly, however, the results from these studies were generated in the context of a final face-to-face, time-limited recognition test. The current investigation extended these findings by testing participants under conditions that would likely maximize the use of more deliberate monitoring strategies (i.e., a computerized, time-extended recognition test). Results indicated that despite these advantages, misled participants continued to be disproportionately affected by the use of multifaceted questions. Both theoretical and practical implications for these findings are discussed.

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6:00-7:30 PM (1062)

Metacognitive Relative Judgments and Social Contagion. KATHERINE M. HART and MICHELLE L. MEADE, *Montana State University* — The current experiment examined the role of spontaneous relative judgments within the social contagion of memory paradigm (Roediger, Meade, & Bergman, 2001). Participants viewed household scenes (for short or long durations) in collaboration with a confederate (with low, average, or superior memory ability) who falsely recalled incorrect items as having occurred in the scenes. Of interest was whether or not participants would spontaneously evaluate both the state of their own memory and the state of the confederate's memory in relation to one another when remembering the suggested information. Participant responses on metacognitive questionnaires demonstrated that participants were aware of their own memory ability relative to the memory ability of



confederate. Interestingly, participants utilized this information on the false recall test only when they felt their own memory was relatively poor. Metacognitive relative judgments spontaneously influence the magnitude of social contagion effects.

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6:00-7:30 PM (1063)

Automatically Guilty: DRM Associations Between Evidence and Guilt. WILLIAM E. CROZIER, *John Jay College, Graduate Center, City University of New York*, DERYN STRANGE, *John Jay College, City University of New York* — Using a DRM list in a novel way, we investigated whether different forms of forensic evidence differentially activate *guilty*. In Study 1, we found no differences in false alarm rates for *guilty* when different forms of evidence were inserted into a 7-word DRM list. In Study 2, we unsuccessfully tried to increase FA rates by priming the evidence forms as either good or bad evidence. In Study 3, we embedded the “guilty” list words in a DRM story, emphasizing the criminal-justice context. On a free recall test, *DNA* caused significantly higher FA rates than stories containing *confession* and *eyewitness* ($d = .33, .23$). We will discuss implications for these findings, and the use of the DRM as a tool to detect association strength between concepts with ecological applications.

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6:00-7:30 PM (1064)

The Interaction Between Sleep and Valence on the Processing of False Memories. CHLOE RHIANNE NEWBURY and PADRAIC MONAGHAN, *Lancaster University* (Sponsored by Marc Brysbaert) — In previous studies using the Deese-Roediger-McDermott (DRM) paradigm, participants view lists of related words, and during testing falsely remember unseen words related to the lists. These false memories tend to be enhanced by sleep, and the emotionality of to-be-remembered material. We investigated the combined effect of sleep and emotionality on false memory formation. Experiment 1 tested word recognition from emotional and neutral lists after a 12-hour period containing sleep or wake. In Experiment 2 participants received training and testing with no delay, to rule-out the possibility that effects could be due to time-of-day. There was a strong effect of emotionality, with greater veridical and false recognition of emotional than neutral words. Sleep particularly enhanced memory for negative than neutral words, whereas wake led to more veridical and false memories for positive words. Thus, wake promotes greater spread of activation of positive memories, while sleep promotes memory for negative information.

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6:00-7:30 PM (1065)

Negative Arousing Moods Reduce False Recognition. SARAH BOOKBINDER and CHARLES BRAINERD, *Cornell University* (Sponsored by Valerie Reyna) — Prior mood-induction research has demonstrated that negative moods reduce false memory and positive moods increase false memory in the DRM illusion. However, that research has usually conflated the valence and arousal components of mood, and it has yet to identify the retrieval processes that are responsible for

mood effects. In two studies, we used a video mood induction that varied valence while keeping arousal low, and a second mood induction that elevated arousal. We found that DRM false recognition was not affected by low-arousal emotional moods but negative-high arousal mood reduced false recognition. Analysis of retrieval processes, using the conjoint recognition model, revealed that this difference in mood effects was due to negative moods enhancing verbatim memory. These results are interpreted in terms of fuzzy-trace theory.

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6:00-7:30 PM (1066)

The Influence of the Misinformation vs. Factual Information Ratio on Political Preferences. ULLRICH ECKER, *The University of Western Australia*, STEPHAN LEWANDOWSKY, *University of Bristol*, ADAM BERINSKY, *Massachusetts Institute of Technology* (Sponsored by Ullrich Ecker) — Even if people decrease their belief in a politician’s inaccurate statement after a correction, their support for the political figure does not simultaneously reduce. It appears that the evaluation of misinformation’s veracity is independent from the credibility and/or likeability of the misinformation’s source. One hypothesis is that misinformation and factual information are often presented in equal quantities in ‘myth vs fact’ formats, explaining the null effect on candidate support. The current study investigates whether participants reduce their support of Republican and Democratic politicians if the ratio of misinformation to factual information is offset. We asked participants to rate their belief in true and false statements from either Donald Trump or Bernie Sanders. We presented participants with (1) equal quantities of misinformation and factual statements from the political candidates, or (2) disproportionately more misinformation than factual statements. Participants then re-rated both their belief in the initial statements as well as their support towards the candidate. This study contributes to a growing body of literature regarding the disconnect between belief updating and the judgement of the source.

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6:00-7:30 PM (1067)

The Helpful and Harmful Effects of Memories People Have Realized are False. RYAN BURNELL and MARYANNE GARRY, *University of Waikato*, ROBERT NASH, *Aston University* (Sponsored by Stephen Lindsay) — People can come to remember experiences they never had, and these false memories—much like their “true” counterparts—can influence thoughts and behavior. Even after people realize one of their memories is false, the memory often continues to share many of the qualitative characteristics associated with true memories. But to what extent do memories that people have realized are false continue to serve functions—that is, to influence people’s thoughts and behavior? To answer this question, we asked subjects to describe two memories: a memory they came to realize was false, and a memory from a similar period that they believe to be true. We then asked subjects to rate the extent to which these memories serve both helpful and harmful functions,



and compared subjects' ratings on the two memories. Our results have implications for understanding the characteristics that drive memories to serve helpful and harmful functions. Email: Ryan Burnell, rburnell@waikato.ac.nz

6:00-7:30 PM (1068)

Interaction of Gist and Verbatim Information in Recognition Memory: Temporal Dynamics. RYAN A. CURL and JENNIFER F. SLOANE, *Syracuse University*, COREY N. WHITE, *Missouri Western State University* (Sponsored by Corey White) — It is well established that semantic similarity plays a role in recognition memory, whereby targets and lures that are semantically similar to the studied words (related) are more likely to be considered targets compared to semantically dissimilar words (unrelated). One way to probe the underlying processes that are responsible for this memory bias is to explore the response time distributions in conditions when this memory bias is or is not present. Here I show that when the related and unrelated words are tested separately, the memory bias for related words is significantly diminished. When the memory bias is present, the response times are significantly faster for related targets, and significantly slower for correct rejections compared to the condition with diminished memory bias. An initial characterization of this phenomena is depicted and possible explanations are discussed which attempt to lay the groundwork for future exploration into the role of semantic similarity in memory.

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COGNITIVE AGING I

6:00-7:30 PM (1069)

I Don't Know vs. I Don't Remember: Can We Discriminate Failures of Availability From Those of Accessibility? (Yes, and We Don't Need Instructions). JEN COANE, *Colby College*, SHARDA UMANATH, *Claremont McKenna College*, JAKE LESTER and JENNIFER D. ROSENTHAL, *Colby College* — When information is remembered or accessed, several measures tap the phenomenology of that experience (e.g., feeling of knowing, remember/know). Here we present a novel and parsimonious paradigm for testing whether individuals can discriminate between what is not available and what is merely inaccessible without extensive instructions or training. Naïve participants were asked to provide definitions of "I don't know" (IDK) and "I don't remember" (IDR). IDR was associated with forgetting and a lack of accessibility, whereas IDK was associated with never having learned the information. In two additional experiments, older and younger participants were asked general knowledge questions or questions about current events and given the option of responding IDK or IDR. When an initial IDK response was given, subsequent performance was lower than after initial IDR responses, suggesting that not remembering is accurately reflecting a failure in accessibility. Older adults showed equal or better use of metamemory than younger adults.

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6:00-7:30 PM (1070)

Programs Underpinning Task Episodes. AUSAF A. FAROOQUI and TOM MANLY, *MRC Cognition & Brain Sciences Unit* — Instantiation of extended episodes of behavior in one go through preassembled programs is well recognized in predictable task situations. We suggest that *any* segment of behavior construed as one task entity is executed through preassembled programs, *irrespective* of the predictability of its component steps. Participants executed unpredictable trials wherein, depending on the margin color, they could either choose the smaller value or the font of the two numbers. Crucially, they were biased into construing a recurring instance of three or five trials as one task episode. Even though the nature of the task item executed on individual trials were unknown, we found signs of subsampling programs identical to those seen previously during memorized task and motor sequence executions - longer step 1 RT whose magnitude prospectively correlated with the length of incoming episode, and absence of item level switch cost only across episode boundaries. We speculate that the programs thus evidenced were related to the task and goal identities with which behavior was executed and, instead of controlling individual steps, organized cognition into episodes corresponding to the construed task episode.

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6:00-7:30 PM (1071)

Stereotype Threat Reduces the Positivity of Older Adults' Recall. SARAH J. BARBER, JORDAN SELIGER and NICHOLAS YEH, *San Francisco State University* — As people get older they show a relative preference to remember positive over negative information. This is known as the *positivity effect*. In these studies we examined whether the positivity of older adults' recall is affected by stereotype threat about age-related cognitive declines. Although stereotype threat's mechanisms are debated, multiple accounts predict that it should reduce the positivity of older adults' recall. For instance, if stereotype threat decreases cognitive control resources, then older adults should be less able to strategically avoid negative and/or seek out positive information. Consistent with this hypothesis, in two separate studies we found that stereotype threat selectively reduced older adults' memory for positive pictures. In contrast, stereotype threat did not affect older adults' memory for negative pictures. This suggests that the positivity effect in older adults' memory is more likely to emerge when testing situations minimize age-based stereotype threat.

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6:00-7:30 PM (1072)

Using Expressive Writing to Reduce Stereotype Threat on Older Adults' Working Memory. MARIE MAZEROLLE, *Université Bourgogne Franche-Comté*, ISABELLE RÉGNER, *Aix Marseille Université*, PASCAL HUGUET, *Université Clermont Auvergne*, FRANÇOIS RIGALLEAU, *Université de Poitiers* — There is now ample evidence that age-related stereotypes contribute to lower older adults' memory performance. For example, under stereotype threat, older adults recall and recognize less words (Kang & Chasteen, 2009; Hess, Emery, & Queen, 2009), or demonstrate altered working-memory



capacity (Mazerolle, Régner, Morisset, Rigalleau, & Huguet, 2012). However, only few studies investigated means that have the potential to reduce the impact of age-related stereotypes. Here, we used *expressive writing*—a clinical intervention that reduces ruminations which, in turn, improves working memory capacity (Klein & Boals, 2001)—to alleviate stereotype threat on older adults' working memory performance. Forty younger and 35 older participants were exposed to age-related stereotypes, completed either an *expressive-writing* or a *control-writing* task, and then performed working-memory span tasks. Results showed that *expressive writing* helps to protect older adults' working memory performance when facing stereotype threat. Practical implications for older adults' memory assessment will be considered.

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6:00-7:30 PM (1073)

Divided Attention at Study Reduces Memory for Focal Information More Than Non-Focal Information in an Item-Associative Memory Paradigm. WILLIAM BLAKE ERICKSON and MOSHE NAVEH-BENJAMIN, *University of Missouri - Columbia* — Benjamin's DRYAD model (2010) implicates global reduction of memory fidelity in source/associative memory declines in older adults. Smyth and Naveh-Benjamin (2016) challenged core assumptions of DRYAD's explanation by manipulating attentional load and directing subjects' focus at study. The current study replicated and extended these findings by comparing item and associative memory for sequentially presented words and spatial locations in younger and older adults while instructing them to focus on words, locations, or word-location combinations at study. Younger adults studied information under full- or divided attention, whereas older adults studied information under full attention. Participants were then tested on word memory, location memory, and word/location combinations. Full attention younger adults and older adults performed equivalently across conditions, although associative instructions yielded better younger adult associative memory. Contrary to predictions of DRYAD, divided attention relative to full attention seems to affect mostly memory for information that participants are attending to during study.

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6:00-7:30 PM (1074)

Simultaneous Storage and Processing Across the Adult Life Span. STEPHEN RHODES, *University of Missouri*, AGNIESZKA JAROSLAWSKA and JASON DOHERTY, *University of Edinburgh*, VALERIE CAMOS, *Université de Fribourg*, PIERRE BARROUILLET, *Université de Genève*, CLEMENT BELLETIER, *Université de Fribourg*, NELSON COWAN and MOSHE NAVEH-BENJAMIN, *University of Missouri*, ROBERT LOGIE, *University of Edinburgh* — There are mixed results regarding the effects of age on temporary storage of information when combined with a processing demand. Variations in methodology, e.g. stimulus-response mappings or whether task demand is adjusted to individual ability, hamper clear conclusions. In 131 healthy participants

aged 18-70, we assessed accuracy when performing a serial-order verbal memory task with arithmetic verification during the retention interval, relative to single task performance. Crucially, task demand was adjusted for each participant, so that single task accuracy was around 80%. Priority given to each task was varied by instruction and differentially rewarding accuracy. For memory, we observed a clear dual-task cost. For processing, dual-task cost was small but increased with decreasing task priority. Importantly, residual performance remained high throughout for memory and processing, and there was little evidence that dual-task costs change across the adult life-span up to age 70, provided task demand is adjusted for each single task. We discuss these results in relation to theoretical accounts of working memory.

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6:00-7:30 PM (1075)

Cognitive Interventions Reduce the Likelihood of Falling. KYLE KRAEMER and SHEILA BLACK, *University of Alabama* — For older adults, suffering a fall can have drastic consequences. Recently, researchers have discovered that aspects of cognition, including executive function and speed of processing, are related to the prevalence of falls in older adults. However, the long-term effects of a cognitive intervention on falls have yet to be determined. We used data from a 10-year follow-up of 301 older adults who completed the ACTIVE (Advanced Cognitive Training for Independent and Vital Elderly) trials to compare the effectiveness of four different cognitive training interventions on reducing incidences of falls. A logistic regression analysis showed that older adults who had been trained in either speed of processing or memory training had significantly fewer falls than the control group, while older adults who had been trained in verbal reasoning showed no difference from the control group in the incidence of falls. Implications for our understanding of the relationship between cognition and falls are discussed.

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6:00-7:30 PM (1076)

Aging and Technology Efficacy. SOWON HAHN, TAEWAN KIM, DOYEON KWON and YOON KYUNG LEE, *Seoul National University* — In today's rapidly aging society, the effective use of ICT can help improve quality of life. As an effort to understand and evaluate digital literacy, we measured various physical, perceptual, and cognitive abilities of elderly users. To determine factors critical to technology efficacy in older age, the present study uses structural equation modeling. The findings indicate that the effects of age on computer skills or smartphone skills are not significant. It appears that the technology efficacy of older users is virtually mediated by primary cognitive abilities measured with processing speed, mental rotation, task switching and stop paradigm tasks. The results also show that physical fitness does not account for technology skills, but gender and levels of social activity contribute to digital efficacy. In addition, our results show that older adults' adoption of robotic agent is best predicted by cognitive and social indicators.

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6:00-7:30 PM (1077)

Processing Goal-Irrelevant Information During the Stroop Task in Younger and Older Adults. JESSICA NICOSIA and DAVID BALOTA, *Washington University in St. Louis* (Sponsored by Jan Duchek) — Compared to younger adults, older adults sometimes benefit from processing goal-irrelevant information. In the present paradigm, participants initially studied a list of high- and low-frequency words. They then received a color-naming Stroop task where neutral words were either previously studied or were new words. Finally, participants were given a recognition memory test for the originally studied words and the Stroop neutral words to examine if older adults were more influenced by the irrelevant neutral words during Stroop. Older adults produced disproportionate Stroop color word interference. Younger adults produced slower color naming to low-frequency compared to high-frequency neutral words, whereas, there was no effect of frequency for the older adults. Older adults' larger Stroop effect suggests a decrease in attentional control while reduced sensitivity to base-word frequency likely reflects greater vocabulary knowledge. There was no evidence that older adults were more likely to store the unattended neutral words in memory.

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6:00-7:30 PM (1078)

Examination of Age-Related Phonological Networks. NICHOL CASTRO and MICHAEL S. VITEVITCH, *University of Kansas* (Sponsored by Michael Vitevitch) — To produce a word, one must activate the correct semantic information and the associated phonological constituents. In the tip-of-the-tongue (TOT) state semantic information is retrieved, but phonological information is not. TOTs increase with age, and are thought to be due to age-related disruptions in the activation of phonological information. An alternative explanation is that the structure of the lexicon changes as we age, and it is the change in the structure that affects processing. However, there is little research examining changes in lexical structure with age. To examine how lexical structure might change with age, phonological associations were obtained from 1,018 participants who received a cue word and provided up to three words that sounded like the cue. Networks were created for young, middle-aged, and older adults by placing links between cue and response pairs. The structure of the phonological networks from the three age-groups will be discussed.

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6:00-7:30 PM (1079)

Brain Mechanisms of Successful Memory Aging: Maintenance or Cognitive Reserve? ABDELHALIM ELSHIEKH, *McGill University*, SRICHARANA RAJAGOPAL and STAMATOULA PASVANIS, *Douglas Mental Health University Institute*, ELIZABETH ANKUDOWICH and M. NATASHA RAJAH, *McGill University* (Sponsored by M. Natasha Rajah) — Aging is associated with declines in episodic memory—i.e., long-term memory for personal events that occur in a specific time and place. Yet, recent studies reveal that some older adults exhibit well-preserved memory functioning. The 'brain maintenance' model by Nyberg et al (2012) argues that the key to preserved

memory in older age is a relative lack of senescent brain changes. In contrast, the compensation model (Cabeza, 1997) suggests that older adults counteract age-related neural decline by re-organizing brain functions. The neural mechanisms of older adults with preserved memory function remain unknown. In this fMRI study, we examined patterns of whole brain activity in 22 High Performing Younger Adults (HYA), 22 Low Performing Younger Adults, 20 High Performing Older Adults (HOA), and 26 Low Performing Older Adults during successful encoding and retrieval of an episodic memory task. Multivariate Partial Least Squares was used to compare and contrast brain activation patterns that support memory performance across groups. Results show that HOA engage similar frontal regions to HYA that are predictive of successful retrieval. Findings will be discussed in light of the brain maintenance and compensation models of aging.

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6:00-7:30 PM (1080)

Naturalistic Episodic Memory for a Laboratory Experience 10-14 Years Earlier in Adults Aged 18-95. DAVID B. MITCHELL, *Kennesaw State University* — Adults who participated in a laboratory study in 1999-2000 were asked to recall their experience. The retention interval ranged from 10 to 14 years. Subjects who were aged 18-82 when tested in the lab were now 30-95 years of age. Four of 14 younger subjects (ages 30-34) professed amnesia for the session (e.g., "I believe I was not part of this study. I do not remember this project, but happy to help"), whereas all of the 14 older subjects (ages 60-95) remembered their participation. However, typical age differences favoring young adults *did* obtain for temporal memory (year, season, month, time of day). In contrast, older adults' memory for the location of the experiment (campus, building, floor) was significantly superior. Interestingly, young adults' naturalistic memory was not correlated with their previous explicit memory in the laboratory; however, older adults' laboratory memory performance was significantly correlated ($r = .601$) with their naturalistic location memory. These findings extend the "aging paradox" investigated recently in the context of naturalistic prospective memory.

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EMOTION AND COGNITION I

6:00-7:30 PM (1081)

Pushing the Boundaries of the Learning Process: Sensitivity to Community Structure Across Input Domains. ELISABETH A. KARUZA, DANIELLE S. BASSETT, MARIYA BERSHAD and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* — Prior work suggests that human learners are remarkably sensitive to clusters of events that densely co-occur in time (i.e., temporal community structure). Here, we probe constraints on and extensions of sensitivity to this topological property. We move beyond the temporal domain to community structure defined solely on the basis of visual similarity. We constructed a series of novel objects defined by a graph in which nodes represented unique objects and edges represented a visual feature shared between two objects. Crucially, objects



within a community tended to share features with one another. Not only do we show that learners distinguish between different communities, but we offer evidence that they generalize this knowledge to classify previously unseen objects. Finally, we characterize how learners contend with multiple structural cues, asking whether learning is bolstered when temporally and visually defined communities are aligned and diminished when they are in conflict.

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6:00-7:30 PM (1082)

Enhanced Facial Muscle Flexibility Under Stress: The Influence of Practice on Affect-Induced Facial Muscle Contractions Increases After Stress. JULIA KOZLIK, *University of Greifswald*, ROLAND NEUMANN, *University of Trier*, RICO FISCHER, *University of Greifswald* — Affect-induced facial muscle responses which are thought to be inflexible can be overwritten by response practice. With an adapted affective Simon procedure including voluntary facial muscle contractions as responses it has been shown that repeated execution of incongruent stimulus-response mappings significantly reduced (and even reversed) affective Simon effects. Thus, newly formed short-term associations seem to be effective in overwriting long-term links between affect and facial muscles. Based on previous research showing that stress increases shielding of current action goals we tested for effects of acute stress on the influence of practice on facial muscle contractions. Participants were either exposed to a stress- or no-stress-induction phase prior to an affective Simon task. Moreover, they were either assigned to a congruent or incongruent practice condition. Again, we observed significant reductions of the affective Simon effect occurring after practice of incompatible (as compared to compatible) S-R assignments. Importantly, this effect was stronger in the stress group. These results indicate that the ability of newly formed short-term links to overwrite existing long-term associations increases after stress.

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6:00-7:30 PM (1083)

Visual-Motor Pointing to Remembered Targets: Merging Fitts' Methodology and the N-Back Wm Task. ROY EAGLESON, *The University of Western Ontario*, SANDRINE DE RIBAUPIERRE, *LHSC, Western Ontario*, ZENON PYLYSHYN, *Western Ontario* — We describe results from a novel paradigm where the subject's task is to point to a target that has been viewed at a previous location in a continually-presented sequence. The displays are comprised by a sequence of squares with random 2D locations and sizes. As the subject is observing each square, their task is to point to the position of the target that had been presented "N-back" from the current target. The subject targets the estimated location, and clicks there; after which, the next square appears. Results: In the case N=0, the subject merely needs to point to the target that is currently on the screen; and so this case corresponds to the classical Fitts' methodology. In the blocks of trials where N=1, the subject needs to move to the location on the display where they estimate it had been located previously. The N=2 task requires subjects

point to the target that shown two trials previously; and so on. We show that the performance on the task decreases linearly with N, up to the point where N corresponds to the limit of "tracked objects" in Pylyshyn's Multiple Target Tracking. While consistent with Pylyshyn's result, it's also controversial, since the theory posits that 'blank space' cannot be FINSTed.

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6:00-7:30 PM (1084)

Effects of Social Anxiety on Gender Differences in Sociability. KENTA ISHIKAWA, TAKATO OYAMA, HIKARU SUZUKI and MATIA OKUBO, *Senshu University* — Shyness is negatively evaluated of men than for women because it is inconsistent with the expected gender role of men (Bruch & Cheek, 1995). To avoid such negative evaluations, socially anxious men try not to be shy but to be sociable. We investigated effects of social anxiety on gender differences in sociability. We used face photographs of 96 models (48 women), who were divided into high and low social anxiety groups on a basis of social anxiety scores. Sixteen raters evaluated photographs in terms of sociability. Male models with high social anxiety were rated as more sociable than those with low social anxiety. This pattern was not found for female models. These results suggest that socially anxious men and women use different strategies to avoid negative evaluation from others. As opposed to women, men tend to be sociable in order to adhere to their expected gender roles.

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6:00-7:30 PM (1085)

Complex Cognitive Training vs. Working Memory Training Paired With Physical Activity. ERIN L. BEATTY, *University of Southern Denmark*, ARRON W.S. METCALFE, *Sunnybrook Research Institute, University of Toronto* — Two cognitive training paradigms were tested on Danish high school students (n=320) where one group completed a twelve week adaptive training program that used mindfulness, attention, and working memory training embedded in a paradigm that included physical movement. Each session lasted one hour and students completed one session per week on average. The second group completed 12 sessions of adaptive dual (audio, spatial) n-back working memory training (lasting approx. 25 min each) followed by a 30 min period of moderate paced walking. A final no contact control group was included. Participants were assessed at baseline, after the 6th training session and following the 12th training session. Outcomes include working memory span, inhibition (go-no go) and a behavioural measure of persistence under conditions of fatigue and frustration. Analyses are ongoing.

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6:00-7:30 PM (1086)

Lateralized Processing of Emotional Images: A Right Hemisphere Memory Bias. ELLA K. MOECK, MELANIE K.T. TAKARANGI and NICOLE A. THOMAS, *Flinders University* (Sponsored by Melanie Takarangi) — The right hemisphere (RH) plays a critical role in visuospatial attention and emotional perception. Therefore, RH processing could enhance our visual memory for emotional events. We examined this hypothesis



by testing whether memory for negative versus neutral (Experiment 1), and negative versus positive (Experiment 2) scenes differs depending on initial hemispheric processing asymmetries. We tested recognition memory for valence-matched image pairs, which were encoded for 500ms in the right and left visual fields. In Experiment 1, valence and visual field interacted: participants remembered negative images processed by the RH more accurately than images processed by the left hemisphere. There were no hemispheric differences for neutral images. In Experiment 2, RH processing improved recognition memory for positive and negative images equally. Our findings suggest preferential RH processing of visuospatial and emotional information enhances recognition memory for emotional scenes, aiding our understanding of the factors that influence emotional processing.

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6:00-7:30 PM (1087)

Influence of Emotional Intelligence on Performance in an Emotionally Laden Cognitive Task: An ERP Study.

ALBERTO MEGÍAS, MARÍA JOSÉ GUTIÉRREZ-COBO and RAQUEL GÓMEZ-LEAL, *University of Málaga*, ROSARIO CABELLO, *University of Granada*, PABLO FERNÁNDEZ-BERROCAL, *University of Málaga* — A higher level of emotional intelligence (EI), understood as a greater ability to perceive, use, understand, and manage emotions, is associated with an increase in performance on emotionally laden cognitive tasks. The main objective of this research was to study the neural basis underlying the execution of an emotional cognitive control task (GoNogo) as a function of ability EI. Forty-four participants were divided into two groups depending on EI level (High EI vs. Low EI). The participants' task consisted of an emotional face GoNogo task, in which happy, fear and neutral facial expressions were the go and no go stimulus. Results showed a larger N170 and smaller N2 amplitude for the low EI group than for the high EI one. Greater levels of cognitive control were associated to participants with high EI. Our findings show the importance of studying emotion and cognition interaction to explain our behavior and performance.

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6:00-7:30 PM (1088)

Improvement in Speech Intelligibility for Familiar Voices Relies on Vocal Tract Length.

EMMA HOLMES and INGRID S. JOHNSRUDE, *University of Western Ontario* — When multiple talkers speak simultaneously, listeners find speech more intelligible if the target talker is someone familiar (e.g., a friend or spouse) rather than a stranger. However, the acoustic features that underlie this benefit are unknown. We investigated whether changes to fundamental frequency (f_0) or the acoustic correlates of vocal tract length (VTL) reduced: (1) the ability to recognize voices as familiar, and (2) the familiar-voice intelligibility benefit obtained when two voices are heard simultaneously (i.e., word-report score for target sentences in a familiar compared to unfamiliar voice). We recruited 8 pairs of participants who had known each other for at least 6 months. Participants could discriminate all of the voice manipulations with close to 100% accuracy. Manipulations to VTL acoustics—

but not f_0 —reduced both recognition and the familiar-voice intelligibility benefit. Thus, VTL cues seem key to recognition and intelligibility of familiar voices.

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6:00-7:30 PM (1089)

Valence, Arousal, and Dominance Ratings for Faces.

TINA M. SUTTON, ANDREW M. HERBERT and DAILYN CLARK, *Rochester Institute of Technology* — A total of 1372 images of faces displaying various emotions were selected from the following databases: (1) Beall and Herbert (2008), (2) the Karolinska Directed Emotional Faces (KDEF; Lundqvist et al., 1998), (3) NimStim (Tottenham et al., 2009), (4) Online MDS, (5) Pictures of Facial Affect (Ekman & Friesen, 1976) (6) UC Davis Set of Emotional Expressions (UCDSEE; Tracy et al., 2009), and (7) the Warsaw Set of Emotional Facial Expression Pictures (Olszanowski et al., 2008). Each of the faces was rated on the dimensions of valence, arousal, and dominance using the Self-Assessment Manikin (SAM) developed by Lang (1980). The current database was constructed to provide researchers with a set of emotional ratings for a large number of face stimuli. This set of stimuli will complement the existing Affective Norms for English Words (ANEW; Bradley & Lang, 1999) and the International Affective Picture System (IAPS; Lang et al., 1999).
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6:00-7:30 PM (1090)

Bad Luck or Bad People: When and Why do Third Parties Reveal Offenders' Intentions to Victims?

EINAV HART, CRISTINA BICCHIERI and BARBARA ANN MELLERS, *University of Pennsylvania* — Third party observers differ in their reactions to others being harmed. In five studies, we examine when and why third party observers decide to inform the victim that an offender's harmful act was intentional or unintentional. Participants are more likely to reveal the offenders' intentions than to remain quiet, and more likely to reveal accidental than intentional harm. Third parties wish to enforce punishment when necessary, but more so, wish to prevent it when harm was accidental. We show that third parties intervene in conflict to reinforce pro-social norms and treat both victim and offender fairly - namely to prevent a harmful victim-to-offender cycle. We disentangle these motivations from those of retribution and deterrence. Our findings have implications for victims' actions, victims' well-being, and offenders' well-being, as well as for litigation and conflict resolution.

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6:00-7:30 PM (1091)

Give and Take in a Mouse Tracking Choice Paradigm.

HANSOL RHEEM, VIPIN VERMA and DAVID VAUGHN BECKER, *Arizona State University* (Sponsored by David Vaughn Becker) — Moving a mouse cursor to a stimulus can reveal online choice-dynamics that are richer than simple RTs, reflecting implicit associations, like female-good/male-bad. We here develop a new mouse tracking design to investigate whether such gender-valence biases interact with approach-avoidance movements— giving an object or taking it away. On every trial, the shape of the mouse cursor appeared as either a



flower or a spider; then both a male and female face appeared on the screen, and the participant had to move this cue to one of the genders (cue-target correspondence counterbalanced across blocks within-subjects), and then withdraw it. Participants were faster to move cursors to, but not from, affectively congruent targets, e.g. the flower to the female face, and mouse trajectories revealed paths with a consistent and potentially rich set of additional insights into choice-dynamics. Results suggest that implicit associations interact with behavior, rather than exerting a one-sided effect on the behavior.

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6:00-7:30 PM (1092)

Extending the Self-Similarity Effect in Impression Memory. ALLISON M. SKLENAR, ERIC D. LESHIKAR, MATTHEW P. MCCURDY and ANDREA N. FRANKENSTEIN, *University of Illinois at Chicago* (Sponsored by Andrew Mienaltowski) — An extension of the self-reference effect, the self-similarity effect is characterized by better memory for social targets more similar to the self. However, much of the work in this area has focused on self-similarity as defined by traits (i.e., similarity of the self to a social target on a trait like extroversion). In this experiment, we examined whether the self-similarity effect would extend to political ideology. Participants formed impressions of social targets based on their political ideology and a trait-implying behavior. We then measured participants' memory for the impression, ideology, and behavior for each social target. As before, impression memory was better for individuals more similar to the self as defined by trait. However, the self-similarity effect did not extend to political ideology. These data suggest that similarity to the self influences memory for social targets, but only for some details (traits) and not others (political ideology).

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6:00-7:30 PM (1093)

Age Effects on Category Rule Learning. AUDREY HILL, POOJA PATEL, ANNA GUIDUBALDI, MARK NEIDER and COREY BOHIL, *University of Central Florida* — A growing literature suggests that separate learning systems may be differently affected by cognitive aging. We conducted two experiments comparing young and older adults on category rule learning. In Experiment 1, two-dimensional stimuli (Gabor patches varying in orientation and spatial frequency) were learned according to either an explicit (verbalizable) rule requiring selective attention to one dimension or an implicit rule requiring integration of dimensions. In Experiment 2, participants categorized 4-dimensional color/shape stimuli (a modified Wisconsin Card Sorting Task) according to explicit or implicit rules. In both experiments, accuracy was higher for young adults than for older adults. In both experiments accuracy was higher for rule-based than for information integration categories, and this difference was more pronounced for older adults. In Experiment 2 (card sorting), older adults required more trials to reach an accuracy criterion. Decision bound modeling indicated that a greater proportion of older adults adopted suboptimal decision rule types.

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6:00-7:30 PM (1094)

Reappraising Mathematics: Emotion Regulation Attenuates Negative Physiological Reactivity in Math Anxiety. RACHEL G. PIZZIE and DAVID J.M. KRAEMER, *Dartmouth College* (Sponsored by David J.M. Kraemer) — Math anxiety causes significant decrements in mathematics performance, resulting in avoidance of math classes and quantitative careers. In the present research, we introduce an emotion regulation (ER) intervention aimed at reducing the impact of anxious emotion on math performance. Participants were trained on two ER techniques: cognitive reappraisal, i.e., rethinking the emotional situation from an objective perspective, or expressive suppression, i.e., maintaining a neutral expression throughout an emotional experience. To measure changes in physiological arousal response, we monitored electromyography (EMG) and electrodermal activity (EDA) while participants completed several tasks including math problems and word-based analogies. For math anxious individuals, reappraisal reduced physiological arousal specifically associated with mathematics. Both ER strategies also reduced physiological reactivity to negative pictures by attenuating facial muscle activity associated with negative affect. Overall, these results suggest that targeting anxious emotion through reappraisal provides a promising strategy to reduce deficits caused by math anxiety.

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6:00-7:30 PM (1095)

Breathe, Think, Learn: The Effects of Brief Mindfulness Training on Students' Robust Learning. NABILA JAMAL OROZCO, GABRIELLE RUSSO, TIMOTHY NOKES-MALACH and BRIAN GALLA, *University of Pittsburgh* (Sponsored by Christian Schunn) — Mindfulness training involves focusing attention on the present moment with a nonjudgmental awareness. In this study, we examined whether a brief mindfulness training would improve students' subsequent emotion regulation and learning outcomes during a challenging math learning scenario. Eighty participants were randomly assigned to either an audio guided mindfulness meditation or a control condition (audio book) and performed various mathematics tasks over the course of two hours. Students' trait and state level of mindfulness and emotion regulation, use of stress appraisals, and final mathematics posttest scores were measured. Results showed that participants in the mindfulness condition performed better than the participants in the control condition on the posttest when controlling for trait mindfulness, emotion regulation, and pretest performance. There was no difference between the two conditions on stress appraisals. The results are discussed with regards to their implications for theories of mindfulness, emotion regulation, and learning.

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6:00-7:30 PM (1096)

Applications of a Bayesian Hierarchical Signal Detection Model to Emotion Research. ANDREA M. CATALDO and ANDREW L. COHEN, *University of Massachusetts, Amherst* (Sponsored by Andrew Cohen) — The rating scale is a common method for quantifying internal states. For instance, emotion is often measured by asking participants to rate how well each of



several emotional words represents their current state. Group mean ratings are then compared to determine which emotion was rated highest. This method of analysis is limited in two ways: First, the finite number of stimuli available to target particular states, such as emotions, reduces within-subjects power. Second, comparing mean ratings is an insensitive measure of how individuals discriminate between possible states. We first test a new method that utilizes faces instead of words to increase the pool of evaluative stimuli. We then present a Bayesian hierarchical signal detection model, which builds on previous models for rating scale data, as a solution to both limitations: signal detection theory offers a more sensitive discrimination measure, and the Bayesian hierarchical framework provides more reliable estimates at the individual level. The results demonstrate the increased sensitivity offered by both the methodological and statistical approaches at both group and individual levels of analysis.

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6:00-7:30 PM (1097)

Decreased Cognitive Functioning in Depression: A Result of Inherent Deficits or a By-Product of Emotion Regulation?

KATHRYN HARDIN and LISA EMERY, *Appalachian State University* (Sponsored by Lisa Emery) — Depression is associated with increased rumination and decreased memory ability. Some researchers theorize that rumination may impair memory by increasing cognitive load. The present study aimed to determine if rumination might cause memory deficits in depression. 100 young adults verbally described a recent negative event to the experimenter. After telling the story, participants were randomly assigned to either ruminate (rumination) or were given no further instruction (control). All participants completed parts of the Wechsler Memory Scale – Fourth Edition to measure memory. Participants also completed the Beck Depression Inventory-II to measure depressive symptoms and the Ruminative Response Scale to measure habitual rumination. Rumination did not significantly affect visual or verbal memory and depressive symptoms did not moderate the effect. In contrast to previous literature, there was no relationship between depression and memory performance and a small positive correlation between memory and habitual rumination. These results suggest that rumination may not be as cognitively harmful as previously theorized.

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WORKING MEMORY I

6:00-7:30 PM (1098)

The Role of Attention in Face-Scene Binding in Visual Working Memory. DWIGHT PETERSON, *Concordia College*, MOSHE NAVEH-BENJAMIN, *University of Missouri* — Despite a wealth of existing literature on the topic, the role of attention in visual working memory (VWM) binding processes remains unsettled. Previous findings indicate that feature binding (e.g., color-shape) within VWM requires no additional resources beyond what is required for single features. However, it is possible that more complex forms of binding (e.g., faces and scenes), in VWM may require additional resources. In three

experiments, VWM item-item binding performance under no load, articulatory suppression, and backward counting was measured using a change detection task. Performance declines under higher compared to lower load conditions were greatest in the item-item binding condition relative to single-item conditions. These findings indicate that processing item-item bindings within VWM requires a greater amount of attentional resources compared to single items. This novel evidence suggests that the specific type of binding is an important determining factor regarding whether or not VWM binding processes require attention.

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6:00-7:30 PM (1099)

Refining Representations to Improve Recall in a Distributed Model of Working Memory.

PETER SHEPHERDSON and KLAUS OBERAUER, *University of Zurich* — In distributed models of working memory (WM), bindings between contents (e.g., items) and contexts (e.g., positions) overlap, causing interference at retrieval. Simulations in which attentional processes (e.g., refreshing, rehearsal) strengthen bindings often contradict the expected effects, with strengthened bindings leading to deterioration in performance. Can attention to information in memory be implemented in such a way as to enhance recall? We attempted this by incorporating competition between bindings into a distributed WM model. First, we showed that selective strengthening of parts of content-context bindings, dependent on between-context overlap, enhanced recall for discrete items. We then implemented this idea in a manner that did not rely on knowledge of between-context overlap, using a simple sampling algorithm. Again, recall for discrete items improved. A further simulation using features in a continuous circular space also showed enhanced recall using the sampling algorithm; this extended to the case where individual items were the focus of attention, analogous to the use of retro-cues. Refining memory representations may be a viable alternative to other attentional processes assumed to benefit WM.

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6:00-7:30 PM (1100)

The Contribution of Disengagement to Temporal Discriminability.

ZACH SHIPSTEAD, *Flagler College*, ASHLEY NESPODZANY, *Arizona State University* — The present study examines the idea that time-based forgetting of outdated information can lead to better memory of currently-relevant information. This was done using the visual arrays task, along with a between-subjects manipulation of both the retention interval (1s vs. 4s) and the time between two trials (1s vs. 4s). Consistent with prior work (Shipstead & Engle, 2013; Experiment 1), longer retention intervals did not lead to diminished memory of currently-relevant information. However, we did find that longer periods of time between two trials improved memory for currently-relevant information. This reinforces recent findings that indicate the presence of



proactive interference in the visual arrays task and further indicates that the reduction of proactive interference occurs in a time-dependent manner.

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6:00-7:30 PM (1101)

Is There a Different Relationship Among Working Memory Factors and General Fluid Intelligence Between Younger and Older Adults? KAZUNORI OTSUKA, *University of Nagasaki* — A number of studies using complex span tasks have reported that working memory factors (storage and processing) are closely related to fluid intelligence (Gf). However, only a few studies have investigated differences in relationships among working memory factors and Gf between younger and older adults to elucidate the effects of cognitive aging on working memory functions. This study investigated differences in relationships between these cognitive functions in 141 younger (18 – 23 years old) and 141 older (65 – 70 years old) participants that completed complex span tasks (reading, operation, and symmetry), Raven progressive matrices, and numerical and verbal inference tasks. The results of multiple-group confirmatory factor analyses indicated that there was a significantly higher positive relationship between processing factor and Gf in older participants than that in younger participants. The importance of processing factors in cognitive aging of working memory in older adults is discussed.

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6:00-7:30 PM (1102)

Individual Differences in Working Memory Capacity and Filtering. MATTHEW K. ROBISON and NASH UNSWORTH, *University of Oregon* — In three experiments we examined individual differences in working memory (WM) and their relationship with filtering – the selective encoding and maintenance of relevant information in the presence of irrelevant information. While some accounts argue that filtering is an important element of individual differences in WM, recent investigations have challenged this view. In all three experiments, we measured WM with three complex span tasks and then had participants complete a visual WM task with a filtering component. In Experiment 1, participants remembered the orientation of red rectangles and ignore blue rectangles. In Experiment 2, the color of relevant items changed on a trial-by-trial basis. In Experiment 3, we presented a constant number of items. On half of trials, participants were told which color item would be tested before each trial. WM span only accounted for a significant portion of variance in filtering trials beyond shared variance between filtering and non-filtering trials in Experiments 2 and 3. We argue that filtering is one of several control processes that gives rise to individual differences in WM, but that the relationship is constrained by the degree to which filtering is demanded by the task.

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6:00-7:30 PM (1103)

The Role of Attention in Maintaining Item, Category, and Order information. NAOMI LANGEROCK, *University of Geneva*, DAVID WISNIEWSKI and MARCEL BRASS, *Ghent*

University, EVIE VERGAUWE, *University of Geneva* — How is information drawn from different categories maintained in working memory? Previous research suggests that attention plays an important role in maintaining series of items drawn from a single category (e.g., series of words or series of locations) by demonstrating that increased attentional demands of a concurrent processing task result in poorer recall performance of single-category lists (Barrouillet et al., 2004, 2007, 2011; Vergauwe et al., 2009, 2010, 2012). Here, we examine the role of attention in multiple-category lists. More specifically, series of four memory items were presented, each memory item drawn from one out of four categories without replacement (faces, places, pseudo-words, line orientations). A tone discrimination task was to be performed concurrently, the attentional demands of which were manipulated. We examined how this attentional manipulation affects recall performance of multiple-category lists. Furthermore, we explored whether item information, category information and order information are affected in the same way.

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6:00-7:30 PM (1104)

Dynamic Adjustments in Working Memory in the Face of Affective Distraction. ALEXANDRA B. MORRISON, JOANNA E. WITKIN and AMISHI P. JHA, *University of Miami* — Dynamic adjustments in cognitive control allow for upregulation of cognitive control to alter cognitive resource availability based on fluctuating environmental demands. Prior research has shown that working memory (WM) demands can induce dynamic adjustments in response to mnemonic load to influence subsequent trial performance. The current study investigated whether these dynamic adjustments extend to other non-mnemonic demands during WM, including affective distraction. Participants (N = 89) completed a delayed-recognition WM task which parametrically manipulated mnemonic load (low-load vs. high-load trials) and delay-spanning distracter valence (neutral vs. negative distracters). Participants had greater current trial performance when previous trials were high load vs. low load. Results also showed dynamic adjustments due to distracter valence, where participants had greater current trial performance when previous trials had negative vs. neutral distracters. These findings suggest that WM task demands induce dynamic adjustments due to mnemonic as well as non-mnemonic (i.e., affective) features of the task.

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6:00-7:30 PM (1105)

Terrorism Risk Assessment for Individuals: A Signal Detection Framework. RICHARD S. JOHN, *University of Southern California*, NICHOLAS SCURICH, *University of California, Irvine* — Increasingly Big Data analytics are being utilized to assess the terrorism threat of individuals. Decades of previous research on violence risk assessment has demonstrated the limitations in how accurately future violent behavior can be predicted from individual characteristics and past behavior. In many respects, the terrorism case is a greater challenge due to the presence of low base rates, the lack of highly diagnostic indicators, and the ability of an adaptive adversary to learn



how to attenuate their predicted threat level. We formulate this generic problem in a Signal Detection framework, and conduct sensitivity analysis to determine conditions in which such threat assessments are useful. Results depend on the prior probability that a randomly selected individual is a terrorist, the likelihood function associated with the predicted threat level, and the relative cost of false-positives and false negatives. Further sensitivity analyses explores the impact of attenuated diagnosticity resulting from an adaptive adversary capable of learning the characteristics required for a “low-risk profile” and either acquiring a low-risk profile, or recruiting an accomplice with a low-risk profile.

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6:00-7:30 PM (1106)

Testing the Predictions of a Single-Process Model of Inductive and Deductive Reasoning. RACHEL G. STEPHENS and BRETT K. HAYES, *University of New South Wales*, JOHN C. DUNN, *University of Western Australia* — Dual-process theories posit that two qualitatively distinct kinds of processes contribute to reasoning. Under this view, inductive judgments are more heavily influenced by faster heuristic processes, while deductive judgments are more strongly influenced by slower analytic processes. However, a recent meta-analysis found that a large body of reasoning data could be accounted for by a “single-process” model that proposes a single dimension of argument strength, but separate decision criteria for induction and deduction judgments. We report a novel experimental test of the single-process model, searching for the pattern of data that it uniquely predicts. By manipulating response bias instructions, we show that induction and deduction decision criteria can change independently. This is consistent with the single-process model, but poses a challenge for popular dual-process theories and highlights the kind of critical data patterns that can be used to distinguish reasoning theories.

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6:00-7:30 PM (1107)

Visual Working Memory Load Increases Stimulus-Repetition Benefits. JASON RAJSIC, MATTHEW D. HILCHEY and JAY PRATT, *University of Toronto* (Sponsored by Jim McAuliffe) — When successive visual stimuli are discriminated, the speed of performance depends on what was previously discriminated. We investigated whether visual working memory (VWM) is involved in storing the codes underlying stimulus-response and location-response repetition benefits in a 4-stimulus, 2-alternative forced choice target discrimination task. Two groups of participants discriminated colored stimuli while holding three locations or colors in visual working memory. Compared to a pre-test discrimination task with no load, holding either locations or colors in VWM increased the magnitude of stimulus-response repetition benefits. Location-response repetition benefits were unaffected. Our results suggest that short-term memory is involved in processing task-relevant features (i.e., color), perhaps by supporting the search for stimulus-response mappings that have not recently been

used. Since repetition effects were not diminished by load, we suggest that recently used location- and color-codes are not stored in VWM.

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6:00-7:30 PM (1108)

Working Memory Capacity and Recall From Long Term Memory: The Influence of Intensity of Attention at Encoding. ASHLEY LYNN MILLER and NASH UNSWORTH, *University of Oregon* (Sponsored by Nash Unsworth) — The present study utilized pupil dilation as an index of the intensity of attention to determine if variation in attention at encoding partially accounts for the relation between working memory capacity (WMC) and long-term memory (LTM). In Exp 1, participants completed a traditional delayed free recall task while pupil diameter was simultaneously recorded. Results revealed high WMC individuals displayed an increase in pupil dilation across serial positions, whereas low WMC individuals exhibited a decline in pupil dilation. Exp 2 employed a similar method to Exp 1, but manipulated encoding conditions via value directed remembering. Results demonstrated when later serial positions are labeled as more important, low WMC individuals no longer displayed a decline in the pupillary response across serial positions. Instead, similar to high WMC individuals, low WMC individuals increased attention across serial positions, with the caveat being that these individuals devote less attention to all serial positions under these conditions. Taken altogether, results suggest the intensity of attention is a critical factor needing to be taken into consideration when explaining the relation between WMC and LTM abilities.

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6:00-7:30 PM (1109)

Stimulus-Driven Attention and Cognitive Control During Encoding: An Event-Related Brain Potential Study. KATELYN WILLS, HANS SCHRODER, JASON MOSER and SUSAN RAVIZZA, *Michigan State University* (Sponsored by Susan Ravizza) — Stimulus-driven attention can improve working memory (WM) for salient, task-relevant items. Previous work using fMRI has suggested that neural mechanisms that enhance cognitive control in the presence of salient items, rather than salience detection mechanisms, are involved in such WM benefits. The present work aimed to follow up on these findings using event related potentials (ERPs) to explore the time course of attention to contingently salient items during encoding. Participants memorized lists of differently colored letters while simultaneously monitoring for a pound sign of a target color. The encoding of letters matching the target pound sign color was associated with larger ERP amplitude in both an early negative (N1) and a later positive (P3) potential. We conclude that both salience detection and cognitive control processes are involved in the encoding of contingently salient information.

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6:00-7:30 PM (1110)

Distraction and Visuospatial Memory Selectivity: Remembering Important Item and Location Associations Under Divided Attention. ALEXANDER L.M. SIEGEL



and ALAN D. CASTEL, *University of California, Los Angeles* (Sponsored by Barbara Knowlton) — Successful visuospatial memory is dependent upon the ability to accurately bind the identity and location information of an object into a coherent unit. In addition, prior research has demonstrated that, given an excess of information, we can selectively attend to and later remember information that is high-value at the expense of competing, low-value information. The execution of such strategies is affected by the format in which information is encountered and the attentional resources available during encoding. In the present study, we examined the effects of presentation format (sequential or simultaneous) and attention at encoding (divided or full) on visuospatial memory selectivity for associative information. Results suggest that participants under divided attention could effectively engage in value-based study strategies with continued task experience in order to mitigate overall memory impairments, as compared to their full attention counterparts. We interpret these results with respect to the role of attention in memory selectivity.

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6:00-7:30 PM (1111)

Mindfulness Meditation Can Enhance Working Memory Performance. MICHAEL F.S. BARANSKI and CHRISTOPHER A. WAS, *Kent State University* (Sponsored by Bradley Morris) — Working memory is an influential psychological construct thought to underlie multiple forms of complex cognition (e.g., general intelligence, novel reasoning, reading comprehension, problem solving, complex learning). Numerous attempts to improve working memory performance have yielded inconclusive results due to design problems. Separately, mindfulness meditation has shown promise as a means to enhance working memory functioning. The present study combines these two literatures by examining if mindfulness meditation can enhance working memory performance compared to an active, adaptive control group using multiple, valid indicators of working memory different from what participants train on. Although there were no group differences in a working memory performance composite score at posttest, as predicted only the mindfulness meditation group significantly enhanced working memory performance following training. This is the first study of its kind to meet most of the stringent criteria necessary for demonstrating working memory enhancement following two weeks of brief and inexpensive training.

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6:00-7:30 PM (1112)

The Contributions of Attention and Binding for Individual Differences in Working Memory Capacity. PAUL HOWLETT and VANESSA M. LOAIZA, *University of Essex* (Sponsored by Vanessa Loaiza) — Individual differences in working memory capacity are known to constrain other higher-order cognition, such as fluid intelligence. This study investigated two prominent theoretical accounts for this finding by manipulating the demands of attention and binding within the same task of remembering colors appearing in different frames. The colors appeared in neutral (i.e., XXXX in red font) or incongruent (i.e.,

BLUE in red font) text, and during recall participants selected among positive (i.e., red in its correct frame), negative (i.e., a color that was never presented in the trial), and intrusion (i.e., red presented in a different frame) probes. Letter Sets was administered to measure fluid intelligence. The results showed that the attentional demand affected the positive probes more strongly than the intrusion probes, and both trial types were correlated with fluid intelligence, thus suggesting that attention and binding may have distinct roles for individual differences in working memory capacity.

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6:00-7:30 PM (1113)

Individual Differences in Working Memory and Learning With Gesture. MARY ALDUGOM and SUSAN WAGNER COOK, *The University of Iowa* (Sponsored by Jodie Plumert) — Gesture facilitates math learning, in children and in adults. When adults view instruction including gesture, they learn more than adults who observe the same lesson without gesture. We investigated individual differences in learning with gesture. College students observed a lesson in abstract mathematical equivalence including gesture, and completed a post-test and transfer test. Verbal, visual, and kinesthetic working memory abilities as well as ACT scores (a measure of intelligence) were assessed. Thirty-nine participants have completed the study (planned $n = 64$). Preliminary analyses reveal a strong correlation between ACT scores and learning. Our pre-registered analysis will consider the relation between working memory capacity and learning, controlling for ACT scores. Although it has been suggested that gesture is particularly helpful for those who are most in need of support, this pattern suggests that the relation between intelligence and mathematical learning is maintained even when instruction includes gesture.

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6:00-7:30 PM (1114)

Do Goal Cue or Goal Oriented Activity Improve Preschoolers' Working Memory? CHRISTOPHE FITAMEN, *Université de Fribourg & Université d'Aix-Marseille*, AGNÈS BLAYE, *Université d'Aix-Marseille*, VALÉRIE CAMOS, *Université de Fribourg* (Sponsored by Valérie Camos) — While some studies showed that presenting goal cues during a task improves preschoolers' performance in task switching (Blaye & Chevalier, 2011), others reported working memory (WM) improvement during goal oriented motor activity (Bertrand & Camos, 2015), both suggesting that goal neglect contributes greatly to preschoolers performance. The current study aimed at disentangling the role of motor activity and the presence of visual goal cue in WM task in which preschoolers had to maintain verbal information during either an unfilled interval or while performing a motor activity (walk); the presence of visual goal cue being orthogonally manipulated. Whereas the visual cue did not affect WM performance, walking had a detrimental effect on recall performance in all age groups. These findings are incongruent with the previous findings on preschoolers.

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ATTENTIONAL CONTROL

6:00-7:30 PM (1115)

The More, the Worse? Beneficial Impacts of Secondary Task Dynamics on Cognitive Flexibility. MIRIAM GADE, *Catholic University of Eichstätt-Ingolstadt*, IRING KOCH, *RWTH Aachen University* — People are remarkably good at flexibly interchanging current goals. Yet, flexibility usually incurs a cost in performance (i.e., switch cost). The cause for this cost remains elusive. In our study, we enriched a cued task switching paradigm (i.e. digit classification) with secondary tasks that differed in their dynamics (i.e. uttering words compared to holding a spittle) as well as their effectors (using vocalization as well as manual gestures). Our dynamic secondary tasks provided beneficial effects in that those reduced the observed costs when participants had to switch the task. In contrast, in our control condition - without secondary task - sizable switch cost was observed. We interpret this finding in line with the memory-account of task switch cost, namely that the introduction of a secondary task hampers the buildup of memory traces that are beneficial in case of a task repetition but harmful in case of a task switch.

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6:00-7:30 PM (1116)

The Temporal Dynamics of Visual Attention in Processing Facial Emotion: What's Special About Facial Emotion? ASHLEY WIEBKE, SARAH GRISWOLD and MEI-CHING LIEN, *Oregon State University*, ERIC RUTHRUFF, *University of New Mexico* — In rapid serial visual presentation, identification of the second of two targets is impaired when it closely follows the first target, a phenomenon known as the attentional blink (AB) effect. Awh et al. (2004) found that face discrimination was immune to the AB when performed together with a digit task. They proposed a multi-channel model in which digit processing utilizes a figure-based channel, leaving the configural-based channel available for face processing. We tested this model using a word discrimination task (assumed to occupy the feature-based channel) and a facial emotional discrimination task (assuming to occupy the configural-based channel). The emotional congruity between facial expressions and emotional words was manipulated. We found a significant but very small AB effect. We also replicated this finding with non-emotional words. Limitations in processing successive visual objects with faces are discussed.

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6:00-7:30 PM (1117)

Measuring Attention Control Abilities With a Gaze-Following Antisaccade Paradigm. JADE YONEHIRO and NICHOLAS D. DURAN, *Arizona State University* — Social gaze-following consists of both reflexive and volitional control mechanisms of saccades, similar to those evaluated in the antisaccade task. This similarity makes gaze-following an ideal medium for studying attention in a social context. The present study seeks to utilize reflexive gaze-following to develop a social paradigm for measuring attention control. We evaluate two social versions of the antisaccade task. In version 1, participants

are cued with still images of a social partner looking either left or right. In version 2, participants are cued with videos of a social partner shifting their gaze to the left or right. As with the traditional antisaccade task, participants were required to look in the opposite direction of the target stimuli (i.e., gaze cues). Preliminary evidence shows strong relationships between the social antisaccade tasks, traditional measures of attention, and the highly related ability of working memory. Specifically, version 2 (the video stimuli) was the strongest predictor of attention and working memory abilities.

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6:00-7:30 PM (1118)

The Influences of Response Mode and Stimulus-Response Mappings on the Cross-Task Congruency Sequence Effect. CHAEEUN LIM and YANG SEOK CHO, *Korea University* — The present study investigated the influence of response mode and stimulus-response mappings (S-R mappings) on the congruency sequence effect (CSE). Kim and Cho (2014) found that the CSE occurs between different tasks sharing a common response mode. However, a response mode-independent CSE was obtained when a non-arbitrary string of stimulus items was used (Weissman et al., 2015). In two experiments, participants were to perform two letter flanker-compatibility tasks alternatively in a trial-by-trial manner. In Experiment 1, in which the arbitrariness of stimulus set (and also S-R mapping) of two tasks was manipulated and each task was performed with a different response mode, a cross-task CSE was found only with the non-arbitrary stimulus set. In Experiment 2, in which the arbitrariness of stimulus set and response mode were manipulated while S-R mappings were always arbitrary, a significant CSE was found between the tasks only when they shared a common response mode. These results suggest that the scope of control is determined in terms of response mode as well as the arbitrariness of S-R mappings, rather than the arbitrariness of stimulus set.

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6:00-7:30 PM (1119)

Modeling Response Time Distributions of Free Recall Initiation With a Racing Diffusion Model. ADAM F. OSTH, *University of Melbourne*, SIMON FARRELL, *University of Western Australia* — Memory models have characterized retrieval in free recall as multialternative decision making. However, the majority of these applications have only been applied to mean response times (RTs) and not to complete RT distributions, which offer more constraint. We fit RT distributions of free recall initiation with a racing diffusion model in a hierarchical Bayesian framework. In our model comparison, we applied models that varied whether a.) the recency gradient was exponential or a power law, and b.) whether the retrieval function reflects a joint contribution of primacy and recency, or is a mixture of primacy and recency gradients, potentially due to reinstatement of the start context on primacy trials. Results from a large number of datasets strongly favor such a mixture model with an exponential recency function.

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6:00-7:30 PM (1120)

The Item-Specific Proportion Congruency Effect is Observed With a Color-Word Verification Task: Implications for Item-Specific Control and Stimulus-Response Contingency Learning Explanations. MINE MISIRLISOY, *Middle East Technical University*, NART BEDIN ATALAY, *TOBB University of Economics and Technology* — The item-specific proportion congruency (ISPC) effect is demonstrated by a smaller Stroop effect for mostly incongruent (MI) items compared to mostly congruent (MC) items. Currently, there is an ongoing debate regarding the contribution of automatic control processes and stimulus-response contingency learning processes to the ISPC effect. The aim of the present study was to further explore the cognitive processes underlying the ISPC effect. Specifically, the ISPC effect was investigated by using a color-word verification task. In this task, which is not a selective attention task, subjects indicate whether or not the presented word and the color match. Results revealed a significant ISPC effect. Importantly, compared to an equal congruency (EC) condition, response times were slower for the MI-congruent items, and faster for the MC-congruent items. Current findings can neither be explained by a pure item-specific control, nor a pure stimulus-response contingency learning account.

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6:00-7:30 PM (1121)

Hearing at a Distance: The Effect of Speaker Distance on Audiovisual Speech Intelligibility. AARON D. MITCHEL and MISHA PATEL, *Bucknell University* — Visual contributions to speech are well-documented. For example, synchronous facial displays greatly enhance the intelligibility of speech, particularly in noise (Sumbly & Pollack, 1954). However, few studies have investigated visual speech enhancement (VSE) at distances that might be encountered in real-world settings. We routinely engage in conversations at distances beyond a few feet, significantly reducing the size of the facial image on the retina. In these situations, does visual speech still facilitate comprehension? In the present study, we tested the effect of speaker distance on VSE. Participants identified words amid noise in audio or audiovisual contexts. In the audiovisual context, the facial display was recorded at 15, 35, and 55 feet. We found that visual speech enhanced intelligibility at distances up to 35 feet. This demonstrates that VSE occurs despite a substantial reduction in retinal image size, suggesting that even a greatly diminished visual signal can enhance speech recognition.

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6:00-7:30 PM (1122)

Investigating the Influence of a Brief Mindfulness Intervention on Mind Wandering. CAGLAR YILDIRIM, *State University of New York Oswego*, VERONICA J. DARK, *Iowa State University* — We investigated whether a brief (10-minute) mindfulness intervention could reduce mind wandering during a sustained attention task. Experiment 1 used an ecologically valid task, i.e., learning from a lecture video. There was no effect on the occurrence of either self-caught or probe-caught mind wandering nor on the disruptive effects of mind wandering on

lecture comprehension. Experiment 2 examined whether two different brief mindfulness interventions (one guided and one unguided) could reduce behavioral indices of mind wandering during the sustained attention to response task (SART), a basic laboratory task. There were no effects. In contrast to some literature, the current experiments indicate that a brief mindfulness intervention has no immediate beneficial effect on mind wandering during demanding tasks, underscoring the importance of examining more robust mindfulness interventions in future investigations.

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6:00-7:30 PM (1123)

Adult ADHD, Executive Functioning, and Cued vs. Voluntary Task-Switching Performance. KATHERINE V. SAMS, ELIZABETH A. COLBURN, NATASHA M. BUTKEVITZ, ANNA E. OSMENT, JACKSON S. COLVETT, JACQUELINE FRIEDMAN and JANINE M. JENNINGS, *Wake Forest University* (Sponsored by Deborah Best) — Children with ADHD are less accurate and slower when switching between tasks (Cepeda et al., 2000). However, little work has investigated task-switching in adult ADHD, and previous studies have relied on the cued task-switching paradigm. In contrast, the current study compared voluntary and cued task-switching performance between young adults with and without ADHD, and examined the relationship between performance and executive functioning (EF) using the BDEFS (Barkley, 2011). The results showed no group differences in switching performance. However, for the voluntary task-switching paradigm, *greater* deficits in EF were correlated with *lower* RT switch costs for both groups. Moreover, the degree of executive dysfunction was positively correlated with the frequency of voluntary switching in ADHD. These results suggest that task-switching may differ for high-functioning adults with ADHD relative to children. Further, greater deficits in EF may mean poorer goal maintenance, which allows faster switching as there is no task-set to overcome.

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6:00-7:30 PM (1124)

Same Context, Different Control: Flexibly Shifting Between Context-Specific Control Settings. NICHOLAUS P. BROSKOWSKY, *The Graduate Center, City University of New York*, MATTHEW J.C. CRUMP, *Brooklyn College and Graduate Center, City University of New York* (Sponsored by Matthew Crump) — The contextual properties of the environment, through learning and memory processes, can rapidly and involuntarily adjust attentional control. Contextual control is often touted as a mechanism that allows for flexible control over attention, but most examples show behavior that rigidly conforms context-specific regularities. Here, we investigated how people might exploit different features within a context to flexibly change between context-specific attentional control settings. In three related experiments, participants completed an arrow flanker task. The arrows were paired with three contextual cues associated with different levels of proportion congruency (100%, 50%, or 0%). Critically, the frequency unbiased items shared a feature with each of the biased sets.



We found that shifting participants focus from one overlapping feature to the other modulated the size of the congruency effect for the frequency unbiased items suggesting that participants could actively change between context-specific control settings. Email: Nicholas P. Brosowsky, nbrosowsky@gradcenter.cuny.edu

6:00-7:30 PM (1125)

On-Task, Off-Task, Rinse, & Repeat: Oscillatory Patterns of Mind Wandering Predict Real-World Functioning. EFFIE J. PEREIRA and JELENA RISTIC, *McGill University* (Sponsored by Jelena Ristic) — Mind wandering has been associated with both detriments (e.g., task performance) and gains (e.g., creativity) in functional outcomes, however the underlying factors that drive such disparate consequences remain poorly understood. Here, we characterized the frequency of mind wandering *within* individuals to examine the effect of internal oscillations on participants' real-life outcomes and cognitive function. Mind wandering, temperament traits, social adjustment, and academic achievement were measured in fifty individuals. Within each individual, mind wandering was assessed for repeating temporal patterns, with participants clustering into three distinct groups. Those with *strongly repetitive* patterns of mind wandering were found to have lower trait-level attentional control and lower academic achievement, those with *irregular* patterns of mind wandering exhibited greater sensitivity to their environment, while those with *weakly repetitive* patterns exhibited greater imagination. Thus, fluctuating patterns of mind wandering within individuals may represent an important determinant in the negative and positive outcomes associated with mind wandering. Email: Effie J. Pereira, effie.pereira@mail.mcgill.ca

6:00-7:30 PM (1126)

Measuring Attention Control: Can We Do Better? JASON S. TSUKAHARA, TYLER L. HARRISON, KENNY L. HICKS, CHRISTOPHER DRAHEIM, JESSIE MARTIN and RANDALL W. ENGLE, *Georgia Institute of Technology* (Sponsored by Christopher Hertzog) — The ability to control one's attention is an important psychological construct underlying theories of working memory, intelligence, and general discrimination ability. However, there are issues with some of the tasks that have been traditionally used to measure attention control. For instance, the Stroop and flanker tasks are widely used by many, yet the dependent variable for these tasks rely on difference scores and do not consider accuracy. These two factors are particularly problematic for individual differences research. As a consequence, the Stroop and flanker tasks often correlate poorly with working memory capacity and show low factor loadings when loaded onto an "attention control" factor. The aim of the current study is to develop tasks to improve the reliability and validity of attention control at the construct level. We modified the Stroop and arrow flanker tasks to arrive at a threshold-level of performance for each subject based on an adaptive procedure. We also developed new attention control tasks. We compare the reliability and validity of these new tasks

with more traditional versions, and we also compare different tasks at the latent level to determine how to best measure the construct of attention control.

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6:00-7:30 PM (1127)

The Role of Attention in Insight Problem Solving. ALEXANDRA CHISTOPOLSKAYA, ILYA VLADIMIROV, VICTORIA MAYOROVA and YULIA SECURTCOVA, *P.G. Demidov Yaroslavl State University* (Sponsored by Ilya Vladimirov) — Low-level processes have an important role in the insight problem solving, in particular, the processes of attention (Grant, Spivey, 2003). For example, in the experiments of Thomas and Lieras it was shown that the eye movement pattern, embodying the solution of the Dunker's problem with a tumor, substantially facilitates its solution. The question then arises as to how effective are the perceptual hints in comparison with cognitive ones, and what is the mechanism of their action. Classically, the change in the attention focus occurs due to the task - hints. In our first experiment the hints were semantic and procedural. It had been shown that procedural hints facilitate the problem's solution, but semantic ones do not. In the second experiment the complete or partial solution configuration was used as a hint. In total, we can conclude that the perceptual hints are effective. Procedure hints are more effective, but we need to investigate what is more important for insight problem solving: the sequence of actions (operators) or the holistic solution configuration. Supported by the RF Government's program No. 25.5666.2017/BP

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6:00-7:30 PM (1128)

Attentional Preference After a Mindfulness Intervention. JOSHUA JOHN HATHERLEY and JOHN PAUL MINDA, *Western University* (Sponsored by John Minda) — It has been suggested that as a cognitive exercise, mindfulness meditation has the ability to significantly affect attention in its practitioners. This may help explain why mindfulness meditation has found success in clinical practices. This research sought to extend this line of reasoning by investigating the influence of mindfulness meditation on attentional preference. Within the context of this paper, attentional preference was seen to be the ability of the viewer to be biased to either detecting local components or the global whole. Study 1 investigated how a 10-minute breathing-oriented mindfulness intervention affects attentional preference on the Navon, Flanker and Simon tasks when compared to a similar relaxation exercise. Study 2 replicated and expanded on these results; adapting the design of Study 1 into a week-long longitudinal study, and modifying the control group into a true control. Results indicate that on measures of attentional preference on global/local images, mindfulness meditation offers no significant improvement when compared to similar relaxation techniques or to an untreated control sample. Future research should investigate whether different methods of mindfulness-based practices have greater effects.

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**6:00-7:30 PM (1129)**

Attention to Audiobooks: In the Lab and in the Wild. TRISH L. VARAO-SOUSA and MICHAEL KUK, *University of British Columbia*, DAN SMILEK, *University of Waterloo*, ALAN KINGSTONE, *University of British Columbia* (Sponsored by Alan Kingstone) — People mind wander (MW) while reading as well as when listening to audiobooks. However, unlike reading, audiobooks permit individuals to engage in concurrent real world activities. We examined how audiobook MW is affected by different task environments, specifically, inside a quiet lab versus outside in a dynamic real world setting (“the wild”). While listening to an audiobook participants were intermittently prompted to indicate whether they were MW, distracted by the external environment, or focused on the task. Overall rates of inattention did not differ between the two settings; however an interaction revealed that people MW more in the lab, and are distraction more in the wild. Furthermore, memory performance was significantly worse for material listened to in the wild. Our findings suggest that lab based MW may overestimate real world MW, and that everyday memory performance may be compromised more by distraction than MW.

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FEATURE/OBJECT PROCESSING**6:00-7:30 PM (1130)**

The Role of Working Memory in Checking: Evidence From a Verification Task. SHARON MOREIN-ZAMIR, *Anglia Ruskin University* — Working memory difficulties have been linked to increased checking. Though functional, checking can become impairing, as in Obsessive Compulsive Disorder. Checking has been measured in a delayed-match-to-sample task where participants judge whether two consecutive pictures are the same or not. Participants can also elect to repeatedly verify the displays before making a final decision (Rotge et al., 2008). To assess whether working memory influenced verification frequency, we manipulated the delay between the displays. A longer duration led to slower and less accurate responses, but no increase in verification requests. In study two, verification levels remained similar when the visual display was changed and participants judged different aspects of the display. In both studies verification levels increased after negative feedback and correlated with everyday checking. The results indicate that verification levels were insensitive to working memory and perceptual demands, but were influenced by external error signals. These findings question the role of working memory in checking and are in line with clinical findings.

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6:00-7:30 PM (1131)

Characteristics of Reasoning Under Uncertainty Revealed by Adults’ Responses to Common Random Phenomena and “Contradictory” Evidence. SYLVIA KUZMAK, *University of Pennsylvania (formerly)* — A complete description of adults’ reasoning under uncertainty needs to account for their responses to uncertain phenomena that present “contradictory” evidence regarding the phenomena. Much of the literature on reasoning

under uncertainty involves studies presenting subjects with situations that are described coherently, call for application of statistical reasoning, and identify errors and biases in judgment. A study is presented in which 24 college students interact with three instances of simple random phenomena involving the mixture of colored marbles, and for which “contradictory” evidence is observed regarding the predictability of the phenomena; specifically, with one of the phenomena, subjects experience a high level of prediction success, despite the evident random nature of the mechanism producing outcomes. Subjects’ judgments of the predictability of the phenomena and their verbal explanations are analyzed to obtain a characterization of their reasoning that includes: situation reassessment, reevaluation of the applicability of assumption of randomness, fine tuning randomness assumptions, and combining evidence while recognizing inconsistency. The strong influence of success in prediction on reasoning is discussed.

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6:00-7:30 PM (1132)

Random Dot Placements Yield Functional Equivalence of Real and Illusory Figures. PHILIP H. MARSHALL and FRANCESCO DONATO, *Texas Tech University* — The convergent validation of common functional characteristics of real and illusory shapes (Dresp, 1997; Guttman & Kellman, 2004) was reexamined in a simple, random dot placement task originally reported by Psotka (1978). Participants were given a booklet consisting of simple line drawings of real geometric shapes (i.e., squares, triangles, and circles), illusory shapes of same (Kanizsa, 1976) generated by “pacman” attachments, and real shapes that had superfluous pacman attachments. Using the simplest conceivable procedure, 166 undergraduate participants placed a single dot anywhere they chose inside each of the nine drawings. The aggregated pattern of dot placements for each type of shape was consistent with previous findings that dot placements for the squares and triangles were predominantly along the imaginary lines projecting from bisected angles, and were centrally located for the circles. Chi-square analyses confirmed (all p 's < .001) similar placements of up to 90% of the dots within anticipated boundary regions for both real and illusory shapes. These findings support common functional characteristics of real and illusory shapes, yet a convincing explanation for the basic dot placement effects remains to be determined.

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6:00-7:30 PM (1133)

Facilitation in Object Based Selective Attention in the Presence of Distractors. JANE W. COUPERUS and ALEXI HU, *Hampshire College* — This study examines the impact of distractors in object based attention by examining the spread of attention to unattended locations on attended objects when distractors are present. Twenty adults completed an object-based attention task similar to Egley et al. (1994). Participants identified a target object at one of four ends of two rectangles. The target location was validly cued on 72% of trials. The remaining 28% were located on the same or a different object. 68% of trials also included a distractor on one of the



two objects. Results show the spread of attention across the attended object when no distractor was present ($F(2,38)=10.96$, $p<.001$). However, while participants also showed the spread of activation when a distractor was present, when the location of the cue and the distractor were confounded this effect was stronger ($F(6,114)=9.08$, $p<.001$).

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6:00-7:30 PM (1134)

Imagined Event Files: An Interplay Between Imagined and Perceived Objects. BRETT COCHRANE and BRUCE MILLIKEN, *McMaster University* — An important function of attention is to bind together features processed in distinct brain areas into a single coherent object representation. The immediate outcome of this binding process has been termed an event file, a transient memory structure that links features, context, and associated actions (Hommel, 1998). A key result that supports the existence of event files is the partial match cost – slowed responses to a current event thought to reflect the updating of event file bindings in simple trial-to-trial repetition methods. In two experiments, using a procedure similar to Hommel (1998), we explored whether a similar partial match binding effect occurs when participants imagine rather than perceive a first event prior to responding to a following visual event. The results indicate that this effect does occur, implying that feature binding in imagery and perception may follow similar principles.

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6:00-7:30 PM (1135)

Thick and Thin: Occluding Elements' Contents and Widths Affect Visual Memory. RACHEL T.T. NGUYEN and CARRICK C. WILLIAMS, *California State University San Marcos* — Occluded objects are challenging to represent in visual long-term memory; how the object is occluded, and what is occluding it could affect memory. We investigated these effects on visual long-term memory by presenting 50% occluded objects with 1 to 50 bars of varying thickness, plus a fully visible control. The occluding elements were also homogeneous (solid black bars or gray bars matching the background) or heterogeneous (random gray or color pixels). Both the thickness and content of occluding bars affected memory performance. When occluding bars were homogeneous, memory performance was unaffected by the number of bars except when 50 black (but not gray) bars occluded objects resulting in better memory performance. For heterogeneous bars, memory performance was similar for fewer bars, but dropped with more bars. This interaction indicates that visual long-term memory is affected by not only positioning on the object but also the content of occluding elements.

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6:00-7:30 PM (1136)

Filtering of Irrelevant Information in Visual Working Memory: The Effect of Labeling Object Features. CLARA S.R. OVERKOTT and ALESSANDRA S. SOUZA, *University of Zurich* (Sponsored by Alessandra Souza) — Previous research showed that irrelevant features of objects encoded into visual working memory (VWM) are not filtered out. The question

addressed here was whether language could be of assistance for filtering irrelevant features from VWM. Objects varying in one or two continuous features (color and orientation) were presented for study, and participant had to store one (single- and filter-condition) or both features (dual-condition) in VWM. To manipulate verbalizations, this task was completed under articulatory suppression, or participants labeled the relevant features aloud. Labeling improved the continuous retention of color and orientation in VWM compared to suppression. Contradicting previous findings, there were no filtering costs: participants were able to disregard irrelevant features of multi-feature objects thereby performing as good as in the single-condition. This result challenges the assumption of a filtering deficit in VWM, and show that labeling one or multiple features supports the retention of a continuous representation in VWM. Email: Clara Overkott, c.overkott@psychologie.uzh.ch

6:00-7:30 PM (1137)

Interactions Between Visual Working Memory and Selective Attention in Survivors of Pediatric Cancer and Typically Developing Children. MELISSA TREVINO, *National Cancer Institute*, BRUNO G. BREITMEYER, *University of Houston*, KIMBERLY RAGHUBAR, *Baylor College of Medicine* — We investigated the relations between visual working memory (VWM) and selective attention (SA) in survivors of pediatric acute lymphoblastic leukemia (ALL) (ages 10-18yrs.) and typically developing children (ages 10-18yrs.). Participants completed the Digit Span subtest (Wechsler, 2003) and a dual task paradigm, combining a VWM change-detection task and a flanker task, assessing SA. Participants completed 6 dual task conditions varying on VWM feature/task (color, shape, location) and flanker feature/task (color, shape). Results reveal maintenance of information in VWM is susceptible to interference from a concurrent SA task for both groups. VWM performance decreased significantly with dual task demands, and this decrease was greater in cancer survivors. Cancer survivors had significantly lower performances on flanker tasks than controls and were susceptible to interference from a concurrent VWM task. Although SA was not correlated with digit span subtests, VWM correlated with both. Utility of experimental measures in clinical populations are discussed.

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6:00-7:30 PM (1138)

Attentional Modulation of Processing Architecture: A Synthesis of Electroencephalographic and Response Time Modeling Approaches. SARAH MONEER (Graduate Travel Award Recipient) and DANIEL R. LITTLE, *University of Melbourne* (Sponsored by Ami Eidels) — Attention is required to select task-relevant information for further processing and suppress irrelevant information in the visual scene. Several models have been proposed to account for the distribution of attention in the visual field; however, these models do not account for differences in the properties of stimulus dimensions and the time-course of information processing. Evidence from our previous studies has suggested that the distance between dimensions that are perceptually separable affects processing architecture, and hence decision times, in a categorization



task. Further, classification response times (RT) for stimuli in which separable dimensions overlap were best accounted for by a model that allows for a mixture of processing strategies, which could be explained by fluctuations in controlled attention across trials. In the present study, we investigate how attention is allocated in the visual field, and how this influences the time-course of information processing using a combination of RT modeling and electroencephalographic approaches.
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6:00-7:30 PM (1139)

Change Blindness for Person Substitutions Persists When Participants Process Identity. CHRISTOPHER BRETT JAEGER and DANIEL T. LEVIN, *Vanderbilt University* (Sponsored by Daniel Levin) — Change blindness (CB) research often relies upon incidental paradigms to demonstrate that people fail to detect changes to central objects. For example, many participants fail to notice the substitution of an actor in a film across cuts. On one view, these findings suggest that people do not typically track features of attended objects. However, it has also been suggested that incidental change blindness paradigms invite unusually minimal processing because participants lack goals. We tested CB for actor substitutions when participants were given orienting tasks that required processing of actor identity. CB persisted when participants counted the number of actors in the video, and when they were required to remember the changing actors for a subsequent recognition test. CB diminished, however, when participants searched for a pre-specified actor in the video. Collectively, our results show that CB can persist even when task goals require processing of changing features.
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6:00-7:30 PM (1140)

Visual Search Following Category Rule Training. POOJA PATEL, ASHLEY ERCOLINO, MARK NEIDER, JOSEPH SCHMIDT and COREY BOHIL, *University of Central Florida* (Sponsored by Mark Neider) — The current study explored differences in visual search behavior depending on category rule training and search cue type (pictorial-preview or category label). Stimuli were Gabor patches varying in spatial frequency and angle of orientation. Participants were trained either on an explicit category rule (a verbalizable rule requiring selective attention to one dimension) or an implicit category rule (a non-verbalizable rule requiring integration of both dimensions). After category training, subjects completed a visual search task with targets and distractors sampled from the category structure on which they were trained. Pictorial search previews led to stronger guidance (higher proportion of trials where first fixation is on target) and produced faster target verification than category label preview. However, this pictorial advantage was only seen when the classifying rule required selective attention to the frequency dimension. Target verification and distractor rejection was faster for explicit rule categories, although these trends did not reach significance.
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6:00-7:30 PM (1141)

An Equisalience Analysis of Centroid and 2AFC Tasks. A. NICOLE WINTER, CHARLES E. WRIGHT and CHARLES CHUBB, *University of California, Irvine* (Sponsored by Charles Chubb) — Sun et al. (2016) describe the centroid task, a new way to study feature-based attention, in which participants briefly view a stimulus cloud containing targets and distractors then estimate the centroid, or center of mass, of the targets. Previous centroid studies have yielded some surprising results, such as performance for conjunctive targets as good or better than for the constituent feature targets (Winter et al., 2016). The natural question is why performance on the centroid task can differ so dramatically from performance on other feature-based attention tasks, such as search. It is possible that the centroid task either has access to different kinds of information, or access to the same information, but uses it differently. Using equisalience function analysis (Wright et al., 2013), we find that the luminance-to-shape equisalience functions are different for centroid and two-alternative-forced-choice (2AFC) tasks, suggesting that the centroid task does indeed have access to either different information (or different uses for the same information) than the 2AFC task.
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6:00-7:30 PM (1142)

Change Detection and Logographic Characters: The Effect of Readability. QIWAN SHI and RICHARD D. WRIGHT, *Simon Fraser University* (Sponsored by Richard Wright) — We used a flicker task to study how readability affects the detection of changes to logographic characters. Participants saw many Mandarin characters or Mandarin-like pseudo characters in a flickering image and were required to find the one that was changing. Changes involved either part of the character or the whole character. Half of the participants were fluent Mandarin readers and half were not. All participants were more sensitive to whole-character changes than to partial-character changes. But Mandarin readers were more sensitive than non-Mandarin readers to changes that occurred within Mandarin characters. This was not the case, however, when changes occurred within pseudo characters. Both groups required the same time to find the change. Our results suggest that when higher level information (e.g. meanings, verbal labels) is available, this helps people to process visual stimuli in a more efficient way.
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6:00-7:30 PM (1143)

Afraid of One, Afraid of All: When Fear Generalizes Across Face-Types. ALESHA D. BOND and HEATHER M. KLEIDER-OFFUTT, *Georgia State University* (Sponsored by Heather Offutt) — When presented with new objects, we consider similarities between the new object and a category prototype. When categorizing people, pervasive stereotypes link Black men to assumed criminality. The current study investigated whether negative associations of threat that is readily associated with the “criminal face” category prototype (men w/ Afrocentric features), could be conditioned to extend to peripheral category members (men w/ non-Afrocentric features). Participants made explicit (i.e., believability in a



negative/positive role) and implicit (i.e., dangerousness ratings) judgments of Black and White target faces after presentation of a threatening prime (i.e. prison population) that varied in composition by race and face-type. Results showed more negative than positive ratings for White target faces but only when the prime was primarily non-Afrocentric. Black target faces were always rated more negative than positive regardless of prime. The findings are consistent with previous studies suggesting that the same cognitive mechanisms that underpin fear generalization in category objects may also support fear generalization with complex social stimuli such as faces.
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6:00-7:30 PM (1144)

The Influence of Naturalness and Low-Level Visual Features on Expressed Thoughts. KATHRYN E. SCHERTZ, *University of Chicago*, SONYA SACHDEVA, *U.S. Forest Service, Northern Research Station*, OMID KARDAN and HIROKI P. KOTABE, *University of Chicago*, KATHLEEN L. WOLF, *University of Washington*, MARC G. BERMAN, *University of Chicago* (Sponsored by Marc Berman) — Prior research has shown that the physical characteristics of one's environment have wide ranging effects on affect and cognition. Other research has demonstrated that one's thoughts have impacts on mood and behavior, and in this two-part study we investigated how physical features of the environment can alter thought content. In the first study, we analyzed thousands of journal entries written by park visitors to examine how low-level and semantic visual features of the parks correlate with different thought topics. In the second study, we experimentally manipulated exposure to these features to determine if they causally induced thinking about these same topics under more generalized conditions. Results from Study 2 demonstrated a causal role for perceived naturalness and high non-straight edges on thinking about topics related to "Nature" and "Spiritual & Life Journey", respectively. These results have implications for the design of the built environment to influence human reflection and well-being.

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6:00-7:30 PM (1145)

ADHD Symptoms and Mind Wandering. GIZEM ARABACI and BENJAMIN PARRIS, *Bournemouth University* (Sponsored by Claudia von Bastian) — Previous research has reported a positive relationship between ADHD and spontaneous mind wandering in a survey study, but did not report if this relationship differed for the core symptoms of inattention and hyperactivity/impulsivity. Both inattention and mind wandering are related to working memory while hyperactivity/impulsivity is associated with response inhibition, and mind wandering only appears in the inattention symptom list. In the present research, we show that spontaneous and deliberate mind wandering are differentially related to inattention and hyperactivity/impulsivity during the performance of easy and difficult versions of the Sustained Attention to Response Task (SART). Our results indicate that individuals with inattentive

and hyperactive/impulsive symptoms may differ in their experiences of mind wandering due to specific impairments in executive function domains.

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DECISION MAKING I

6:00-7:30 PM (1146)

Problem Encoding Does Not Always Drive Problem Solving: Evidence From Children's Performance on Mathematical Equivalence Problems. CAROLINE BYRD HORNBERG, *Purdue University*, NICOLE M. MCNEIL and LIJUAN WANG, *University of Notre Dame* — Prevailing theory suggests that problem encoding drives problem solving. However, two studies on children's understanding of mathematical equivalence challenge this assumption. In the first study, children encoded equivalence problems in the left-blank format (e.g., $3 + 4 = _ + 5$) better than those in the right-blank format (e.g., $3 + 4 = 5 + _$), consistent with past work. However, solving accuracy was higher for right-blank problems, $p < .001$, $\eta_p^2 = .22$, and the correlation between encoding accuracy and solving accuracy was stronger for right-blank problems. In the second study, children's encoding accuracy improved when an intervention was given in the context of left-blank but not right-blank problems; however, improvements in solving accuracy did not differ by condition. Encoding accuracy also did not predict response to the intervention. Together, results suggest that the role of encoding in problem solving depends on solvers' interpretations of what they encode.

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6:00-7:30 PM (1147)

The Subjective Utilitarian Theory of Moral Judgments: Of Terrorists and Orphans. DALE J. COHEN and KATELYN E. FREDA, *University of North Carolina Wilmington* — In 2016, Cohen and Ahn proposed the *Subjective Utilitarian Theory* of moral judgment (SUMJ). SUMJ is a computational model that make point predictions of people's RT and response choices to moral dilemmas. SUMJ assumes that when people are presented with a moral dilemma that pits two items against one another, the decision maker will attempt to save the item he or she values more. Here, we assess whether the SUMJ can accurately predict participants' RTs and response choices to dilemmas that pit the lives of two individuals, differing only on an acquired characteristic, against one another. In two experiments, we show that personal values account for about 90% of the variance in RTs and response choices to these moral dilemmas. These data provide strong validation of the SUMJ.

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6:00-7:30 PM (1148)

Impact of Cognitive Load on the N400 Semantic Context Effect in Degraded, Spoken Sentences. CYNTHIA R. HUNTER and DAVID B. PISONI, *Indiana University* — In current models of listening effort, understanding speech under adverse listening conditions demands central cognitive resources, which may become unavailable to other, concurrent cognitive processes. The focus of this study is the impact of



cognitive resource availability on the N400 semantic context effect, an event-related potential (ERP) index of the processing of a word's meaning in relation to a context. Cognitive resource availability was manipulated by varying the cognitive load created by a concurrent memory task. Participants were asked to hold short (low cognitive load) or long (high cognitive load) sequences of visually presented digits in memory while listening to spectrally degraded spoken sentences wherein the final word was either predictable or not predictable. Preliminary results support the hypothesis that a reduction in available central cognitive resources under high cognitive load reduces the amplitude of the N400 semantic context effect in degraded, spoken sentences. Results will be discussed in terms of the impact of cognitive resource availability on semantic processing and implications for recent models of effortful listening to speech.

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6:00-7:30 PM (1149)

The Berlin Emotional Response Scale: Assessing Emotional and Affective Reactions to Decision-Relevant Information.

DAFINA PETROVA, *University of Granada*, EDWARD T. COKELY, *University of Oklahoma*, ROCIO GARCIA-RETAMERO, *University of Granada* — Although emotions are known to profoundly shape decision making and risk perception (see RiskLiteracy.org), currently there is no standardized instrument validated for assessment of individual differences in affective and emotional reactions to decision-relevant information (e.g., risk communications). Here, we review development of the Berlin Emotional Response Scale: A broad 6-item self-report of positive (hopeful, relieved, assured) and negative emotions (afraid, worried, anxious), providing simultaneous estimates of specific emotional reactions and overall positive/negative affective impressions, in about 1 minute. Here, we review results from three experiments with diverse adults (US, EU), assessing psychometric sensitivity and validity via subtle emotional manipulations of risk communications (cancer, HIV, Ebola). Causal cognitive process and structural modeling indicates that the Berlin Emotional Response Scale offers unique predictive validity for risk perceptions, behavioral intentions, decisions, and recommendations, independent of other influential characteristics (e.g., numeracy, deliberation, confidence, comprehension, personality, demographics).

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6:00-7:30 PM (1150)

Temporal Reproduction Within and Between Sensory Modalities: Testing the Predictions of the Pacemaker-Counter Model. DANIEL BRATZKE and ROLF ULRICH, *University of Tübingen* — We tested the predictions of the pacemaker-counter model in a temporal reproduction task with auditory and visual stimuli. Auditory stimuli are usually perceived as being longer than visual stimuli of the same duration. A common explanation for this modality difference in temporal perception is that a pacemaker runs faster for auditory than for visual stimuli. In our study, participants had to reproduce standard intervals by terminating a reproduction stimulus. The sensory modalities of the standard stimulus and

the reproduction stimulus were either auditory or visual and varied orthogonally. While mean reproductions largely matched with the predictions of the model, reproduction variability showed a much larger congruency effect than predicted. Thus, the pacemaker counter model cannot fully account for the crossmodal effects in temporal reproduction.

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6:00-7:30 PM (1151)

Norm Conflicts and Conditionals. DAVID KELLEN, *Syracuse University*, NIELS SKOVGAARD-OLSEN, *University of Konstanz* — Suppose that two competing norms, N1 and N2, can be identified such that a given person's response can be interpreted as correct according to N1 but incorrect according to N2. Which of these two norms, if any, should one use to interpret such a response? In this work we seek to address this problem by studying individual variation in the interpretation of conditionals by establishing individual profiles of the participants based on their behavioral responses and reflective attitudes. To investigate the participants' reflective attitudes we introduce a new experimental paradigm called the Scorekeeping Task, and a Bayesian mixture model tailored to analyze the data. We thereby aim to identify the participants who follow the Suppositional Theory (ST) of conditionals and Inferentialism and investigate their performance on the uncertain and-to-if inference task. Results show that clear differences between individuals classified as following one of the two theories, with most people being classified as being in line with the inferentialist account.

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6:00-7:30 PM (1152)

Value From Nothing. ANDREW JOSEPHSON, *Huddersfield Business School*, VICTORIA BARANOVA, *Lomonosov Moscow State University*, PETKO KUSEV, *Huddersfield Business School* — Digital currency has the potential to have value, despite being intangible. The experiment conducted considers possible influencers that can affect the value of a digital currency. Primarily exploring the possibility of endowment effect (ownership or non-ownership of digital currency), sampling frequency (number of sample of goods explored), mental accounting (mental budgeting for digital currency), and content of utility (perceived value of goods explored based upon previous experience) as contributing factors to the influence of the value of a digital currency. The findings suggest that the content of utility is a reliable influencer on willingness to accept, willingness to buy, and value of a digital currency. Sampling frequency, endowment effect, and mental accounting were unreliable as influencers on the willingness to accept, willingness to buy, and value of a digital currency. The experimental findings suggest that a digital currency could be regarded as an actual currency, if accepted by the populace.

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6:00-7:30 PM (1153)

Examining the Influence of Enhanced Wording on Decisions to Impact Based Tornado Warnings. MARK A. CASTEEL, *Penn State York* — The National Weather Service has



implemented nation-wide enhanced tornado warnings known as Impact Based Warnings (IBWs). The goal of these IBWs is to improve the threat warning process and motivate effective responses to reduce risk. IBWs include enhanced language about a tornado's potential impact and severity. Research recently published by the author found that IBWs promoted more shelter in place decisions compared to non-IBWs. The research presented here examined shelter in place decisions to tornadoes of potentially greater magnitude, which included the use of "CONSIDERABLE" or "CATASTROPHIC" threat tags indicating heightened risk. A control condition was also included where some warnings matched the IBWs in length, but did not include "scary" language, to rule out warning length as a contributing factor to the decisions. Participants adopted the role of a plant manager and read IBWs for both lower- and higher-intensity storms. At three different message points, participants made decisions about shutting the plant and sheltering in place. Results will be compared to those obtained previously.

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6:00-7:30 PM (1154)

Conscious and Unconscious Deliberation in Deciding Among Information-Rich Options. BRIAN M. FRIEL, WINNIE W. THUKU and TIMOTHY J. HOWELL, *Delaware State University* — Deliberation Without Attention (DWA; Dijksterhuis, 2004) was investigated in a decision task involving four car options, each with 12 features. Options were structured such that one had the most overall positives (MOP), one had positives on important features (PI), a third had the fewest positives but was the only option with a positive on the most important feature (PMI), and a fourth option that was not clearly superior to the others (Filler). Participants were assigned to one of the usual DWA study groups (Immediate Decision, ID; Conscious Thought, CT; Unconscious Thought, UT) or to a Note-Taking (NT) group who recorded the cars' features and used these notes during deliberation. Participants then chose which car they preferred and rated each option's attractiveness. All groups preferred the PI car most and rated it most attractive. The degree of this preference differed by group, as the CT group was least likely to choose it. Conversely, they were most likely to select the least popular and lowest-rated PMI car. CT participant choices were also least consistent with which car they rated highest. Results support the notion that conscious deliberation uses suboptimal strategies in high-information decisions.

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6:00-7:30 PM (1155)

Cognitive Perception of Task Context: The Impact of Roles on the Psychological Definition of Fairness. ELITZA AMBRUS, *Huddersfield Business School*, RENATA HEILMAN, *Babeş-Bolyai University*, PETKO KUSEV, *Huddersfield Business School* — How does task context enter the decision making process? Individuals' choices in income distribution tasks are traditionally modelled as stemming from stable preferences and universally acknowledged concept of fairness (Fehr & Schmidt; 1999). However, task context influences individuals' preferences (Hoffman, McCabe, & Smith, 1996; List, 2007)

and different consistent behavioural patterns are distinguished when tasks evoke market or social norms. We propose that roles (for instance job descriptions) are cognitive tool for task context perception: roles allude to specific task characteristics providing a perception angle to the task environment as a whole. Based on the outlined task features, individuals define fairness (normative behaviour) in the given setting and make decisions. Our results showed that in otherwise identical bilateral income distribution tasks, individuals behaved in line with the way their role as a proposer was described (serving as implicit job characteristic) and shared different proportion of their endowment with a recipient.

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6:00-7:30 PM (1156)

Absolute Identification on a Continuum. PETER D. KVAM, *Indiana University - Bloomington*, ANDREW HEATHCOTE, *University of Tasmania* — Work on absolute identification has typically focused on the case where participants assign a stimulus to a set of discrete categories. In this presentation, we extend this paradigm to the case where participants must assign a stimulus to a location on a continuum and examine the prototypical absolute identification phenomena that occur in this case. We compare it against 3-, 6-, and 9-alternative discrete absolute identification conditions, and find empirical support for bow effects in response times, assimilation and contrast effects, and (in discrete cases) category boundary effects. To account for these results, we propose a modeling framework utilizing 2 racing accumulators – the multiple threshold race – that predicts distributions of responses and response time in both discrete and continuous selection conditions.

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6:00-7:30 PM (1157)

The Impact of Inconsistent Forecasts on User Trust. JESSICA N. BURGENO and SUSAN L. JOSLYN, *University of Washington* (Sponsored by Susan Joslyn) — For high impact weather events, forecasts often start days in advance. Meteorologists believe that consistency among subsequent forecasts is important to user trust and can therefore be reluctant to make changes when newer, potentially more accurate information becomes available. However, to date, there is little empirical evidence for an effect of inconsistency on user trust. The psychological study reported here compared the effects of forecast inconsistency and inaccuracy on user trust under two different forecast formats. Participants made several school closure decisions based on either single value snow accumulation forecasts or single value forecasts accompanied by uncertainty estimates, projected one and two days prior to the target event. Consistency between forecasts one and two days in advance was varied systematically, as was forecast accuracy, the difference between the day two forecast and the outcome. We found that inconsistency reduces user trust, but not to the extent that inaccuracy does. Additionally, including uncertainty estimates attenuates the effect of inconsistency but not that of inaccuracy.

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6:00-7:30 PM (1158)

The Effects of Personality-Driven Decision Strategies and Decisiveness in Stopping Rule Evidence Collection. MARIO FIFIC, THOMAS GORALSKI and REBECCA ROTH, *Grand Valley State University* (Sponsored by Mario Fific) — One of the most important topics in the decision making is how individual subjects determine to stop evidence collection and make effective decisions. This is defined as the stopping rule problem. Typically, the research in this area is focused on determining the decision strategies people use. In our previous study we explored whether personality traits could be used to explain the individual differences in decision making. The initial results indicated an intricate role of decisiveness, conscientiousness and extraversion in decision making. The current study is a conceptual replication aiming at reducing the length of the original task: we used a small set of trials and shorter feedback time in a decision making task. Our replication indicated a dominant role of extraversion in decision making which was consistent with our previous findings, but also challenged other findings.

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6:00-7:30 PM (1159)

Do People Simultaneously Over-Estimate and Underweight Rare Events in Decisions From Experience? ABA SZOLLOSI, GARSTON LIANG, EMMANOUIL KONSTANTINIDIS, CHRIS DONKIN and BEN R. NEWELL, *University of New South Wales* (Sponsored by Ben R. Newell) — Most decision-making models assume that people base their choices on their beliefs. However, when making risky decisions from experience, people seem to both over represent rare events in their judgements and underweight rare events in their choices. In three experiments, we aimed to increase the accuracy of people's beliefs about the probability of such rare events, and investigated how these representations inform their choices. Our findings reveal that, even though overestimation decreased when people paid more attention to the outcome-probabilities, underweighting was still apparent. These results shed more light on how people's decisions are informed by their beliefs about probabilities.

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6:00-7:30 PM (1160)

Comparing Verbal and Numeric Forecasts: New Findings and Implications. KENNETH D. NGUYEN and RICHARD S. JOHN, *University of Southern California* (Sponsored by Richard John) — This research compares verbal and numeric forecasts of subjective probability estimates of sporting events. Forecasting accuracies were compared using indexes from the Yates' covariance framework as well as the area under the ROC curve. In addition, a methodology based on Savage's conceptualization of subjective probabilities was used to transform probability words into numbers for the evaluation purpose. A sample of 118 NFL football experts was recruited to participate in the study. The experts were randomized into one of the two experimental conditions that differ in the modes of the response scale. Experts in the verbal condition participated in a follow-up study to quantify the values associated with

probability words. Results showed that verbal forecasts were not statistically significant from numerical predictions in terms of the overall accuracy—the Brier score. However, numerical judgments were more discriminatory than verbal judgments. Experts showed a tendency of underconfidence although verbal experts expressed a lesser degree of bias compared to numeric experts.

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6:00-7:30 PM (1161)

Risk-Reward Structures Shape Attentional Processes in Decisions Under Risk. CHRISTINA LEUKER, TIMOTHY J. PLESKAC, THORSTEN PACHUR and RALPH HERBRING, *Max Planck Institute for Human Development* (Sponsored by Timothy J. Pleskac) — A frequent and recurrent property across many of life's gambles is that the larger the reward, the less likely to occur. An adaptive approach to cognition implies that the mind should use this relationship to simplify choices instead of processing payoffs and probabilities as independent attributes. To test this hypothesis, we exposed participants to gambles in which payoffs and probabilities were either negatively or positively correlated, or uncorrelated (between-subjects). Then, participants chose repeatedly between nondominated gambles drawn from these different risk-reward environments under time pressure. Eye-tracking data showed that in correlated environments many participants shifted their attention to the payoff information, while maintaining a similar level of expected value maximizing choices as individuals with more competition processing strategies. The results show that people are sensitive to risk-reward structures and exploit them to process payoffs and probabilities dependently in situations in which processing capacities need to be invested effectively.

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6:00-7:30 PM (1162)

Assessing the Effects of Forewarned Interruptions on Situation Awareness and Perceived Workload in Dynamic Settings. KATHERINE LABONTÉ, JOANIE LAMIRANDE, MICHAËL LÉVESQUE-DION and FRANÇOIS VACHON, *Université Laval* (Sponsored by François Vachon) — Empirical studies about the negative consequences of task interruptions and ways to reduce them have centered mostly on static primary tasks. However, in many work domains, operators must deal with autonomously-evolving situations. In such dynamic contexts, performance must remain optimal in spite of frequent interruptions. The goal of the present study is to investigate the impact of suspending a dynamic task on situation awareness (SA) and perceived workload and to determine whether a pre-interruption warning can help counter any potential loss of SA entailed by primary task interruptions. We employed a microworld simulating above-water warfare and compared objective SA and subjective workload measures across three different types of scenario: uninterrupted, interrupted without warning, and interrupted with warning. Results revealed that interruptions hinder SA and increase perceived workload in dynamic situations. However, warning participants of an imminent interruption can help prevent this effect to some



extent. These findings highlight the need to minimize the consequences of interruptions in dynamic situations where public safety is at stake, such as in extreme work environments. Email: Katherine Labonté, katherine.labonte.1@ulaval.ca

6:00-7:30 PM (1163)

Measuring Risk Propensity in Young Children. EMILY SUMNER, RYAN STOKES, PERCY MISTRY, SUSANNE JAEGGI and BARBARA SARNECKA, *University of California, Irvine* (Sponsored by Susanne Jaeggi) — Children are notoriously fearless; running across slippery grass, eating bugs, and climbing up to the top of trees while their anxious parent yells at them to get down. Research on the development of risk propensity suggests that as we get older, risk aversion increases. However, there is little research on risk aversion within the preschool age range. The current study introduces the Child Risk Utility Measure (CRUM), a developmentally sensitive, dynamic task that measures risk propensity. We develop a novel cognitive modeling perspective to interpret our behavioral data and segregate the effects of risk propensity, probability learning, contaminant processes, and age effects within a unified framework. Unlike previous studies of risk propensity, we found reasonable evidence suggesting that preschool-aged children do not become more cautious as they get older. Any effect of age was attributed to confounds due to contaminant behavior. We suggest this as an alternative explanation for age effects in risk propensity during early childhood.

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6:00-7:30 PM (1164)

Economic Decision Making With Rapid Reaching: Two-Fold Reward System. NATHAN J. WISPINSKI, SAMANTHA HO and CRAIG S. CHAPMAN, *University of Alberta* (Sponsored by Craig Chapman) — Suppose a person is picking from a raspberry bush. What part of the action is more intrinsically rewarding: Successfully grabbing the raspberry (action success)? Or eating the raspberry (value)? We investigated the segregation of reward systems in motor economic tasks. Specifically, we wanted to analyze and compare the idea of a rapid reaching motor task resulting in two different reward functions. When a successful motor movement is made, the subject is acknowledged for their accuracy toward a target, but they are also given a monetary reward, a two-fold reward system. We want to observe what is more important to the subject. Is the reward of hitting the target regions more of a priority than the reward itself? If so, how does this change strategies from person to person? And how does risk-variance affect the preference for either reward system? To summarize, our objective is to quantify these measures by finding clear-cut thresholds of when people prefer to opt for target success over reward success or vice versa. This may give us insight into how motor movement aligns with economic variability where two types of reward systems may be juxtaposed.

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6:00-7:30 PM (1165)

Conscious Perception of Self-Related Information is Necessary for Incidental Self-Reference Effect. AMABEL JEON, DANIELLE ROTHSCHILD and KYUNGMI KIM, *Wesleyan University* — Self-related information has been found to affect subsequent behavioral judgments in non-self-referential tasks even when presented subliminally, below one's conscious awareness. The current study investigated whether subliminal processing of self-related information would result in an incidental self-reference effect (SRE; memory advantage for items presented with self- vs. other-related information in the absence of any explicit task demand to evaluate an item's self-relevance). During incidental encoding, participants were presented with words in two different colors either above or below a name (the participant's own or another person's name). The names were presented either supraliminally (for 2 sec) or subliminally (for 33 msec, with backward and forward visual masks). Participants' task was to make a simple location judgment for each word. Memory for each word and its associated source features (location, color) was subsequently tested. There was a SRE for both item and source memory when the names were presented supraliminally but not when they were presented subliminally. These findings suggest that different mechanisms may underlie the self-advantage found in early visual processing vs. in memory.

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REASONING AND PROBLEM SOLVING I

6:00-7:30 PM (1166)

Finding the Solution Precedes Awareness in Insight Problem Solving. ILYA YU. VLADIMIROV and MAXIM O. MARKEVITCH, *P.G. Demidov Yaroslavl State University* — One of the crucial problems in the studies of insight problem solving is the dynamics of its process. Traditional views of insight as an instantaneous process are opposed by the idea of insight as an emerging process (Dunker, 1945, Metcalfe & Wiebe, 1988). However, there is evidence that finding the solution can precede awareness. Ellis and colleagues (2011) received such data on anagrams material. We investigated this effect in verbal problem solving based on the principle of linguistic ambiguity. We hypothesized that linguistic ambiguity resolution is preceded by the awareness of the solution. We used modified method of cognitive monitoring: participants were required to make a lexical decision task at the same time as the problem solving. As stimuli we used words that are semantically related and nonrelated to the solution. We found that by the middle of the problem solving process the words associated with the answer are recognized faster in insight problem solving. This was not observed for nonrelated words and nonwords. Therefore, we can conclude that solving the insight problem and becoming aware of the solution are not the same instant. Supported by RSF 16-18-10030.

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**6:00-7:30 PM (1167)**

Social Comparison and Attentional Focusing in Problem Solving. AARON C. DRAKE, BENJAMIN D. ENGLAND and BRIAN C. CRONK, *Missouri Western State University* — Although attentional focusing is thought to benefit cognitive processes, this is not true for all processes, namely problem solving. Specifically, work has shown that attentional focusing benefits non-insight performance but harms insight problem-solving. In other work, researchers have induced attentional focusing using social comparison. Therefore, to combine this work, we examined if social comparison information alters performances on problem-solving through attentional focusing. We predicted that participants given comparison information will perform worse on insight problems and better on non-insight problems due to attentional focusing. To do this, we falsely told participants that they were performing slower than an average or a paired coactor that did not exist. We found performance decreased on *both* non-insight and insight problems when exposed to social comparison. Relatedly, participants spent less time solving problems in social comparison conditions. Variations on the believability of social comparison information and factors related to attentional focusing were also examined.
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6:00-7:30 PM (1168)

Individual Differences in Relational Processing. KEITH J. HOLYOAK and MAUREEN E. GRAY, *University of California, Los Angeles* — Relational processing has been linked to variations in cognitive abilities, such as working memory capacity and fluid intelligence. Sufficient capacity, however, does not ensure attention to relational structure, as relational processing may also be influenced by an individual's cognitive style. The current project aims to illuminate the prerequisites of relational processing by examining multiple individual-difference measures that may be related to relational processing. Cognitive capacity was measured using Raven's Progressive Matrices. Measures of cognitive style included the Cognitive Reflection Test, Need for Cognition scale, and a relational category-learning task. Tendency to engage in relational processing was assessed using tasks that require relational processing, including spontaneous analogical transfer, algebra translation, and a picture-mapping task. The findings help to understand the cognitive variables underlying relational processing.
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6:00-7:30 PM (1169)

The Power of Expectations in the Nine-Dot Problem. SERGEI KOROVKIN and ANASTASIA GERASIMOVSKAYA, *Yaroslavl State University* — There are multiple causes of difficulty in the nine-dot problem (Kershaw & Ohlsson, 2004). Specific models of the solution associated with step-by-step actions (Kershaw & Ohlsson, 2004; MacGregor et al., 2001) as a solution blind search. The main predictions of the existing models of the nine-dot problem solving are the maximization heuristic use and the difficulty of the non dot turns in the problem solving. We

assume that a problem solver can use the expectations checking strategy which aims to use a configuration of the goal state search. The configuration of the goal state allows compiling the elements together. To test this assumption, we modified the nine-dot problem by changing the configuration of the dots, leaving the remaining conditions of the problem unchanged. The modified nine-dot problem has several possible solutions predicted by different models with different probabilities. The results show that the expectations checking strategy is much more effective and frequent in the modified nine-dot problem. Supported by RSF 16-18-10030.

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6:00-7:30 PM (1170)

Expert Children Problem Solvers are Similar to Adult Problem Solvers: Evidence From Eye-Tracking. BRENDA A. HANNON and MIGUIL PONTIFF, *Texas A&M University - Kingsville* — This study uses eye-tracking technology to assess the online strategies that young children use as they complete matrix-reasoning problems. More specifically, we recorded the eye movements of children aged 6-8 as they completed a series of matrix-reasoning problems taken from Lohman's Cognitive Abilities Test (i.e., CogAT, 2012). The results showed that children who performed better on the matrix-reasoning problems also spent more time on the problems than they did on the answers, whereas children who performed poorly on the matrix-reasoning problems spent less time. These findings are consistent with the adult literature which shows that expert adult problem solvers spend more time analyzing the problems then looking at the answers. Of course the extraordinary finding here is that 6-8 year olds are using a strategy typically used by expert adult problem solvers.

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6:00-7:30 PM (1171)

Computer Mousetracking Reveals the Facilitation and Interference Components of the Size Congruity Effect. TRINA GEYE and THOMAS J. FAULKENBERRY, *Tarleton State University* — When presented with two Arabic numerals differing in both physical size and numerical value, participants will select the physically larger of the two more quickly and efficiently when it is also the numerically larger. This tendency is known as the size congruity effect. The size congruity effect is the result of both the benefit of congruity, or facilitation, and the hindrance of incongruity, or interference. The present study used computer mousetracking to examine the facilitation and interference components of the size congruity effect by introducing neutral stimulus trials to a typical physical size comparison task between numbers. Responses on congruent trials were both faster and more efficient, with less deflection towards the incorrect response than on incongruent trials. Interference was identified by comparing the incongruent trials to the neutral trials on measures of response time and trajectory complexity. However, facilitation was present only in the measures of trajectory complexity. The results lend



support to the late interaction effect and suggest that computer mousetracking may be a more sensitive measure of facilitation and interference in the size congruity effect.

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6:00-7:30 PM (1172)

Embodiment of Emotional Reasoning: Studying the Impact of Facial Expression. MARIE-ÈVE GAGNON, JEAN-NOËL AMATO and ISABELLE BLANCHETTE, *Université du Québec à Trois-Rivières* (Sponsored by Isabelle Blanchette) — The embodiment theory suggests facial expression, among other body movements, can influence some cognitive processes. Some studies suggest facial expression also impacts the experience of emotions and the processing of emotional information. The goal of this study was to explore the facial expression's role in a reasoning task which includes emotional and neutral stimuli. Participants were asked to frown, smile or contract the thumb abductor muscle, while reasoning about logical statements. Emotional value was manipulated using IAPS pictures (Expt 1) or via the semantic contents of the reasoning problems (Expt 2). The proportion of logically correct responses was lower when an emotional stimulus (picture or semantic content) was presented, in comparison with a neutral stimulus, but only when participants were frowning. This suggests facial expressions modulate the impact of emotion on reasoning, which supports the embodiment theory by revealing an influence of the body on a high level cognitive process.

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6:00-7:30 PM (1173)

The Role of Working Memory Subsystems and Executive Functions in the Process Formation of Mental Set. NATALIA YU. LAZAREVA and ILYA YU. VLADIMIROV, *Demidov Yaroslavl State University* (Sponsored by Ilya Vladimirov) — The problem of the mental set mechanisms is analyzed in current paper. We assume that the main mechanisms of the mental set formation are the processes occurring in the working memory subsystems and executive functions. For the participants' mental set formation, we used a modified set of water jar problems and a set of a special purpose verbal task. For the mental set destruction, we used the method of additional loading of working memory subsystems and executive functions. The additional loading was carried out using a dual-secondary task. The results showed that the process of executive functions is fundamental in the formation and overcome of the mental set. Additional load on the executive functions has a destructive influence on the formation of an automated scheme of solving the problems. If the scheme of problem solving is automate quickly, then a lot of resource of executive functions required for the destruction of this scheme. Thus, executive functions are important in both the structure of the formation and overcome of the mental set. This work is supported by Russian Foundation for Basic Research (grant 17-06-00672a).

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6:00-7:30 PM (1174)

How to Make Scientific Arguments More Compelling: The Role of Evidential Diversity. ARTHUR KARY, BEN R. NEWELL and BRETT K. HAYES, *University of New South Wales* (Sponsored by Brett Hayes) — Two studies assessed the impact of evidential diversity on lay evaluations of scientific claims about climate change and public health. Participants read scientific arguments containing two facts on each of three dimensions (geographical, socio-cultural, and temporal) and rated the extent to which these supported a general claim (e.g., "global sea levels are rising"). Facts were drawn from diverse locations, societies and time periods or from similar points on the dimensions. In each study, diverse evidence on one dimension increased perceived support for scientific claims, but the critical dimension differed between domains (geographical for climate change; socio-cultural for health). In the second study, we found that evidence from recent time periods was preferred to evidence from diverse time periods for both climate change and public health arguments.

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6:00-7:30 PM (1175)

It is Magic! How Impossible Solutions Prevent the Discovery of Obvious Ones. CYRIL THOMAS, *Goldsmiths University of London*, ANDRÉ DIDIERJEAN, *Université de Franche-Comté*, GUSTAV KUHN, *Goldsmiths University of London* — When confronted with an insight problem, some factors limit our capacity to discover the optimal solution. Previous research on problem solving has shown that familiar, and unfamiliar/non-intuitive ideas can prevent participants from finding better alternatives. We used magic tricks to demonstrate that this mind fixing effect is more robust than previously thought: a solution that participants known to be wrong prevents the discovery of an alternative, even if they know that another solution must exist. In two experiments we show that a simple exposure to an intuitive and self-generated false solution (e.g., the magician hides the card in the palm of his hand to secretly transfer it to his back pocket) can prevent participants from finding the real secret of the trick (e.g., he used a duplicate card), even if the magician proves that this false solution is impossible (e.g., he shows his hand is empty). In Experiment 1, this effect was observed when the false solution is ruled out *after* the effect of the trick. In Experiment 2, the effect was observed in another magic trick even when the false solution is ruled out *before* the effect. We discussed of the psychological processes underlying this robust fixing effect.

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6:00-7:30 PM (1176)

Aiding the Search: Examining Individual Differences in Multiply-Constrained Problem Solving. DEREK M. ELLIS and GENE A. BREWER, *Arizona State University* (Sponsored by Gene Brewer) — In the daily life of an individual, being able to understand and resolve complex problems is of vital importance. Certain problems are defined by the constraints inherent for the problem solver. Multiply constrained problems of this nature are traditionally examined with the compound remote associates task (CRAT). Performance on the CRAT is related



to an individual's working memory capacity (WMC) suggesting reliable individual differences in multiply constrained problem solving abilities. The goals of the current study are to replicate and further elucidate the relation between WMC and performance in the CRAT. We manipulated preexposure to CRAT solutions to attenuate performance differences between low and high WMC participants. Preexposure to CRAT solutions improves problem solving accuracy. However, WMC did not moderate the effect of preexposure on CRAT accuracy. Contrary to our prediction, we failed to improve the performance of low WMC individuals to be on par with high WMC individuals.

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6:00-7:30 PM (1177)

Investigating Predictors of the Feeling of Rightness (for) Accompanying Intuitive Answers. SELINA WANG and VALERIE A. THOMPSON, *University of Saskatchewan*, RAKEFET ACKERMAN, *Technion - Israel Institute of Technology* (Sponsored by Jamie Campbell) — Fluently produced answers were associated with high Feeling of Rightness (FOR) than less fluent answers (Thompson, Prowse Turner, & Pennycook, 2011). However, answer fluency mediated by hand dominance has not been examined. The current study investigated the effect manipulation of hand dominance on FOR. We hypothesized that high FORs are associated with answers written with the dominant hand, shorter rethinking time, and low likelihood of answer change. In the study, participants ($N = 60$) completed 20 reasoning problems. For each problem, one intuitive and one deliberate response were both given by the participants with each response followed by a FOR score from 0 to 100. Participants wrote down answers with their dominant or nondominant hand on half of the trials. The results showed that high FORs were associated with shorter rethinking time and unchanged answers. Answers written down by the dominant hand were given high FORs, but were more likely to be changed, possibly due to the relative difficulty of writing with the nondominant hand. These data suggest that answer fluency predicts FORs accompanying intuitive answers, but answer change is influenced by both FOR and effort invested in writing down the answers.

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6:00-7:30 PM (1178)

The Smart System 1: Evidence for Intuitive Correct Responding in the Bat and Ball Problem. BENICE BAGO, *Paris Descartes University*, WIM DE NEYS, *Centre National de la Recherche Scientifique* (Sponsored by Wim De Neys) — Influential work on reasoning and decision making has popularized the idea that sound reasoning requires correction of fast, intuitive thought processes by slower and more demanding deliberation. We present studies that force us to revise this corrective view of human thinking. We focused on the very problem that has been widely featured as the paradigmatic illustration of the corrective view, the notorious bat-and-ball problem. A two-response paradigm in which people were required to give an initial response under time-pressure and cognitive load allowed us to identify the intuitively generated response that preceded the final response given after

deliberation. Across our studies we observe that correct final responses are typically non-corrective in nature. The majority of reasoners who manage to answer the bat-and-ball problem correctly after deliberation already solved it correctly when they reasoned purely intuitively in the initial response phase. This implies that sound reasoners do not need to deliberate to correct their intuitions, their intuitions are already correct. We discuss implications for the dual process framework of thinking.

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6:00-7:30 PM (1179)

Why We Have Aha Moments: The Eureka Heuristic. RUBEN E. LAUKKONEN and JASON M. TANGEN, *The University of Queensland* (Sponsored by Michael Humphreys) — We propose that the eureka phenomenology serves an important adaptive role in problem solving and judgment and decision-making. It is well known that solutions accompanied by aha moments result in higher confidence, and that the aha moment is predictive of problem solving accuracy (Salvi et al., 2016; Danek & Wiley, 2017; Webb et al., 2016). To account for these results, we describe and test the hypothesis that the affective dimensions of the eureka experience act as phenomenological cues regarding the potential veracity of a candidate solution. We also test the prediction that the intensity of the aha moment results in greater confidence and a higher probability of accurate problem solving. We speculate that the intensity of the eureka phenomenology signals the degree of implicit support from memory and existing knowledge structures. We also propose the *insight fallacy* to describe situations where a person incorrectly concludes that a solution or idea must be true solely based on the fact that the solution was accompanied by eureka.

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6:00-7:30 PM (1180)

Exploring the Relationships Between Biases in Information Integration, Thinking Styles, and Conspiracy Theory Beliefs. TOBY PRIKE, MICHELLE M. ARNOLD and PAUL WILLIAMSON, *Flinders University* (Sponsored by Michelle Arnold) — Belief in conspiracy theories is widespread and can have a variety of negative consequences. We investigated whether bias against disconfirmatory evidence (BADE), bias against confirmatory evidence (BACE), liberal acceptance, and analytical thinking style were associated with conspiracist beliefs. Higher levels of conspiracist belief were associated with a stronger BACE, more liberal acceptance, and a less analytical thinking style. However, no relationship was found between conspiracist belief and BADE. These findings support the idea that believers in conspiracy theories are less willing to accept the conclusion suggested by evidence, are more receptive to unlikely options, and are more likely to rely on heuristics or intuitive answers. Additionally, greater belief in conspiracy theories was associated with more conservative political beliefs, support for President Trump, greater delusion proneness, and higher levels of anomalous belief (e.g., paranormal). The relationships between the various beliefs could not be explained by underlying biases or thinking styles.

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PERCEPTION AND ACTION

6:00-7:30 PM (1181)

How Perception Guides Action: Figure-Ground Segmentation Modulates Integration of Context Features Into S-R Episodes. CHRISTIAN FRINGS, *University of Trier*, KLAUS ROTHERMUND, *University of Jena* — Perception and action are closely related. Responses are assumed to be represented in terms of their perceptual effects allowing direct links between action and perception. In this regard, the integration of features of stimuli (S) and responses (R) into S-R bindings is a key mechanism for action control. Previous research focused on the integration of object features with response features while neglecting the context in which an object is perceived. In three experiments we analyzed whether contextual features can also become integrated into S-R episodes. The data showed that a fundamental principle of visual perception, figure-ground segmentation, modulates the binding of contextual features. Only features belonging to the figure region of a context but not features forming the background were integrated with responses into S-R episodes, retrieval of which later on had an impact upon behavior. Our findings suggest that perception guides the selection of context features for integration with responses into S-R episodes. Results of our study have wide-ranging implications for an understanding of context effects in learning and behavior.

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6:00-7:30 PM (1182)

How Do We Compare the Difficulty of Physical Tasks and Mental Tasks? JENNA R. MONSON and DAVID A. ROSENBAUM, *University of California - Riverside* — Extensive research has been done on the difficulty of physical tasks and on the difficulty of cognitive tasks. However, little research has been done on what common currency, if any, allows the two kinds of difficulty to be compared. We investigated the probability of choosing a physical task or a cognitive task, whichever the participant preferred, as a function of the number of elements and possible number of trials for each task. The probability of choosing a task increased as the total number of acts (elements \times trials) decreased relative to the number of acts for the other task. Results suggest that our university-student participants had access to a common currency for comparing the two task types.

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6:00-7:30 PM (1183)

Conceptual Relations Compete During Auditory and Visual Compound Word Recognition. DANIEL SCHMIDTKE and CHRISTINA L. GAGNÉ, *University of Alberta*, VICTOR KUPERMAN, *McMaster University*, THOMAS L. SPALDING and BENJAMIN V. TUCKER, *University of Alberta* — Previous research has indicated that compound word recognition involves constructing a relational meaning from the meanings of the compound's constituents (e.g., steamboat is a 'boat that uses steam'). A recent study (Schmidtke et al., 2016) showed that this process is competitive. Using entropy as a measure of competition between relational meanings, they found that

multiple relational meanings are computed online during visual lexical processing, and that increased competition among meanings leads to greater processing difficulty. In the present study, we investigated the relational competition effect during visual and auditory word recognition of over 400 English compound word stimuli. We found that higher entropy (greater competition among relational meanings) elicited longer response time latencies in two visual lexical decision and two auditory lexical decision studies. These findings suggest that relational meanings are constructed and evaluated during compound word recognition, regardless of whether the compounds are recognized via auditory or visual input.

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6:00-7:30 PM (1184)

For Response Effects, You Must Maintain the Spatial Frame. JAMES D. MILES and ANDRIANA TESORO, *California State University - Long Beach* — Responses are not only influenced by their spatial compatibility with respective targets, but also the compatibility of the response with anticipated outcomes (response effect compatibility). We investigated whether the influence of response effect compatibility is specific to the spatial frame of reference (FOR) adopted during response selection. Participants directed a car through a top-down intersection either toward or away from a target. Response selection was based on an Ego Reference Frame (ERF – car's perspective) or a World Reference Frame (WRF – top-down perspective). The response effect (final location of the car) was consistently spatially compatible or incompatible with the response and always either in the ERF (intersection moved around car) or WRF (car moved) FOR. For both ERF and WRF, response effect compatibility only influenced responses when it was in the same FOR as response selection. Results indicate that only one FOR is used at a time during a response episode.

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6:00-7:30 PM (1185)

A Comparison of Children's and Adults' Judgments of Action Capabilities in Virtual Environments. DEVIN M. GILL, GRANT POINTON, SARAH H. CREEM-REGEHR and JEANINE K. STEFANUCCI, *University of Utah* — Research has demonstrated that adults judge affordances in immersive virtual environments (VEs) similarly as in the real world and that VEs can provide a means to test questions not as easily implemented in the real world. For example, in VEs, adults' estimation of step-ability across gaps is related to their fear of higher heights (Guess et al., 2016). Although children's affordances have been examined in the real world, less is known about whether they perceive affordances in VEs as adults do. The present study compared children, teens, and adults on their perceived maximum step across gaps at the ground plane or 15 m above the ground. All groups underestimated their maximum step at the high height compared to on the ground. Children, compared to teens and adults, underestimated their maximum step length when scaled to their actual step. The mechanisms and implications of developmental differences in VEs will be discussed.

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**6:00-7:30 PM (1186)**

Sensorimotor Cross Talk Within and Between Event Files When Using Tools. CHRISTINE SUTTER and OLIVER SIMON SACK, *German Police University* — In modern technical environments, spatial separation and distortion between sensory and motor action effects specify tool use. Theories of common coding propose that perception and action are represented within the same cognitive domain. Consequently, they are likely to interact (cross talk), and generate short-term aftereffects. Recent studies demonstrated this, e.g., by using a motor replication task (Ladwig et al., 2012, 2013). The present study further investigates perception-action interaction within and between event files with a *n-1* motor replication task. The task consists of two phases: In phase 1, participants move a cursor with a pen on a covered tablet while a gain varies the relation between hand and cursor amplitude. In phase 2 (no visual feedback), participants replicate the hand amplitude of phase 1 of the previous trial *n-1*. We found an assimilation (contrast) effect when analyzing cross talk within (between) event files. A second experiment (no visual feedback at all) ruled out that the pattern resulted only from characteristics of the motor system. We extend the view of a selective code modification (Schubö et al., 2001) to explain how temporally overlapping event files influence perception-action interaction. Email: Christine Sutter, christine.sutter@dhpol.de

6:00-7:30 PM (1187)

Optic Ataxia as a Model of Temporal Constraints in Visually Guided Reaching. CELIA PAULA LITOVSKY and MICHAEL MCCLOSKEY, *Johns Hopkins University* (Sponsored by Michael McCloskey) — Prior studies of visually guided reaching demonstrate that many optic ataxic (OA) patients exhibit improvements in delayed reaching to visual targets relative to immediate reaching. Researchers have proposed that this dissociation arises because these patients have an impaired vision-for-action system but relatively spared vision-for-perception system. The on-line vision-for-action system operates on a moment-to-moment basis, leading to poor immediate reaching in these patients, while the vision-for-perception system can retain information longer-term, allowing for improved delayed reaching. Our research with OA patient MDK raises questions about this dual-system theory. MDK exhibits typical OA mis-reaching when reaching to on-line peripheral visual targets, implying a vision-for-action deficit. Further, his reaching is equally poor following a delay. However, MDK's poor delayed reaching cannot be explained by an additional perception deficit, since he does not show comparable impairment on other vision-for-perception spatial localization tasks. We consider potential explanations for visually guided reaching under varying temporal constraints. Email: Celia Litovsky, litovskyy@jhu.edu

6:00-7:30 PM (1188)

Task Relevance (Mostly) Controls 'Automatic' Imitation. ILYA MARK-TAVGER and BARUCH EITAM, *University of Haifa, Israel* (Sponsored by Baruch Eitam) — Automatic imitation (unintentional simulation of observed behavior through the motor system) enhances our ability to understand

others actions and emotions. An imitated response may affect performance by facilitating compatible and hindering incompatible responses (in terms of RT and accuracy). A prominent position states that automatic imitation is the default response whenever actions are observed. In contrast, we test a conditional automaticity hypothesis, arguing that imitation is automatic only if the observed actions are task relevant. We show that automatic imitation largely disappears when the observed action is irrelevant to the response-set of the individual. We then show that muted imitation can be reinstated if a second task renders the observed actions relevant. Finally, we discuss boundary conditions for this relevance-based regulation of automatic imitation and outline a model.

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6:00-7:30 PM (1189)

The Effect of Emotional Vocal Stimuli on Perceived Duration. VINCENT LAFLAMME, *Laval University*, GIOVANNA MIONI and MASSIMO GRASSI, *University of Padova*, SIMON GRONDIN, *Laval University* (Sponsored by Simon Grondin) — The purpose of the present study was to determine how emotional vocal stimuli distorts the perceived duration of empty temporal intervals. Three variables of interest were manipulated orthogonally: the emotional valence of the spoken words (negative, positive or neutral), the arousal elicited by those words (high, neutral or low) and the gender of the voice speaking the emotional stimuli. A bisection task used to measure perceived duration. Results show that, when the vocal stimuli were spoken by a female voice, intervals marked by words with a negative valence tended to have their duration underestimated compared to intervals marked by words with positive valence and which elicit low arousal. There was, however, no effect of emotional content on perceived duration when the voice producing the vocal stimuli was male. Thus, the present study shows that vocal stimuli can influence perceived duration exclusively through the emotional content of the words.

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6:00-7:30 PM (1190)

About the Replication Crisis: Shall We Teach the Most Up-to-Date Knowledge? GUILLAUME CHAUVEL, *Université Bourgogne Franche-Comté*, FRANCOIS MAQUESTIAUX, *Université Bourgogne Franche-Comté; IUF*, MARIE MAZEROLLE and ANDRÉ DIDIERJEAN, *Université Bourgogne Franche-Comté* (Sponsored by Francois Maquestiaux) — We try to expose our students to the most up-to-date knowledge. For instance, since Witt, Linkenauger, and Proffitt's (2012, *Psychological Science*) paper, we happily taught our students that a famous visual illusion—the Ebbinghaus illusion—can also influence action. Indeed, Witt et al. (2012) found that students performed better on a golf-putting task when the hole was perceived larger (when surrounded by small circles) rather than smaller (when surrounded by larger circles). Replication of recent findings has also become part of our students' training in experimental methods (Franck and Saxe, 2012, *Perspectives on Psychological Science*). Here we will report five experiments aiming at replicating Witt et al.'s



finding. In the first three experiments, we attempted to replicate the procedure used by Witt et al., even though shorter distances to the hole had to be used. In the last two experiments, we even manipulated participants' beliefs about the consequences of the visual illusion on action. The results failed to replicate any trend toward an effect of perception onto action. In the future, we will certainly be more reluctant to teach the most up-to-date knowledge that stems from papers based on a single experiment. Email: Guillaume Chauvel, gechauvel@gmail.com

6:00-7:30 PM (1191)

Getting a Handle on Object Based Alignment Effects. SANDER A. ROEST (Graduate Travel Award Recipient), RENÉ ZEELBERG and DIANE PECHER, *Erasmus University Rotterdam* (Sponsored by Diane Pecher) — Responses to objects with a graspable handle are faster when the response hand and handle location are aligned (e.g., a key press with the right hand is required and the object handle is located on the right) than when they are misaligned. This alignment effect can be explained by overlap in stimulus and response dimensions or activation of actions afforded by the depicted object. Participants performed a reach-and-grasp action in either a joint task or a solo one handed task. They had to either respond to an object centered beer mug or a body centered frying pan. In both tasks, participants did not show an alignment effect in response to the beer mug. However, participants showed an alignment effect in response to the frying pan in both tasks. Earlier studies showed an alignment effect in response to the beer mug stimulus when the task contained between hand competition. Our results support the suggestion that, under certain task demands, the alignment effect can be better explained by activation of actions afforded by the depicted object, while under other task demands the alignment effect can be better explained by overlap in stimulus and response codes. Email: Sander Roest, sander.roest@gmail.com

6:00-7:30 PM (1192)

Intentional Binding of Two Effects. MIRIAM RUESS and ROLAND THOMASCHKE, *University of Freiburg*, CAROLA HAERING, *University of Würzburg*, DORIT WENKE, *PFH Private University of Goettingen*, ANDREA KIESEL, *University of Freiburg* (Sponsored by Andrea Kiesel) — When an action produces an effect, the action is perceived later in time compared to an action without following effect. Likewise, the effect is perceived earlier in time compared to a stimulus without preceding action. Despite a substantial number of studies on this phenomenon - referred to as intentional binding effect (IB) - the underlying mechanisms are still not fully understood. Typically, IB is investigated in settings, where the action produces only one single effect, whereas in everyday action contexts our actions rather cause a sequence of effects before leading to the desired outcome. Therefore, we investigated in four experiments IB of two consecutive effects and observed substantially more IB for a first effect compared to a second effect. Interestingly, the second effect yielded stronger IB when it was less delayed. These results suggest that even effects occurring later in an unfolding action effect sequence can be bound to the causing action; but they might be bound less to actions than effects following actions

directly. This, however, seems rather to be caused by the longer delay of a later occurring effect, instead of the fact, that it is the second of two effects.

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MULTI-SENSORY INTEGRATION

6:00-7:30 PM (1193)

Feeling the Bumps in the Road: Aging, Multisensory Integration, and Driving. MARYAM PANDI, ANISHA KHOSLA, BEN TOWNSEND, MARTIN VON MOHRENSCHILDT and JUDITH M. SHEDDEN, *McMaster University* — For older drivers, continued safe driving is important in maintaining independence. One of the necessities for safe driving is to have an accurate perception of self-motion based on information from all sensory systems (Steen, 1998). Research shows multisensory integration may change with age. Our goal was to determine if these changes are influential in driving (Mozolic et al., 2012). Therefore, we measured the contribution of different combinations of sensory cues on driving performance among older and younger adults. Participants were exposed to a series of combinations of vestibular, visual, and auditory cues in a driving simulator. In each condition, participants had to drive in the middle of a road with few speed bumps while maintaining a constant speed. Driving performance was evaluated based on mean speed, speed variability, lateral position, and lateral position variability. Results indicated that performance gain as a result of multisensory integration is higher among older adults. Email: Judith M Shedden, judith.shedden@gmail.com

6:00-7:30 PM (1194)

Data on the Mind: Bridging the Gaps Between Psychology and Big Data. ALEXANDRA PAXTON and THOMAS L. GRIFFITHS, *University of California, Berkeley* — Big data presents cognitive science researchers with unprecedented challenges and opportunities to understand human cognition, holding the potential to radically change theory-building in psychology and cognitive science by supplementing traditional experimental paradigms to create a "virtuous cycle" of theory-building (Paxton & Griffiths, in press). However, meeting these new challenges and opportunities requires new tools, methods, and mindsets. To that end, we introduce Data on the Mind (<http://www.dataonthemind.org>), a community-focused initiative aimed at helping bridge the gaps between big data and cognitive science: the *imagination gap* (the difficulty of seeing a theoretically driven research question in big data), the *skills gap* (questions about the mechanics of preparing, analyzing, interpreting, and sharing such data), and the *culture gap* (the challenge of finding role models in specific research areas). By couching our discussions in specific projects, we demonstrate the potential that Data on the Mind has to connect researchers to datasets and tools that can help psychology effectively tap into the behavioral and cognitive dynamics hidden in big data. Email: Alexandra Paxton, paxton.alexandra@berkeley.edu



6:00-7:30 PM (1195)

Mammography to Tomosynthesis: Examining the Differences Between Two-Dimensional and Segmented-Three-Dimensional Visual Search. STEPHEN H. ADAMO, JUSTIN M. ERICSON, JOSEPH C. NAH, RACHEL BREM and STEPHEN R. MITROFF, *The George Washington University* — Breast cancer detection is undergoing a technological shift—moving from mammography, a process that takes a two-dimensional (2D) image of breast tissue, to tomosynthesis, a technique that creates a segmented three-dimensional (3D) image. Tomosynthesis leads to fewer false alarms and more hits, but takes much longer. This added time is a problem as it is not clear how clinical practices can manage more time per patient (while maintaining the same number of patients). This can lead to detrimental effects for the radiologists (e.g., fatigue) and patients (e.g., more errors due to the radiologists' fatigue). The current study looked to establish a new paradigm that could reliably examine the differences between 2D and segmented-3D search among both radiologists and undergraduates. The results from both participant groups matched the performance patterns found in previous radiology studies, suggesting that this paradigm could provide a flexible and cost effective tool to better understand tomosynthesis and segmented-3D search more broadly. Subsequent insights can potential improve clinical practice and search theories.

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6:00-7:30 PM (1196)

Directed Forgetting as a Tool for Detecting Biased Processing of Food Words: Approach-Avoidance Conflict Towards High Calorie Foods Among Overweight Adults. SARA L. APPLETON-KNAPP, DAWN M. EICHEN, MICHAEL MANZANO and DAVID R. STRONG, *University of California, San Diego*, KERRI N. BOUTELLE, *University of California, Los Angeles* — Individuals with eating disorders, obesity and alcohol dependence show biased processing of emotionally-relevant stimuli (e.g. body shape, food or alcohol words). Overweight adults entering weight loss treatment saw 48 words in a directed forgetting paradigm using the item method. An instruction to remember or forget appeared immediately after each word. Words were counterbalanced across three categories: high calorie foods, low calorie foods and non-foods. Of the "remember" words, participants recalled fewer high calorie foods than non-foods. Conversely, participants recognized more "forget" high calorie foods than "forget" non-foods. Consistent with attention bias findings in overweight adults (Werthmann et al. 2011), this recall/recognition pattern suggests an approach-avoidance conflict between the positive and negative aspects of high calorie foods. Participants may have paid more attention to high calorie foods when the words were presented (leading to higher recognition of "forget" high calorie foods), but avoided processing high calorie foods during word learning.

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6:00-7:30 PM (1197)

Integration of Visual-Haptic Senses With Spatiotemporal Disparities in Stiffness Perception. SUNG HUN SIM and BING WU, *Arizona State University* — Two experiments were conducted to examine how the integration of visual and haptic senses was affected by their spatial and temporal disparities in stiffness perception. In a 2AFC task, subjects used a haptic interface to interact with two virtual elastic materials on each trial, saw their deformations in simulated ultrasound, and judged which felt stiffer. The ultrasound simulation was rendered with a latency of 0 or 166 ms relative to the haptic feedback and shown on a LCD placed above the subject's hand or 30 inches away. In the control condition, hand-motion was directly seen. Subjective stiffness (PSE) was found to be overestimated with the latency at both LCD locations, and stiffness discriminability (JND) increased as the LCD was displaced away from the hand. The findings suggest that the optimal visual-haptic integration in stiffness perception requires that signals coincide in both time and space. (Supported by NIH grant 5R00EB008710)

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6:00-7:30 PM (1198)

Congruent Tactile Information Enhances Visual Awareness During Binocular Rivalry. NOBUYUKI HIROSE, *Kyushu University* (Sponsored by Shuji Mori) — When we touch familiar objects without seeing them, the visual image of their surface properties immediately comes to our mind. Although we have an abundance of such daily experiences, the effects of haptic information on visual awareness have not been fully studied. A recent study using well-controlled laboratory stimuli has shown that exploring haptic gratings congruent in orientation and spatial frequency with one of the competing visual gratings prolongs dominant durations of that image during binocular rivalry (Lunghi et al., 2010). Here we extend this finding to daily products familiar to us, considering our multisensory integration situations. Participants viewed dichoptic images of artificial turf and bath mat while actively touching one of them, and reported the dominant perception. The dominant duration became longer with congruent than incongruent tactile stimulation. This suggests that material representations based on touch interact with those based on vision to modulate visual awareness during binocular rivalry.

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6:00-7:30 PM (1199)

Cortical Mechanisms of Multisensory Integration. ALLISON M. PIERCE and JESSICA GREEN, *University of South Carolina* (Sponsored by Jessica Green) — Previously our lab has demonstrated that sounds rapidly activate visual cortex within the first 50 ms after stimulus onset. This rapid response may be a potential mechanism by which auditory and visual information are integrated in primary visual cortex. Here, we explored how this auditory-evoked visual cortex activity was affected by the presence and relevance of simultaneously presented visual stimuli. Multisensory enhancement was observed for the audio-visual stimuli immediately following the initial rapid response, suggesting direct auditory inputs to primary visual areas facilitate multisensory integration in cortex. In addition,



this multisensory enhancement was present regardless of the attended modality, indicating that this rapid integration occurs automatically.

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6:00-7:30 PM (1201)

Multiple Mechanisms Underlying Shifts in Perceived Limb Position in the Mirror Box Illusion. YUQI LIU and JARED MEDINA, *University of Delaware* (Sponsored by Jared Medina) — In the mirror box illusion, visual and proprioceptive information regarding hand position can be dissociated, and participants frequently report their hand as closer to the visual estimate (proprioceptive shift). However, the time course of this shift has never been examined. Perceived hand position could immediately shift to, or gradually drift towards, the viewed hand position; with different potential mechanisms underlying each pattern. We separated the visual and proprioceptive estimates of hand position by 6" using a mirror box and asked participants to report perceived hand position every 5 seconds over a 60 second trial. Our participants make both immediate and gradual shifts, and that shift types vary on a trial-by-trial basis. The proportions of immediate to gradual responses were unaffected by whether participants were cued to report or, controlling for observer effects, self-reported whenever felt shifts. We discuss how models of multisensory integration could account for these distinct mechanisms.

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6:00-7:30 PM (1202)

Establishing Normative Eye Movement Patterns in Functional Tasks. EWEN B. LAVOIE, AIDA M. VALEVICIUS, QUINN A. BOSER, PATRICK M. PILARSKI, ALBERT H. VETTE, JACQUELINE S. HEBERT and CRAIG S. CHAPMAN, *University of Alberta* (Sponsored by Colin MacLeod) — By synchronizing a head-mounted eyetracker and a wireless motion-capture system, we studied eye behaviour in two tasks mimicking real-world demands, establishing a normative model for functional eye gaze. Participants fixated very little on their own hand, instead looking ahead to the next target of action. We believe that it is other sensory systems, predominantly proprioception, that allow for this behaviour. An important extension currently underway is to test individuals who have compromised proprioception – most notably, upper-limb amputees. The strong prediction is that upper-limb prosthetic-users will fixate on their moving limb due to a lack of proprioceptive feedback. The normative data set that we have established has the potential to aid clinicians and researchers: Clinicians will be able to better assess a patient's level of impairment relative to a validated baseline, and researchers will be able to use these normative eye movement data to explore even more complex real-world tasks.

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6:00-7:30 PM (1203)

Dissociable Outcomes of Tactile Perceptual Learning for Simple vs. Complex Stimuli. ESTEBAN SEBASTIAN LOLO-DE-LARREA-MANCERA and AARON SEITZ, *University of California Riverside*, HARRIET DEMPSEY-JONES and

TAMAR MAKIN, *University of Oxford* (Sponsored by Catherine Reed) — Tactile perceptual learning has been largely understudied and little is known about the details of what is learned through tactile training. To understand how different types of training may give rise to different learning outcomes, we trained participants to discriminate vibrotactile patterns presented on their digits and tested the extent to which this training transferred to untrained tactile discrimination tasks. One group of participants trained on a narrow-band of stimulation based on pure tones, while the other, on a broad-band of stimulation based on music. Results showed that training with broad-band stimulation yields learning effects that generalize to other tactile tasks on the trained digits but did not generalize to untrained digits. In contrast, training on narrow-band stimulation generalizes more strongly to untrained adjacent digits, but not to novel tasks on the trained digit. These data suggest that very similar training paradigms can give rise to very different learning outcomes.

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LETTER/WORD PROCESSING I

6:00-7:30 PM (1204)

Bilingual and Monolingual Language Control Mechanisms. IVA IVANOVA, *University of Texas at El Paso* — Bilinguals exercise control to avoid wrong-language intrusions. But monolinguals need control too, to avoid semantically-related or wrong-register intrusions. How are the two types of control similar or different, and how does control change over time? Monolinguals switched between naming pictures with a basic-level (simpler and more frequent) name (*dog*), and a subordinate (harder and less frequent) name (*Dalmatian*). Two groups of bilinguals (non-balanced and balanced) switched between (basic-level) words in their two languages ("dog" and "perro"). Sessions began with two single naming blocks in counterbalanced order, followed by three mixed blocks, followed by two further single blocks. Both bilinguals and monolinguals incurred switching costs and mixing costs. Interestingly, the speed advantage of words with stronger representations (for bilinguals, dominant-language words; for monolinguals, basic-level words) decreased linearly across blocks and across groups. The graded effects between groups might suggest that the difference between monolingual and bilingual control is one of degree, and depends on the strength of lexical representations, relatedness of their associated conceptual representations, and task conflict.

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6:00-7:30 PM (1205)

Teaching the Purpose and Meaning of Algebraic Variables by Engaging Math Students' Intuitive Thinking. JEFFREY K. BYE, PEI-JUNG CHUANG and PATRICIA W. CHENG, *University of California, Los Angeles* — Traditional approaches to teaching variables start with formal definitions and one-step problems that can be solved arithmetically, leaving many students puzzled about variables' purpose and meaning. We developed multimedia videos for 6th graders that A) present



relatable stories and contextual hints to facilitate students' intuitive thinking about variables, and B) encourage contrast comparisons and constructive struggling through complex (8th-grade level system-of-equations) problems to understand why and how variables help to solve them. The use of symbols is progressively developed over two learning sessions as students experience variables' conceptual and practical purposes. The experimental condition was compared to two traditional-approach controls matched for content and time-on-task, one of which used Khan Academy videos. Despite receiving fewer examples of each problem type, students in the experimental condition performed as well as or better than the control students in solving transfer problems on a posttest 1-3 weeks later. They also rated the videos more favorably. Our purpose-driven approach seems to enable students to better learn fundamental concepts and procedures of algebra.

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6:00-7:30 PM (1206)

A tDCS Investigation of Taboo Language. JORDAN A. BRYNE and BROOKE PORTER, *Central College* — Taboo language is emotionally salient and may be distinct from normal language processing (Hillis & Caramazza, 1991; Jay, 2000). The goal of the current study was to examine whether, as with other types of language processing, taboo language is lateralized. Application of tDCS was used to examine the role of the left and right dlPFC in taboo language through multiple behavioral tasks (taboo stroop, word stem completion, and verbal fluency). Behavioral results revealed a main effect of word type indicating that low frequency taboo words were processed differently than high frequency taboo words, emotional words and neutral words. The accessibility of taboo language and verbal fluency was similar between conditions. Hemispheric differences were not observed in this study despite the use of previously published methodology (Iyer et al., 2005). Gender differences in the types of taboo language produced in the experiment and future directions will be discussed.

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6:00-7:30 PM (1207)

Modeling Semantic Fluency Data in Alzheimer's Patients. JEFFREY C. ZEMLA and JOSEPH L. AUSTERWEIL, *University of Wisconsin-Madison* — A hallmark symptom of Alzheimer's disease is impaired retrieval from semantic memory. This impairment can be measured with the semantic fluency task, in which patients recall as many items from a category (e.g., animals) as they can in a short period of time (e.g., one minute). Healthy control patients typically recall items in semantically related clusters (e.g., "lion, tiger, cat"), avoid repeating words (perseverations), and avoid listing non-category items (intrusions). In contrast, patients with Alzheimer's disease exhibit less clustered retrieval behavior, perseverate more often, and retrieve fewer items overall. We examine how well various retrieval processes on a semantic network mimic fluency data from Alzheimer's patients. Because Alzheimer's disease progressively worsens over time, we analyze

how the observed semantic impairments might emerge from increasing failures within the retrieval process and/or damage to semantic networks.

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6:00-7:30 PM (1208)

Identifying Letters and Words: Spatial Biases. KIM RANSLEY, SALLY ANDREWS and ALEX HOLCOMBE, *The University of Sydney* (Sponsored by Alex Holcombe) — Experiments using concurrent rapid serial visual presentation (RSVP) of letters have documented that the direction of reading affects which of two horizontally-displaced streams is prioritised — in English, the letters of the left stream are better reported but this is not the case in Arabic. Here, we present experiments investigating whether this left bias occurs when the stimuli are concurrently presented English words. The first experiment revealed a right bias for reporting one of two simultaneously and briefly-presented words (not embedded in an RSVP stream), when the location of one of the words was subsequently cued. An ongoing experiment directly compares spatial biases in dual RSVP of letters with those in dual RSVP of words in the same participants. These findings have implications for understanding the relative roles of hemispheric lateralisation for language, and attentional deployment during reading.

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6:00-7:30 PM (1209)

Effects of Aging and Pattern Complexity on the Visual Span of Chinese Readers. KAYLEIGH L. WARRINGTON, *University of Leicester*, LIN LI, FANG XIE, SHA LI and JINGXIN WANG, *Tianjin Normal University*, VICTORIA A. MCGOWAN, SARAH J. WHITE and KEVIN B. PATERSON, *University of Leicester* (Sponsored by Kevin Paterson) — Research with young adult Chinese readers suggests that pattern complexity (i.e., number of character strokes) limits the visual span (i.e., number of characters recognized accurately on a single glance; Wang, He, & Legge, 2014). This is attributed to greater visual crowding for complex characters. Older adults read Chinese more slowly than younger adults. Moreover, sensory declines, including increased effects of crowding, may limit their ability to recognize complex characters. Whether these declines produce smaller visual spans, and therefore slower reading, is unclear. We assessed the visual spans of young and older Chinese readers by presenting low, medium and high complexity characters at different horizontal eccentricities. Overall, span size reduced with increasing complexity, but older adults had a smaller span for high complexity characters. This indicates that older readers acquire more limited character information when complexity is high. This may be an important factor underlying adult age differences in Chinese reading.

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6:00-7:30 PM (1210)

Transposed Radical Priming Effects in Chinese. XUAN PAN and STEPHEN LUPKER, *The University of Western Ontario* (Sponsored by Stephen Lupker) — As in English word recognition, Chinese word recognition appears to involve a hierarchical processing framework, with, in Chinese, both



radical and character levels of representation. A key question is whether radical representations are position-sensitive or position-general. We addressed this question by investigating transposed radical (TR) priming effects using a masked priming same-different task with ERP measurements. TR primes were created by transposing two radicals within a single character target word. Repetition and TR priming effects were observed in response time, in N170 amplitude and in P2 latency with, as expected, the TR priming effect being smaller and arriving later in the N170 than the repetition priming effect. Most centrally, the clear TR priming effects, which were independent of the type of radicals being transposed, indicate that radical representations are position-general in Chinese character representations and that the orthographic coding of Chinese characters is flexible, similar to that in alphabetical languages. Email: Xuan Pan, xpan55@uwo.ca

6:00-7:30 PM (1211)

Visual Similarity Effects of Multi-Letter Combinations During Word Recognition. ANA MARCET and MANUEL PEREA, *Universitat de València* (Sponsored by Manuel Perea) — Previous research has shown that early in the word recognition process, there is some degree of uncertainty concerning letter identity and letter position. Here we examined whether this uncertainty also extends to the mapping of letter features onto letters. Indeed, anecdotal evidence suggests that nonwords containing multi-letter homoglyphs (e.g., rn→m) such as docurnent can be confusable with their base word. We conducted two masked priming lexical decision experiments in which the words/nonwords contained a middle letter that was visually similar to a multi-letter homoglyph. Three types of primes were employed: identity, multi-letter homoglyph, and orthographic control. We used two commonly used fonts: Tahoma (Experiment 1) and Calibri (Experiment 2). Results in both experiments showed faster word identification times in the homoglyph condition than in the control condition—the homoglyph condition produced nearly the same latencies as the identity condition. These findings have important implications at both theoretical and applied levels. Email: Ana Marcet, ana.marcet@uv.es

6:00-7:30 PM (1212)

Functional Orthographic Units in Chinese Character Reading: Are There Abstract Radical Representations? DONALD SP. LI and BRENDA RAPP, *Johns Hopkins University* (Sponsored by Brenda Rapp) — Behavioral and neuroimaging studies have provided evidence of abstract letter representations -format-free, symbolic representations of letter shapes that share an identity (e.g., A/a share the same abstract letter representation). In Chinese orthography, a comparable question is whether components of characters (i.e., radicals) that have different shapes but share an identity also share an abstract representation. This was investigated using a same-different judgment task in which, on every trial, participants responded yes/no if two radicals were physically identical. Results indicate that “different” decisions to radical pairs with the same identity but different shapes were slower than decisions to pairs of radicals with different identities and different shapes. These

results provide, for the first time, evidence of abstract radical representations. However, because radicals with the same radical identity also share semantic meaning, further experiments are ongoing to determine whether the observed effects are due to shared abstract radical representations or shared semantics. Email: Donald Li, sli97@jhu.edu

6:00-7:30 PM (1213)

Using Resource Depletion to Examine Processing of Familiar and Unfamiliar Metaphors. FELIX S. PAMBUCCIAN and GARY E. RANEY, *University of Illinois at Chicago* (Sponsored by Kara Morgan-Short) — An important question in research on metaphor comprehension is whether familiar and unfamiliar metaphors are understood through separate processes. In prior research, the Categorization model (Glucksberg, 2003) specifies that comprehension of familiar and unfamiliar metaphors relies on the same set of controlled processes, whereas the Career of Metaphor model (Bowdle & Gentner, 2005) specifies separate processes: a controlled process for unfamiliar metaphor comprehension and an automatic process for familiar metaphor comprehension. We assessed these competing models using a resource depletion manipulation. Because resource depletion (temporary impairment of executive control) negatively impacts higher-order controlled processes but does not affect automatic processes, we compared comprehension times for familiar and unfamiliar metaphors between control and depletion condition participants (N = 80). We found that resource depletion slowed comprehension by much greater margins on unfamiliar than familiar metaphors. This finding may support differential processing of familiar and unfamiliar metaphors, consistent with the Career of Metaphor model. Email: Felix Pambuccian, fpambu2@uic.edu

6:00-7:30 PM (1214)

Investigating Parafoveal-on-Foveal Effects During Semantic Ambiguity Resolution. ASHLEY N. ABRAHAM, *Kent State University*, MICHAEL A. ESKENAZI, *Stetson University*, JOCELYN R. FOLK, *Kent State University* (Sponsored by Jocelyn Folk) — Parafoveal-on-foveal (POF) effects during reading – when processing of the upcoming word impacts processing of the currently fixated word – have been elusive. However, recent research has provided some evidence for POF effects (eg. López-Peréz, Dampuré, Hernández-Cabrera, & Barber, 2016). This is important because serial and parallel processing models of eye movement control make different predictions about the existence of POF effects. The current study investigates POF effects during natural reading by leveraging semantic ambiguity effects. Participants read sentences containing ambiguous words followed by a disambiguating word in the parafoveal. Results indicate that the parafoveal word did not impact processing of the fixated, ambiguous word. Instead, ambiguity effects emerged on the disambiguating word. The results are consistent with serial processing models of word recognition. However, individual differences in reading skill may influence POF effects. Skill differences will be discussed. Email: Ashley Abraham, aabrah15@kent.edu



6:00-7:30 PM (1215)

Reading is Disrupted by Intelligible Background Speech: Evidence From Eye-Tracking. MARTIN R. VASILEV, *Bournemouth University*, SIMON P. LIVERSEDGE and DANIEL ROWAN, *University of Southampton*, JULIE A. KIRKBY and BERNHARD ANGELE, *Bournemouth University* (Sponsored by Denis Drieghe) — Everyday reading is often accompanied by different noise and speech sounds in the background. Previous behavioural studies have suggested that reading comprehension accuracy may be negatively affected by meaningful background speech, but the evidence is mixed. In the present study, we recorded participants' eye-movements while they were reading single sentences in four background sound conditions: silence, pink noise, Mandarin speech and English speech. Additionally, in each sentence, there was a target word whose lexical frequency was manipulated. Meaningful (i.e., English) speech prolonged the total reading time of the sentences compared to silence. This was mostly due to making more re-reading fixations. Additionally, English speech resulted in significantly more re-reading fixations and greater regression probability compared to Mandarin speech, thus suggesting that auditory distraction by background speech is mostly semantic in nature (Martin et al., 1988). There were no significant interactions with lexical frequency, which shows that meaningful speech did not interfere with the lexical access of words. These findings suggest that distraction by meaningful speech occurs mostly in the later stages of sentence integration. Email: Martin R. Vasilev, mvasilev@bournemouth.ac.uk

LANGUAGE

6:00-7:30 PM (1216)

Word Length and Frequency Effects in Dyslexic Copying Behaviour: An Eye Movement Study. JULIE A. KIRKBY and ABBY E. LAISHLEY, *Bournemouth University* — Classroom learning relies heavily on written information transfer; seemingly simple classroom tasks of copying text are psychologically complex. They involve sequential visual and cognitive processes, including visual-encoding, constructing and maintaining mental representations, and written production (Laishley, Liversedge, & Kirkby, 2015). Dyslexic readers in particular struggle with decoding text; problems with working memory, sequencing and spelling are often associated, presenting serious difficulties in copying tasks. We examined copying performance in an ecologically valid classroom task using mobile eye-tracking. Dyslexic readers copied words, specially manipulated for word-length and frequency, as modulators of word recognition difficulty; assessing evidence for whole word or segmented word encoding strategies. Encoding times and gaze transfer behaviour for dyslexic readers indicated difficulty visually-encoding whole word representations. We conclude that dyslexic readers frequently used word segmentation of multiple letter-clusters, smaller than the word, to facilitate visual-encoding during copying; as such they may not access word meanings throughout the task. Email: Julie A Kirkby, jkirkby@bournemouth.ac.uk

6:00-7:30 PM (1217)

The Centrality to Identity of Traumatic Racial Discrimination Events and Racial Identity. JUSTIN T. COLEMAN, *Medgar Evers College* — The relationship between the centrality to identity of a traumatic racial discrimination event (TRDE) and racial identity (RI) was examined in an online study in which 231 African Americans completed the Centrality of Events Scale (CES) and the Multidimensional Model of Racial Identity (MMRI), as well as other scales. Participants indicated if the CES event was a TRDE. Seven hierarchical regressions were conducted to test if the event, its CES rating, and their interaction predict the seven dimensions of RI. Results show that for the Assimilation, Humanist, Minority, and Nationalist subscales, CES was a significant predictor in block 1. Event was significant for Nationalist in block 1. For the Centrality, Assimilation, Minority, and Nationalist subscales, CES was a significant predictor in block 2 and the interaction was significant in block 2 for all subscales. All analyses had significant ΔR^2 for model 2 and both models were significant for all subscales except Public Regard. The results show that whether a TRDE predicts dimensions of RI depends on the extent to which it has become central to identity, suggesting ways that experiencing a TRDE is related to African Americans' beliefs about the meaning of being Black.

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6:00-7:30 PM (1218)

Divergent Conceptions of Irony and Sarcasm. ELISABETH LESLIE CAMERON, *Carthage College*, SAMAN FOULADIRAD and CATHERINE ANN CAMERON, *University of British Columbia* — We explored college students' understanding of verbal irony and sarcasm. Three studies were conducted using experimenter-designed questionnaires. Study 1, 94 undergraduates defined and provided examples of verbal irony and sarcasm. Although there was great variability, most participants included "non-literal" as a defining characteristic of both irony and sarcasm. In addition, "humor", "biting" and "tone" were identified as important characteristics of sarcasm. In Study 2, 104 undergraduates classified written scenarios as examples of *verbal irony* or *sarcasm*, both or *neither*. Participants were excellent at detecting lack of irony in the absence of coincidence or anything unexpected; however, they tended to overextend the concept of irony in their presence. In Study 3, 219 undergraduates selected from provided characteristics to indicate what made a statement ironic or sarcastic. Results were consistent with Study 1. College students' understanding of verbal irony is idiosyncratic and often diverges from researcher definitions.

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6:00-7:30 PM (1219)

Similes Spoil the Surprise: An Eye Movement Study of Simile and Metaphor Processing. JANE ASHBY and STEPHEN J. AGAUAS, *Central Michigan University* — This study examines how aptness and expression type affect figurative language processing. Participants read less apt metaphors (*ants are bulldozers*) and similes (*ants are like bulldozers*) as well as highly apt metaphors (*boxers are bulldozers*) and similes (*boxers are*



like bulldozers). Familiarity was controlled between the less apt and highly apt metaphors. Aptness affected the pattern of re-reading; participants regressed into the topic region more often and spent more time re-reading the topic of less apt sentences than the topic of more apt sentences. Participants read the vehicle and V+1 regions of similes faster than metaphors, replicating the “metaphor effect” (Ashby et al., 2017). Readers were more likely to regress out of the vehicle and V+1, indicating that the metaphor effect was strongest in the less apt sentences. Findings are consistent with theories predicting that similes and metaphors are processed differently.

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6:00-7:30 PM (1220)

Clinically Interpretable Acoustic Meta-Features for Characterising the Effect of Mental Illness on Speech and Voice. MARIA K. WOLTERS and KRISTIN K. NICODEMUS, *University of Edinburgh*, ALEX S. COHEN, *Louisiana State University* — A person’s mental health can be reflected in their speech. Recent studies have used machine learning to detect signs of mental illness from hundreds of acoustic features. However, the resulting algorithms can be hard to interpret clinically. The Geneva Minimalistic Acoustic Parameter Set for voice research and affective computing (GeMAPS) partly addresses this issue by providing a standard, restricted set of 88 acoustic variables. In practice, though, many of these variables covary, and can thus be summarised into more easily interpretable meta-variables. Using principal component analysis, we derive a set of eight such meta-variables for a data set of 17949 samples from nonpsychiatric adults and adults with a diagnosis of mania, depression, psychosis, or schizophrenia. We show that (a) there are significant differences between healthy controls and people with a mental illness on these variables; and (b) the patterns of these differences (size and significance) vary depending on the condition.

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6:00-7:30 PM (1221)

The Up-Regulatory Nature of Voluntary Control for the Quality of Visual Long-Term Memory Encoding. KEISUKE FUKUDA, *University of Toronto Mississauga* — Our visual long-term memory has unlimited capacity to store visual information over a long period of time. On the other hand, our ability to encode new visual information into this massive memory storage fluctuates from moment to moment. In this study, we examined the nature of voluntary control we have in regulating the encoding quality of visual long-term memory. Across a series of experiments, we found behavioral and electrophysiological evidence that we can voluntarily up-regulate the quality of memory encoding, and importantly, this up-regulation came with a cost in the encoding quality of a stimulus that was simultaneously presented with the to-be-up-regulated item. On the other hand, we failed to find evidence for voluntary down-regulation of encoding quality. Interestingly however, we found that individuals can strategically up-regulate the encoding quality of the simultaneously presented stimulus in order to indirectly down-regulate the encoding quality of the to-be-down-regulated item. Taken together, our results suggest

that our voluntary control over memory encoding quality is up-regulatory in nature, but we can strategically use this ability to indirectly down-regulate the encoding quality of unwanted memories.

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6:00-7:30 PM (1223)

Children’s Use of Language as a Cue for Talker Identification. REINA MIZRAHI and SARAH C. CREEL, *University of California, San Diego* (Sponsored by Sarah Creel) — Knowing who is speaking facilitates comprehension, as it tells us what a speaker is more likely to say. This may be especially useful for young children, whose comprehension skills are still developing. Yet, few studies have asked what vocal features children can distinguish. The current studies asked whether 3- to 5-year-old English monolinguals ($n=32$), English/Spanish bilinguals ($n=19$), and English/other language bilinguals ($n=32$) use the language someone speaks to identify who is talking. In Experiment 1, participants were familiarized with 2 cartoon characters, one who spoke English, the other Spanish. Next, a 2AFC task presented both characters, and one “spoke” a novel sentence in their respective language. Children pointed to the character that spoke. Visual fixations to characters were also recorded. Accuracy in all language groups exceeded chance (84%, $p<.001$), suggesting children can use language features to identify talkers. In a similar procedure, Experiment 2 further showed that talker language drives recognition (88% language-match responses after voices switched), rather than voice quality (13% voice-match responses). Findings suggest that language, more than voice quality, is a salient cue to talker identity.

Email: Reina Mizrahi, rmizrahi@ucsd.edu

6:00-7:30 PM (1224)

Alleviating the Translation-Ambiguity Disadvantage: Using A Placeholder to Signal an Upcoming Translation. GABRIELA TERRAZAS and NATASHA TOKOWICZ, *University of Pittsburgh* (Sponsored by Natasha Tokowicz) — Translation-ambiguous words are words with two or more translations across languages. These words are remembered less accurately and at slower rates than words with only one translation (translation-unambiguous words; e.g., Eddington & Tokowicz, 2013; Tokowicz & Kroll, 2007). Previous research has investigated different training methods that could reduce the translation-ambiguity disadvantage. Degani et al. (2014) found that presenting multiple translations in the same session improves retention of translation-ambiguous words compared to training translations in separate sessions. The current study aims to expand the latter findings by exploring the effects of informing second language learners that a word has multiple translations, and that the second one will be presented later in training.

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6:00-7:30 PM (1225)

Name Sound Symbolism: Associations Between Phonemes and Personality. DAVID M. SIDHU, KRISTEN R. DESCHAMPS, JOSHUA BOURDAGE and PENNY M. PEXMAN, *University of Calgary* (Sponsored by Penny Pexman)



— Sound symbolism typically involves associations between phonemes and perceptual dimensions (e.g., size, shape). However, there is also evidence that certain phonemes have particular connotations. For instance, sonorants (e.g., /l/, /m/, /n/) are associated with delicacy, while voiceless stops (e.g., /p/, /t/, /k/) are associated with ruggedness. Here we examined if these connotations would result in sound symbolic associations between phonemes and the more abstract construct of personality. We compared names containing sonorants to those containing voiceless stops, and found that they were associated with distinct personality factors. The most robust finding was that names containing sonorants were associated with high Agreeableness. This emerged using both a binary forced choice task (Study 1) and a ratings task (Study 2). In Study 3 we explore the impact of this on individual's self-reported personality. These findings demonstrate that sound symbolism extends beyond perceptual associations to include more abstract associations.
Email: David M. Sidhu, dsidhu@ucalgary.ca

PSYCHOLINGUISTICS I

6:00-7:30 PM (1226)

Does Technology Change the Quality of Parent-Child Interactions During Play? JOANNE LEE, ALEXIS LUND and EILEEN WOOD, *Wilfrid Laurier University* — Parents play an important role in supporting children's early spatial development. Despite the increasing use of interactive technological devices, little is known about the impact of these devices on the nature of parental interaction during play. Four aspects of this interaction – responsiveness, teaching, encouragement, and affection – were coded for 31 parents and their preschoolers (16 girls, 15 boys; mean age = 51.16 months, S.D. = 8.93), during 3D spatial play using blocks and puzzles and 2D spatial play using an iPad® in two separate home visits. After accounting for child gender and age, our two-way repeated-measures ANCOVA revealed that parents were more responsive and taught more spatial concepts to their child during 3D spatial play than during 2D iPad play. Moreover, parents with older preschoolers engaged in fewer encouraging and teaching behaviors during 2D iPad play than did those with younger ones.
Email: Joanne Lee, jlee@wlu.ca

6:00-7:30 PM (1227)

Anchoring and Decision Bias: A Failure to Disregard. JUSTIN H. MOSS and STEVEN A. BERG, *Arkansas Tech University* — The current investigation examined the phenomenological effects of heuristics that pertain to the availability of information stored in memory. Classic anchoring effects demonstrate that people will use any available information, despite the cost of response bias, as a reference for making decisions. The specific aim of Experiment 1 was to examine whether people exhibit similar patterns of behavior despite explicit notice of instruction to disregard the supplied information (the anchor). Experiment 2 delved further into the anchoring phenomenon using a paradigm identical to the one used in Experiment 1. In this re-examination, adjustments were made to the selection of stimuli, delivery of instruction, and an additional control group was added in order to bring clarity to open questions from the

previous study. Across both Experiments 1 and 2, participants failed to demonstrate an ability to disregard the anchor even when the instruction to do so was explicit. The results are discussed within the context of the availability heuristic and the directly related effects of anchoring. Implications are considered for our understanding of the role of cognitive biases in the decision process.

Email: Dr. Justin Moss, jmoss12@atu.edu

6:00-7:30 PM (1228)

Task Effects on Eye Movements During Sentence Reading. PATRICK PLUMMER, *University of California, Los Angeles*, PETER C. GORDON, *University of North Carolina Chapel Hill* — Previous research indicates that eye movement characteristics during reading can be modulated by task goals. Research has also shown that domain-specific testing anxiety can disrupt attention during processing. The current study examined how specific task goals influenced eye movement behavior during reading by manipulating task (i.e., reading for comprehension or reading to make a meta-linguistic judgment) and item difficulty. Across both tasks, each sentence was presented either with no errors or with one grammatical error. The results showed slower reading times for meta-linguistic judgments on first-pass and later reading measures across the entire sentence. The presence of an error increased processing time as shown by later reading measures in both tasks. Critically, meta-linguistic judgment accuracy was lowest when an error was present, despite evidence indicating that subjects detected grammatical errors in both tasks. These results suggest that linguistic insecurity may bias meta-linguistic responses when language proficiency is being evaluated.

Email: Patrick Plummer, pplummer@ucla.edu

6:00-7:30 PM (1229)

Instinctive Drifts in the Illusory Perception of Objects: The Ready Perception of Animate Objects in Random Noise. JOSHUA J. NEW, *Barnard College, Columbia University* — Pareidolias are the illusory perception of meaningful objects – often faces – in random, unpatterned stimuli. We evaluated the hypothesis that a biological preparedness for detecting animate objects (people and animals) makes their illusory experience especially likely and explored which manners of visual noise and features contribute to their occurrence. In these experiments, participants were asked to trace and label any objects appearing in displays of Perlin, Gaussian, or uniform noise. In the first study, nearly half of the pareidolias reported were of people, followed in frequency by animals, then artifacts, plants, and other inanimate objects. Our further studies 1) confirmed that neurologically-typical individuals readily and illusorily experience complex and meaningful objects in random noise, 2) constitute a novel approach for uncovering the fundamental visual features (i.e. curvilinearity) involved in the perception of animate objects and other natural categories, and 3) suggest that animate objects are especially likely to be illusorily perceived.
Email: Joshua J. New, jnew@barnard.edu



6:00-7:30 PM (1230)

Bilingualism Modifies Brain-Behavior Relationships During a Working-Memory Task. JOHN A.E. ANDERSON, JOHN G. GRUNDY, RYAN M. BARKER and ELLEN BIALYSTOK, *York University* — Much evidence suggests that speaking two languages yields improvements in domain-general executive function, including an increase in working memory in children and older adults. Yet, no study has examined how bilingualism affects neural recruitment in elderly individuals during a working memory task. Such evidence is essential for understanding the mechanism responsible for these effects and the populations to which they may apply. We examined bilingual and monolingual older adults while they performed an n-back task during an fMRI scan. Behavioral performance was similar but fMRI revealed frontoparietal and default mode (DMN) networks tracking task difficulty that differentially correlated with performance by the two language groups. Monolinguals recruited the DMN for both 1- and 2-back, leading to speed-accuracy tradeoffs for the 2-back. Bilinguals relied primarily on frontoparietal network, particularly for 2-back performance. These findings are discussed in terms of implications for cognitive aging and the role of bilingualism in cognitive reserve. Email: John A.E. Anderson, johnaeanderson@gmail.com

6:00-7:30 PM (1231)

Perceptual Learning Across a Cline of Phonetic Variation. MOLLY BABEL, *University of British Columbia*, MICHAEL MCAULIFFE, *McGill University*, CAROLYN NORTON and BRIANNE SENIOR, *University of British Columbia*, CHARLOTTE VAUGHN, *University of Oregon* — Lexically-guided perceptual learning is the updating of linguistic categories based on novel input disambiguated by its linguistic context. For learning to occur, listeners must recognize the word and notice its deviant phonetic detail. What is the range of phonetic variation that allows for lexically-guided perceptual learning? This question pairs claims regarding phonetic ambiguity and encoding strength (Hay et al., 2015) with frameworks suggesting what might merit adaptation (Kleinschmidt & Jaeger, 2015; Norris et al., 2016). Across four lexically-guided perceptual learning tasks where a target fricative is graded in terms of phonetic ambiguity (?s/sh) and two AX discrimination tasks, we find perceptual learning is greatest with maximally ambiguous stimuli. Overly atypical pronunciations show attenuated perceptual learning, while more typical pronunciations show none. Discrimination tasks demonstrate that the maximally ambiguous stimuli are not perceptually unique. These results indicate that perceptual learning may involve both confidence in linguistic predictions and acoustic-phonetic category typicality. Email: Molly Babel, molly.babel@ubc.ca

6:00-7:30 PM (1232)

How Native Writing System May Influence Picture Processing: An ERP Study. SAM-PO LAW, *University of Hong Kong*, YEN NA YUM, *Education University of Hong Kong*, ANNA PETROVA, *University of Hong Kong* — The Chinese orthography has often been characterized as pictographic. Previous neuroimaging studies have reported bilateral

processing of Chinese characters, in contrast with left-lateralized processing of alphabetic scripts. This ERP study examined the possible influence of one's native writing system in picture processing. Trilingual participants were tested in a repetition detection task with mixed presentation of pictures and Chinese or English words. The participants were L1 readers of either Korean or Japanese, with both Chinese and English as L2s. The results showed greater N170 and smaller N400 by the Japanese group compared with the Korean readers. Interestingly, a significant interaction between group and language block in the N400 indicated that greater N400 in the English than Chinese block was exhibited by the Korean participants only. The overall findings are taken to reflect differential visual expertise and processing demands between the two groups, possibly resulting from their different L1 literacy experiences. Email: Sam-Po Law, splaw@hku.hk

6:00-7:30 PM (1233)

Examining Facial Processing Biases: Does Race or Gender Have a Greater Effect? STEPHANIE J. BABB, *University of Houston-Downtown* — Research has shown that people perceive faces differently based on the race and gender of the target image with respect to one's own race and gender. The current study examined this outgroup homogeneity effect across both race and gender using a flicker paradigm. Participants viewed six color images of male and female African American, Hispanic/Latino, and Caucasian faces (500 ms). After a brief visual disruption (80 ms), the display reappeared with one of the six images changed to a different face of the same race and gender. The display continued to flicker until participants selected the changed facial image. Reaction time was fastest when the changed face matched the participant's own race and gender; however, the effect size was larger for race compared to gender. These findings suggest that facial processing biases are not just social, but linked to early cognitive processes with race and gender having individual and combined effects. Email: Ruth M. Johnson, johnsonru@uhd.edu

6:00-7:30 PM (1234)

Are Tip-of-the-Tongue States for Names More Likely to Repeat in Older Adults? KATHLEEN OLIVER and KARIN R. HUMPHREYS, *McMaster University* (Sponsored by Karin Humphreys) — Older adults experience more tip-of-the-tongue (TOT) states than young adults (e.g., Salthouse & Mandell, 2013). Some studies have shown that names elicit more TOT states than other word types (e.g., Burke, MacKay, Worthley, & Wade, 1991), whereas some show that proper nouns do not elicit more TOT states than other word types (e.g., Maylor, 1995). The error repetition effect—the tendency for tip-of-the-tongue (TOT) states to repeat at a rate greater than can be predicted by chance—has been observed in young adults (D'Angelo & Humphreys; Warriner & Humphreys, 2008). This effect is hypothesized to be driven by learning incorrect lexical-to-phonological mappings within the speech production system, which is interpreted as error learning. There has been no research on whether or not TOT states have a greater tendency to repeat for proper nouns as compared to common nouns in older adults. We elicited TOT states by



presenting either a definition or a common noun, a picture of common noun, a description of a famous person, or a picture of a famous person. The same task was administered five minutes later. The implications for the speech production system will be discussed.

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6:00-7:30 PM (1235)

Adult Age Differences in Eye-Guidance During Chinese Reading. LIN LI, SHA LI, JINGXIN WANG, FANG XIE and MIN CHANG, *Tianjin Normal University*, KEVIN B. PATERSON, *University of Leicester* (Sponsored by Kevin Paterson) — Young adults use parafoveal information about upcoming character information to guide their eye movements when reading Chinese. However, it is unclear if the greater difficulty experienced by older readers is associated with less effective use of this information. Accordingly, we examined the eye movements of young (18-21 years) and older (65+ years) readers for sentences containing a 2- or 4-character target word. These target words were matched for the complexity of their first character, lexical frequency and predictability. Typical patterns of age-related reading difficulty were observed. In addition, word length effects were observed for young but not older adults for words receiving one first-pass fixation, and for neither age-group for words receiving multiple first-pass fixations. The findings add to the evidence that parafoveal cues guide saccade-targeting, but reveal that the effectiveness of these cues declines with age. We consider the implication of these findings for ageing effects on Chinese reading.

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6:00-7:30 PM (1236)

Adult Age Differences in Chinese Reading: Effects of Character Complexity. JINGXIN WANG, LIN LI, SHA LI, MIN CHANG and FANG XIE, *Tianjin Normal University*, KEVIN B. PATERSON, *University of Leicester* (Sponsored by Kevin Paterson) — Older adults produce characteristic patterns of reading difficulty for alphabetic and non-alphabetic languages. This difficulty is attributable to visual and cognitive declines in older age but remains poorly understood. The present research focused on the role of visual complexity. Chinese is well-suited to investigating such effects, as Chinese characters occupy the same area of space but contain differing numbers of strokes, and so vary substantially in visual complexity. In our experiment, young (18-28 years) and older (65+ years) adults read text containing interchangeable high-complexity (>9 strokes) or low-complexity (<=7 strokes) two-character words matched for lexical frequency and predictability. Typical patterns of age-related reading difficulty were observed. Additionally, a visual complexity effect in fixation probabilities and gaze durations for the target words was greater for the older adults. This suggests older readers have greater difficulty processing more visually-complex words. We discuss these findings in relation to aging effects during Chinese reading.

Email: Jingxin Wang, wjxpsy@126.com

6:00-7:30 PM (1237)

Modality Switch Effects Emerge Early and Increase Throughout Conceptual Processing: Evidence From ERPs. PABLO BERNABEU (Graduate Travel Award Recipient), *Radboud University*, ROEL M. WILLEMS, *Max Planck Institute for Psycholinguistics*, MAX M. LOUWERSE, *Tilburg University* (Sponsored by René Zeelenberg) — We tested whether conceptual processing is modality-specific by tracking the time course of the Conceptual Modality Switch effect. Forty-six participants verified the relation between property words and concept words. The conceptual modality of consecutive trials was manipulated in order to produce an Auditory-to-visual switch condition, a Haptic-to-visual switch condition, and a Visual-to-visual, no-switch condition. Event-Related Potentials (ERPs) were time-locked to the onset of the first word (property) in the target trials so as to measure the effect online and to avoid a within-trial confound. A switch effect was found, characterized by more negative ERP amplitudes for modality switches than no-switches. It proved significant in four typical time windows from 160 to 750 milliseconds post word onset, with greater strength in posterior brain regions, and after 350 milliseconds. These results suggest that conceptual processing may be modality-specific in certain tasks, but also that the early stage of processing is relatively amodal.

Email: Pablo Bernabeu, pbernabeu@gmail.com

6:00-7:30 PM (1238)

When Less is More: Visual Detail and the Activation of Semantic Associates. RAHELEH SARYAZDI, JASLEEN GREWAL and CRAIG G. CHAMBERS, *University of Toronto* (Sponsored by Craig Chambers) — During real-time language comprehension, the processing of a spoken word increases the activation level of same-category concepts. For example, given a display containing images of an apple and a banana (among other things), listeners show increased incidental fixations to the banana upon hearing “Click on the apple”. The present study explored how this effect is influenced by the degree of realism in visual stimuli. The results show that semantic activation is greater when spoken instructions refer to line-drawings rather than highly-realistic coloured clipart images. This effect appears to be independent from recognition/encoding processes (accuracy on a later memory test for displayed objects did not differ across image types). We suggest these semantic activation differences arise because (i) line-drawings are typically intended to depict abstract object concepts, whereas more realistic images can represent instances from those categories; and (ii) spreading activation in semantic memory is a phenomenon involving primarily abstract concepts.

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6:00-7:30 PM (1239)

Facilitating Higher-Order Learning Mnemonically: Additional Evidence. RUSSELL N. CARNEY, REBECCA E. KNOPH and JULIE A. BAUMANN, *Missouri State University* — The mnemonic keyword method has been shown to be an effective vocabulary learning strategy. Yet, the technique is often described as facilitating only lower level, rote memory (i.e., at the “knowledge” level of Bloom’s Cognitive Taxonomy). Yet, a small



number of mnemonic studies have shown benefits in higher-level thinking. To examine this further, 46 undergraduates were randomly assigned to one of two study conditions: writing practice (control) or keyword method. Following an introduction to their respective techniques, students used their strategy to study 24 difficult vocabulary words and their meanings selected from GRE-related study materials (e.g., *logorrhea* means *excessive wordiness*). On both immediate and 2-day-delayed tests (match vocabulary words with the studied meanings), students in the keyword condition statistically outperformed writing practice (control) participants. And, of special note, students in the keyword condition also statistically outperformed control participants on an 11-item matching test that required higher-level thinking.

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POSTER SESSION II

Friday Noon

West Ballroom BCD

Viewing 11:00-1:30, Author Present 12:00-1:30 PM

NEURAL MECHANISMS OF COGNITION

12:00-1:30 PM (2001)

Investigating Neurological Correlates of Chiari Malformation Type I Symptomatology: A Diffusion Tensor Imaging Study of Cognition and Pain. MICHELLE L. HUGHES and JAMES R. HOUSTON, *The University of Akron*, MEI-CHING LIEN, *Oregon State University*, SAREL VORSTER, *The Cleveland Clinic*, MARK G. LUCIANO, *Johns Hopkins University*, FRANK LOTH and PHILIP A. ALLEN, *The University of Akron* — 18 Chiari patients (CMI) and 18 matched control participants were tested using a neuropsychological assessment (RBANS), completed self-report measures of pain and mental health, and underwent diffusion-weighted (DTI) scan sequences. Diffusion indices of fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD), and radial diffusivity (RD) were extracted from standardized space. CMI patients exhibited greater FA, and reduced RD and MD relative to control participants, localized to inferior antero-posterior white matter pathways. In both groups, FA was negatively correlated with the attention subscale of the RBANS and positively associated with pain, anxiety, and stress. RD and MD were negatively associated with pain and stress. RD in CMI patients, but not control participants, was negatively associated with overall performance on the RBANS. These results suggest that compression of white matter tracts, likely due to the chronic inflammatory response exhibited by many CMI patients, potentially accounts for the cognitive dysfunction observed in CMI.

Email: James R. Houston, houstonjr@outlook.com

12:00-1:30 PM (2002)

Decision Making With Ensembles of Accumulators. BRENT MILLER, GORDON LOGAN, THOMAS J. PALMERI and JEFF SCHALL, *Vanderbilt University* — Decision-making is explained by psychologists through stochastic accumulator models and by neurophysiologists through the activity of neurons believed to instantiate these models. As noted recently by Zandbelt et al. (2014), this identification has overlooked an inherent scaling problem, where the same accumulator model is being used to explain behavior as well as explain a neural component giving rise to behavior. To investigate the scaling from individual accumulators in models of behavior to ensembles of neural accumulators in the brain, we introduce a framework for modeling RT and accuracy in choice that incorporates varying numbers of redundant accumulators for each alternative. We highlight conditions under which individual accumulator RTs, choice, and dynamics are not differentiable from those predicted by the overall ensemble of accumulators. Highlighting conditions under which predicted behavior and accumulator dynamics are invariant with ensemble size promises insights into the likely organization of accumulator-like elements in the brain.

Email: Brent Miller, brent.miller@vanderbilt.edu

12:00-1:30 PM (2003)

Visual Change Detection Process Reflected In vMMN is Involved in the Exogenously-Driven Perceptual Alternation. TOMOKAZU URAKAWA, KAZUMA NAGANO and OSAMU ARAKI, *Tokyo University of Science* — The present EEG study tested a hypothesis that visual change detection process reflected in the visual mismatch negativity (vMMN) would be relevant to the exogenously-driven perceptual alternation of a bistable image. Bars with an identical orientation were symmetrically arranged and were intermittently presented based on an oddball paradigm, while the Necker cube was centrally presented for a short period. By changing the orientation, the deviant violating and the standard not violating the sequential regularity were set during the Necker cube's presentation. Neural adaptation to the deviant and the standard were further controlled by the equiprobable method. Results showed that the deviant more facilitated perceptual alternation than the standard, and vMMN (enhanced brain response to the deviant, calculated as deviant - standard) pronouncedly appeared. Notably, the enhancement of vMMN's amplitude significantly correlated with an increase in the proportion of perceptual alternation (deviant - standard) across participants, supporting our hypothesis.

Email: Tomokazu Urakawa, urakawatom3@gmail.com

12:00-1:30 PM (2004)

EEG Investigations of Visual Statistical Learning for Faces, Scenes, and Objects. PHUI CHENG LIM and MATTHEW ROBERT JOHNSON, *University of Nebraska-Lincoln* — Statistical learning is a phenomenon in which stimuli become associated via repeated temporal or spatial co-occurrence. In this EEG study, we explored whether neural activity signatures of predictable upcoming items could be detected prior to the items' appearance, during the presentation of a preceding (predictor) item. Participants viewed a serial stream of faces, scenes, and objects that, unbeknownst to them, were grouped into either strong pairs (first and second item in pair always occurred in succession; 100% transitional probability) or weak pairs (first item in pair did not reliably predict the second; 11% transitional probability). We found evidence that when viewing the first item in a strong pair, event-related potential (ERP) and multivariate pattern analyses (MVPA) revealed activity signatures that were predictive of the category of the upcoming item. However, this was not the case for weak pairs, where the first item was not predictive of the second item's category.

Email: Phui Cheng Lim, cheng.lim@unl.edu

12:00-1:30 PM (2005)

Can Binaural Beats Improve Long-Term Memory? LYNN CAMERON and TROY A. SMITH, *University of North Georgia* — Binaural beats, presenting tones of different frequencies to each ear, have been hypothesized to affect cognitive performance. The underlying theoretical assumption is that brainwaves synchronize to the difference between the two tones



and this entrainment leads to changes in cognition (Atwater, 1997). However, this assumption has not been rigorously tested, and evidence for the effect of binaural beats on cognition is limited. In Experiment 1, we examined the effects of alpha band binaural beats on long term memory using a free recall task and found no effect ($n=19$). In Experiment 2, we used EEG to directly test whether alpha (10Hz) or beta (15Hz) band binaural beats embedded in music or pink noise lead to brain entrainment ($n=16$). Stimulation in the beta band lead to entrainment effects, but there were no reliable effects of alpha band stimulation. Experiment 3 tested the effects of beta band binaural beats on long term memory.

Email: Troy A. Smith, troy.smith@ung.edu

12:00-1:30 PM (2006)

Neural Circuits for Source Memory and Imagination. HEATHER M. KLEIDER-OFFUTT, AMBER GRANT, DARRYL BURNET and JESSICA TURNER, *Georgia State University* — Imagination and experience activate similar brain regions, and the similarity has been correlated with errors in reality monitoring. Brain activity during both imagination and experience of visual and auditory stimuli was assessed in undergraduate students in a two-session study. The first phase consists of behavioral assessments and the second, an fMRI scanning during an auditory and visual slideshow. In the slideshows, participants were either shown an image or sentence as the experience condition or they were asked to imagine seeing an image or hearing a sentence. Following the scan, they were asked whether they experienced (heard or saw) the stimuli, and how vividly they remember it. Imagery indices did not reliably correlate with activation during imagination in either modality, when corrected for whole-brain analyses. Imagination in both modalities showed activation in a left-lateralized network including medial and lateral frontal cortices, which are associated with imagery, planning, and evaluation. The results support the relationship between imagery and future planning.

Email: Heather M. Kleider-Offutt, hoffutt@gsu.edu

12:00-1:30 PM (2007)

Plasticity in Memory for Sounds. AMANDA MARKS and MELISSA K. GREGG, *University of Wisconsin - Parkside* — Visual cortical areas have been found to be remarkably plastic. For example, visual cortex activity has been observed in response to sounds after only two days of continuously wearing a blindfold. In this study, we investigated the implications of this neural restructuring on auditory memory, which has consistently been demonstrated as inferior to visual memory. Sighted individuals were trained to echolocate using self-generated palate clicks on two subsequent days. Auditory memory was measured before and after the echolocation training. The results indicated that an improvement in echolocation ability was accompanied by a significant improvement in auditory memory. The results suggest that training participants to use sound for spatial localization (that would ordinarily be served by vision) causes a change in the mechanisms involved in processing sound

for other cognitive tasks. This study makes an important contribution to our understanding of the mechanisms of auditory and visual plasticity in the brain.

Email: Melissa Gregg, greggm@uwp.edu

12:00-1:30 PM (2008)

Neural Substrates of Beat Gesture-Pitch Accent Integration: An ERP Investigation. LAURA M. MORETT, *University of Alabama*, NICOLE LANDI, *University of Connecticut*, JULIA IRWIN, *Haskins Laboratories*, JAMES MCPARTLAND, *Yale University* — In this experiment, event-related potentials (ERPs) were recorded from participants ($n=24$) as they watched videos featuring a speaker producing sentences in which a word in a specific grammatical role (patient) was pitch accented. The experiment consisted of two blocks: in one, the speaker did not gesture in conjunction with pitch accented words in half of the sentences; in another, the speaker produced beat gestures temporally asynchronous with pitch accented words in half of the sentences. In both blocks, the speaker produced beat gestures concurrently with pitch accented words in the remaining half of the sentences. Variability of evoked responses was compared between the no gesture and temporally asynchronous conditions. Across trials, median absolute deviation of N400 response amplitude was greater in the temporally *asynchronous* than in the no gesture condition ($t=2.88, p=.004$). Across timepoints, inter-trial phase coherence of the P1 response at 11 Hz was greater in the *no gesture* than in the temporally asynchronous condition, ($t=53.81, p<.001$). These results indicate that ERP variability reflects temporal synchrony of beat gesture and pitch accenting, suggesting that stable ERPs reflect effective gesture-speech integration.

Email: Laura Morett, laura.morett@yale.edu

12:00-1:30 PM (2009)

Exemplar-Based Judgments are Mirrored by Brain Activation in the Precuneus. SARA STILLESJÖ, LARS NYBERG and LINNEA KARLSSON WIREBRING, *Umeå University* — Brain activation in precuneus has been associated with a variety of cognitive functions including episodic memory, visual attention, mental imagery and consciousness. Recent neuroimaging studies propose precuneus as a key brain region also for human judgment. We tested the hypothesis that the role for precuneus in judgment might be related to episodic memory processes, and especially exemplar-based strategies. If so, with increased reliance on exemplar-based strategies during learning we expect increased activation in precuneus. Twenty-seven participants were scanned with fMRI while learning to make judgments via outcome feedback, in a task inviting the use of exemplar-based strategies. Contrasting brain activation during late compared to early learning indeed displayed higher activation in the ventral precuneus. Increased demands on the precuneus associated with learning to apply an exemplar-based strategy indicate that precuneus role for judgment is linked to the importance of episodic memory processes.

Email: Sara Stillesjö, sara.stillesjo@umu.se



12:00-1:30 PM (2010)

Slow Wave Activity as a Marker of Proactive Control. KIRA BAILEY, SEAN MCCARTT and ERIKA SHULTZ, *Ohio Wesleyan University* — The Dual Mechanisms of Control theory proposes that individuals flexibly alternate between two modes of control – reactive and proactive – based on current task demands (Braver, 2012). In imaging studies, reactive control is correlated with transient activity in the lateral prefrontal cortex (PFC) and the anterior cingulate cortex, while proactive control is associated with sustained activity in the lateral PFC. Research using event-related potentials (ERPs) has identified the frontal slow wave (FSW) as a neural marker of proactive control (Bailey, West, & Anderson, 2010; West & Bailey, 2012; West et al., 2012). The current study aimed to replicate and extend previous work by examining slow wave activity in three different tasks: the counting Stroop, N-back, and flanker tasks. Participants completed the three tasks while EEG was recorded. Stimulus and response-locked slow waves were present across all three tasks, further supporting its association with the implementation of proactive control.

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12:00-1:30 PM (2011)

Neural Mechanisms of Learned Switch-Readiness. ANTHONY W. SALI, CHRISTINA BEJJANI and TOBIAS EGNER, *Duke University* — Individuals adjust their readiness to switch task-sets according to changing environmental demands, but the neural bases underlying this learning process are unknown. Here, participants completed a numerical task-switching paradigm with time-varying switch likelihoods during functional magnetic resonance imaging (fMRI). Task-switch costs were smaller in blocks with frequent task switches relative to those with infrequent switches, demonstrating learned modulations of flexibility. A temporal difference learning model successfully accounted for the switch learning process within and between individuals. Employing the trial-by-trial estimates of switch prediction error in model-based fMRI analyses revealed that activation in the left posterior parietal cortex scaled positively with the updating of switch-likelihood predictions. Together, our results provide evidence that reinforcement learning mechanisms, linked to the posterior parietal cortex, mediate learned adjustments in switch-readiness.

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12:00-1:30 PM (2012)

The Role of Audiation Abilities in the Statistical Learning of Auditory Sequences: An ERP Study. SAMANTHA N. EMERSON and CHRISTOPHER CONWAY, *Georgia State University* (Sponsored by Christopher Conway) — The ability to extract patterns from series of discrete elements and to make predictions about future occurrences—known as statistical learning (SL)—is a vital component to many aspects of cognition and behavior including language acquisition. Little is known about what factors contribute to SL; as such, the current study seeks to examine one possible contributor to SL: audiation—the ability to hold a pattern (particularly an auditory pattern) in working memory. 27 adults were divided into three groups

based on their audiation abilities. Then electroencephalography was recorded during an auditory SL task that involved sequences of tones in which statistical regularities were embedded: a standard tone repeated a pseudo-random number of times followed by a tone that predicted a high-pitched target tone in 90% of trials (high; HP), 50% of trials (medium; MP), or 20% of trials (low; LP). Event-related potentials that were time-locked to the onset of the predictor stimuli showed an increase in a component known as the P300 in response to LP and HP for participants with low and medium audiation abilities but not in those with high abilities suggesting more efficient SL processing with increased audiation abilities.

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12:00-1:30 PM (2013)

Relations Between Pattern Separation Ability and Hippocampal Subfield Volume in Childhood. KELSEY L. CANADA, FENGJI GENG and TRACY RIGGINS, *University of Maryland* (Sponsored by L. Robert Slevc) — Episodic memory relies on pattern separation, the ability to encode similar memories separately. Research in adults suggests hippocampal subfields, dentate gyrus (DG) and CA3, work together to facilitate pattern separation. These same regions show prolonged development, well into childhood. However, relations between pattern separation and hippocampal subfields during childhood have not been examined. To address this gap, the current study examined relations between performance on a Mnemonic Similarity Test, which reflects pattern separation, and hippocampal subfield volumes. Manual tracing of 20 cases was used with the Automatic Segmentation of Hippocampal Subfields software to yield bilateral subiculum, CA1, and CA2-4/DG volumes from ultra-high resolution T2-weighted structural MRI scans. Intracranial volume differences were corrected. Preliminary analyses of 55 4- to 8-year-old children showed an interaction between age and left DG volume when predicting pattern separation ability. Left DG volume was positively correlated with pattern separation ability in younger (4-6 years) but not older children (7-8 years). These findings will be discussed in relation to the developmental trajectory of the hippocampus during childhood.

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12:00-1:30 PM (2014)

Neural Correlates of N-Back Performance Depend on the Level of N. ROSALIND NGUYEN, LESLEY A. SAND, MICHAEL DOUGHERTY and DONALD J. BOLGER, *University of Maryland, College Park* (Sponsored by Donald Bolger) — The popularity of using N-back in WM training studies lies in the fact that its performance has been shown to correlate with other measures of WM. The underlying assumption of the task is that it engages core memory processes involved with the maintenance and updating of WM. In a typical WM training study, the difficulty (level of N) increases as the participant improves with training. This is critical because as the level of N increases, it is assumed that the same WM processes continue to be engaged and that the construct validity of N-back is maintained across different levels of N. In this study, we explore the degree to which performance at



different levels of N correlate with estimates of both pre-frontal and hippocampal volume extracted using FreeSurfer. The results suggest that the relationship between task performance and regions of the pre-frontal cortex and hippocampus depend on the level of N.

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12:00-1:30 PM (2015)

Are Neural Oscillations Responsible for the Enhancement of Flicker Brightness? JENNIFER K. BERTRAND, NATHAN J. WISPINSKI, KYLE E. MATHEWSON and CRAIG S. CHAPMAN, *University of Alberta* (Sponsored by Peter Dixon) — Over 100 years ago, Brucke (1864) showed that a flickering light was perceived as significantly brighter than a non-flickering baseline. In two experiments, we explored this phenomenon with electroencephalography (EEG). We replicated and extended Brucke's behavioural finding: Despite all stimuli having identical luminance, a 4 Hz stimulus was perceived as the brightest nearly 80% of the time. EEG analysis with 4, 9, and 13 Hz stimuli suggested that the amount of phase locking induced by the flickering stimuli was correlated with its perceived brightness: Occipital activity showed the greatest phase coherence for the 4 Hz stimulus which was also judged as brightest. This study suggests a potential neural mechanism responsible for brightness enhancement that we hope to extend to other biased perceptual decisions.

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12:00-1:30 PM (2016)

Touching the Concrete N400: Differential Effects of Body-Object Interaction on N400 Latencies and Amplitudes. HAMAD AL-AZARY and KEN MCRAE, *University of Western Ontario* (Sponsored by Ken McRae) — Although concrete words elicit greater N400 amplitudes than abstract words, they have the same peak latency. This suggests that the time required to activate concepts is not affected by semantic richness. In our study, ERPs were recorded as participants categorized concrete and abstract words as touchable or untouchable. The concrete words differed on body-object interaction (BOI), which is a normed semantic richness measure of the ease with which a person can physically operate on a word's referent. High BOI words such as bicycle are easy to interact with, whereas low BOI words such as rainbow, although imageable, are difficult to interact with. N400s were greater for the low BOI than for the high BOI words. More interestingly, N400s peaked earlier for high than for low BOI words. We interpret these results to be consistent with flexible models of semantic processing in which semantic richness facilitates concept activation for relevant tasks.

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12:00-1:30 PM (2017)

Differences in Then and Now: Partially Unique Neural Activation Patterns in Prospective and Retrospective Metacognitive Judgments. TIMOTHY DAVID KELLEY and MICHAEL J. SERRA, *Texas Tech University*, BENJAMIN D. ENGLAND, *Missouri Western State University*, TYLER H. DAVIS, *Texas Tech University* (Sponsored by Tyler Davis)

— Neurocognitive research demonstrates that prospective metacognitive judgments utilize the medial prefrontal cortex (PFC), whereas retrospective metacognitive judgments utilize the lateral PFC. Researchers, however, have not compared these two types of metacognitive judgments within the same study. Behaviorally, people may use explicit information about past performance to inform their prospective judgments, but may use subjective information about the retrieval experience to inform their retrospective judgments. In the current study, we compared both prospective and retrospective judgments while subjects performed a probabilistic classification task in the MRI scanner. During prospective judgments, the hippocampus and right rostralateral PFC (rLPFC) were active. During retrospective judgments, the ventral striatum and right rLPFC were active. When making prospective and retrospective judgments of the same cognitive process (probabilistic classification), these results suggest that both types of judgment rely (at least partly) on similar metacognitive processes, but use different sources of information to inform that process.

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12:00-1:30 PM (2018)

Tracking the Contents of Working Memory Using Oscillatory and Event-Related Slow Wave Activity. GISELLA K. DIAZ, EDWARD K. VOGEL and EDWARD AWH, *University of Chicago* (Sponsored by Edward Awh) — Oscillatory brain activity in the alpha-band (8-12 Hz) and slow wave EEG activity have both been strongly implicated in the maintenance of information in visual working memory (WM). For instance, increasing visual working memory load leads to monotonic declines in alpha power and monotonic increases in the amplitude of a parieto-occipital negative slow wave (Fukuda et al., 2015). Interestingly, while both signals tracked performance, they were uncorrelated and explained distinct variance in ability. Here, we replicated this empirical pattern using tasks that required subjects to maintain colors or spatial positions in visual WM. In addition, we used grouping by collinearity to manipulate the number of perceptual groups in the display while holding constant the number of display elements. These data provide further insight into how these distinct neural signals track the online contents of visual WM.

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12:00-1:30 PM (2019)

Fast Mapping vs. Explicit Learning: Neural Tuning After Ten Minutes. MICHELLE R. JOHNSON, RUTHIE E. WITTENBERG and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* (Sponsored by Evangelia Chryssikou) — Fast mapping, a rapid word-learning procedure, may be critical to language acquisition in early development. Previous studies show that fast mapping may bypass the hippocampus, unlike explicit learning; however, the specific neural mechanisms of fast mapping remain unclear. Preliminary behavioral data reveal that fast-mapped concepts undergo rapid lexical integration after ten minutes, indicating that they may directly consolidate in the neocortex. Using fMRI rapid adaptation methodology, we therefore hypothesize that ten minutes after learning, fast-mapped concepts will display tighter neural



tuning than explicitly learned concepts. The results of this study would contribute to a model of the differential contributions of the hippocampus and neocortex in varying learning contexts. Email: Michelle Johnson, michellj@sas.upenn.edu

COGNITIVE CONTROL

12:00-1:30 PM (2020)

What are the Costs of Degraded Parafoveal Previews During Silent Reading? MARTIN R. VASILEV, TIMOTHY J. SLATTERY, JULIE A. KIRKBY and BERNHARD ANGELE, *Bournemouth University* — Marx et al. (2015) claimed that the standard random letter masks used in parafoveal preview experiments not only reduce preview benefit, but also induce preview costs. They suggested that visually degraded previews reduce preview costs and provide a neutral baseline. In order to test this claim, we performed three reading experiments: In Experiment 1, we found no compelling evidence that degraded previews reduced processing costs associated with traditional letter masks. Moreover, participants were highly sensitive to detecting degraded display changes. Experiment 2 utilized the boundary detection paradigm (Slattery et al., 2011) to explore whether participants were capable of detecting actual letter changes or if they were responding purely to changes in degradation. We found that degrading the parafoveal letter masks did not reduce processing costs in adults, but both degraded valid and invalid previews introduced additional costs in terms of greater display change awareness. Finally, in Experiment 3, we performed a moving window study in which all words on the screen were degraded until they were fixated. This enabled us to separate the effects of parafoveal orthographic processing and the effects of display change awareness. Email: Bernhard Angele, bangele@bournemouth.ac.uk

12:00-1:30 PM (2021)

Examining the Boundaries of Task Structure and Performance. ELIOT HAZELTINE, *University of Iowa*, ERIC SCHUMACHER, *Georgia Institute of Technology* — Cognitive control allows for the selection of responses to stimuli as a function of current task goals. Prior research has shown that control processes may operate globally or at the set-level depending on task demands. Recently, Hazeltine and Schumacher (2016) proposed that task sets are established dynamically as a function of both the stimulus and response features and the rules and context guiding their selection. We conducted three experiments in which participants responded to two stimulus types that were mapped to two response groups either segregated by type or mixed across types. Exp. 1 mapped faces and places to the left and right hands. Exp. 2 used color and spatial stimuli. Finally, Exp. 3 repeated Exp. 1's stimuli, but used manual and vocal responses. Participants executed these mappings with precues that could give information about the stimulus type or response group. The results indicate that participants with segregated mappings treated the task as two subtasks, while those with mixed mappings treated it as a single overarching task. These findings suggest that task structure

provides boundaries for control processes and that these boundaries rely on more than stimulus- and response-specific determinants.

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12:00-1:30 PM (2022)

Can Research Participants Comment Authoritatively on the Validity of Their Self-Reports of Mind Wandering? A Replication and Extension of Seli, Jonker, Cheyne, Cortes, and Smilek (2015). MATT E. MEIER and ADAM J. LYONS, *Western Carolina University* — Seli, Jonker, Cheyne, Cortes, and Smilek (2015) found that through retrospective confidence reports, subjects can distinguish the validity of mind wandering reports. In addition, some subjects were better able overall to make this distinction than others. Here, we sought to replicate both the within and between-subjects' effects of confidence judgments on thought probe validity. To this end, we executed a preregistered close replication of Seli et al. (2015) and extended this work by administering the metronome response task twice and by measuring potential individual difference markers for which subjects may be better than others at monitoring their thoughts. Specifically, we measured working memory capacity, conscientiousness, neuroticism, and dispositional mindfulness. With data from 291 subjects, we replicated a within-subjects effect of confidence on the first administration of the metronome response task. However, no evidence was found for individual differences in the ability to monitor thoughts.

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12:00-1:30 PM (2023)

Cross-Cultural Differences in Conflict Monitoring. MYEONG-HO SOHN, *The George Washington University*, JARANG KWAK, *Pusan National University*, REBECCA B. WELDON, *Juniata College*, DONGHOON LEE, *Pusan National University* — The conflict-monitoring hypothesis suggests that the rigidity of cognitive control can be contextually adjusted. We examined whether conflict monitoring is subjected to attention deployment strategies, especially those strategies associated with different cultural backgrounds. In Experiment 1, we modified the Egner and Hirsh (2005) paradigm with Korean materials, and the performance of Korean participants did not replicate the typical sequential modulation effect. In Experiment 2, we used images of two superimposed line drawings (one in red and the other blue), each of which can be animal or tool. In the Stroop version, participants categorized the red stimulus as animal or tool while ignoring the blue stimulus. American participants showed the sequential modulation effect but not Korean participants. In the same-different version, participants indicated whether two line drawings belong to the same category or not, and there was no group difference. These results indicate that conflict monitoring is subjected to attention deployment strategies.

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12:00-1:30 PM (2024)

Mind Wandering and Temporal Focus. PETER DIXON, CATHY AGYEMANG and LANE LIDDLE, *University of Alberta* — When mind wandering, people may lose temporal



focus, so that they are more readily influenced by recent prior episodes. We tested this hypothesis by examining sequential effects in the flanker task. In this paradigm, responses to a central target are slower when flanked by incompatible stimuli. However, this compatibility effect is often smaller following incompatible trials and larger following compatible trials. We replicated this sequential effect, but found that it only occurred when subjects indicated they were mind wandering, not when they were on task. Our interpretation is that when subjects were on task, they were focused on the current trial; when they were mind wandering, memory for prior trials interfered with performance.

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12:00-1:30 PM (2025)

Response-Set Overlap in Modulation of the Simon Effect by Intermixed Location-Relevant Trials. AKIO NISHIMURA, *Yasuda Women's University*, KEI KURATOMI, *Aichi Shukutoku University* — Performance is better when stimulus and response spatially correspond than when they do not even when the stimulus location is task-irrelevant (Simon effect). The Simon effect is reversed if incompatible location-relevant trials are intermixed. The present study investigated the role of response-set overlap between the location-relevant and location-irrelevant trials. Stimulus appeared at left or right in white, green, or red. Participants made left/right response based on the white stimulus location (location-relevant trials), and on its color if the stimulus was green or red (location-irrelevant trials). Reversal of the Simon effect was observed with left/right button for one trial type and left/right pedal for the other (i.e., without response-set overlap), although the modulation of the Simon effect was larger with response-set overlap (i.e., buttons or pedals for both trials). The results indicate that response-set overlap is not a determining factor of the reversal of the Simon effect.

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12:00-1:30 PM (2026)

Response Time Distribution Analysis of the Reverse Stroop Effect With Manual Responses. YUKI ASHITAKA, *West Japan Railway Company*, HIROYUKI SHIMADA, *Kobe University* — Many researchers have used delta plots to examine RT distributions in conflict tasks. It is well known that delta plots of the Stroop effect have a positive slope. However, to our knowledge, delta plots of the reverse Stroop effect (RSE) have not been investigated to date. We examined the reverse Stroop task by using manual responses because the RSE tends to be observed with manual rather than with vocal responses. Three conditions were compared: (A) keys without labels, (B) keys with color labels, and (C) keys with varying color labels. Results showed that the delta plot slope in the second and third conditions was positive, whereas that in the first condition was not. We discuss the translation account and the strength-of-association account of the RSE.

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12:00-1:30 PM (2027)

Adaptive Procedure Training Succeeds in Facilitating Cognitive Control. YOSHIYUKI UEDA and JUN SAIKI, *Kyoto University* — Cognitive control, or executive function, plays an important role in focusing on relevant information while preventing interference from distracting stimuli. In this study, we explored the efficiency of training with adaptive procedure, in which the task difficulty was decided based on the history of participants' performances using this skill. Participants performed the multi-source interference task, in which they were asked to identify the oddball digit among three digits via a button press. In interference trials, the oddball was always placed incongruently with the button box response positions and distractors constituted digits relevant to participants' response, creating an attentional conflict. When the probability of occurrence of interference trials changed based on performances of the last 8 trials, cognitive control was significantly facilitated. However, this effect was weak when feedback was based on performance of others. The results suggest that cognitive control was facilitated more efficiently with adaptive, relative to uniform, technique.

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12:00-1:30 PM (2028)

Memory Span and Updating in Working Memory-Independent or Inter-Related Processes? GIDON T. FRISCHKORN, ANNA-LENA SCHUBERT, JAN RUMMEL and DIRK HAGEMANN, *Heidelberg University* — Working memory realizes two different tasks, (1) storing information while (2) the same or other information is being processed, raising the question if these two cognitive functions in working memory are independent or inter-related. Additionally, studies on working memory mostly focus on the accuracy of representations neglecting the role of processing speed as an additional property of working memory. The present poster presents an adapted updating task measuring both accuracy, as well as speed of memory retrieval that independently manipulated memory and processing demands to evaluate in how far these two core functions of working memory are functionally independent or interrelated. Results showed that increases in memory demands, as well as updating demands, lead to less accurate representations and slower memory retrieval. More importantly, these two effects depend on each other suggesting that storage and processing are inter-related cognitive functions in working memory.

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12:00-1:30 PM (2029)

Influence of Target-Box Onset on Spatial Compatibility Effects for Eye-Movement Responses. COURTNEY GRIFFIN-OLIVER and ROBERT W. PROCTOR, *Purdue University* (Sponsored by Thomas Strybel) — Exogenously-driven saccadic eye movements to visual stimuli are often characterized as highly automatic. This implies that element-level mapping effects should be more pronounced for eye-movement responses to spatial stimuli than for keypress or vocal location-word responses. Previously, we found that prosaccadic



and antisaccadic mappings of left-right eye movements to visual stimuli at left and right locations did not show the expected large element-level mapping effect. In those experiments, outline boxes designating the target locations were visible prior to onset of the imperative stimulus. The present study was a follow-up in which the target boxes appeared simultaneously with the imperative stimulus. In this case, eye-movement responses to the spatial stimuli were significantly faster overall and yielded the expected large element-level mapping effect. Thus, saccadic eye movements in response to peripheral visual stimuli are more automatic when target locations are not visible in advance.

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12:00-1:30 PM (2030)

Evaluating the Use of Self-Relevant Stimuli in Attention Bias Modification: Effects on Reaction Time, Test-Retest Reliability, and Near-Infrared Spectroscopy Measures. JACOB ADAY, *Central Michigan University*, JOSHUA CARLSON, *Northern Michigan University* (Sponsored by Christopher Davoli) — Attention bias modification (ABM) is thought to reduce attention biases towards threat and in turn, anxious symptoms. Tailoring the training to each individual by incorporating self-relevant stimuli may improve reliability. Participants in this study completed ABM (treatment) or a dot-probe task (DPT; control) using self-relevant stimuli 6 times bookended by a standard DPT with near-infrared spectroscopy (NIRS) measures. There were no anxiolytic effects; however, reaction time in their first training session was slower than all other sessions- suggesting participants may need a practice session to eliminate noise in the data. The control group showed an attention bias towards their self-relevant threats, but this effect was specific to top-target trials. Top and bottom-target bias indices calculated separately were highly correlated across the 6 sessions. The control group also showed increased prefrontal cortex activity following training during threat-congruent trials, perhaps due to heightened top-down goal-directed inhibitory control.

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12:00-1:30 PM (2031)

Reduced Reports of Mind Wandering in Older Adults are Associated With Behavioral and Pupillometric Indicators of High Task Engagement. NATHANIEL T. DIEDE, DILLON SEALS, JEFFREY L. SHI and JULIE M. BUGG, *Washington University in St. Louis* (Sponsored by Julie Bugg) — Older adults report mind wandering (MW) less than younger adults, a finding that contradicts major theories of both cognitive aging and MW. One major concern regards the validity of self-reported MW. Taking a multifaceted approach, the current study used behavioral, thought probe, and pupillometric methods to assess the validity of self-reports in both age groups. Subjects completed a psychomotor vigilance task during eyetracking, after which motivation, drowsiness, and perceived task difficulty were measured. Both age's reaction times became slower with time on task. However, over time older adults had a shallower increase in attention lapses, pupillary hippus (a measure of fatigue), and maintained a higher tonic pupil size

(measure of sustained effort). Older adults felt less drowsy, rated the task more difficult, were more motivated to perform the task, and reported MW less than did younger adults. Results converge in suggesting older adults MW less because of greater task engagement.

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12:00-1:30 PM (2032)

Adaptation to Conflict Frequency Without Contingency and Temporal Learning: Evidence From the Picture-Word Interference Task. GIACOMO SPINELLI, JASON R. PERRY and STEPHEN J. LUPKER, *University of Western Ontario* (Sponsored by Lucia Colombo) — In interference tasks (e.g., Stroop), the difference between congruent and incongruent trials is larger in mostly congruent than in mostly incongruent lists. Although this proportion-congruent effect has typically been interpreted as reflecting adjustments in attention towards/away from the task-irrelevant dimension (i.e., a conflict adaptation strategy), recent research has suggested that learning of contingencies (i.e., distractor-response associations) or of temporal information (i.e., typical response speed on previous trials) as alternative explanations. Using the picture-word interference paradigm, we report three proportion-congruent experiments in which contingency learning was made impossible by using nonrepeated distractors (Experiment 1) or nonrepeated distractors and responses (Experiments 2 and 3). The classic proportion-congruent effect emerged in all three experiments. Further, this effect remained even when considering trials for which the response speed on the previous trial was equated between the mostly congruent and mostly incongruent lists (Experiment 3). These results suggest that conflict adaptation remains a robust explanation for the proportion-congruent effect.

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12:00-1:30 PM (2033)

Do Working Memory and Conflict Resolution Share Common Cognitive Resources? MELISSA MOSS, ATSUSHI KIKUMOTO and ULRICH MAYR, *University of Oregon* (Sponsored by Ulrich Mayr) — Working memory and conflict resolution are often regarded as overlapping functions. Although individual differences research has suggested that the two are highly correlated, the extent to which they share common cognitive resources within individuals is unknown. To study how overcoming conflict influences the maintenance of working memory representations and vice versa, we ran two experiments using a dual-task paradigm in which both conflict and working memory load were manipulated. Participants performed an auditory Stroop task ("High" or "Low" spoken in high/low pitch), which was embedded in the retention period of a visual change detection task. Across the two experiments, we found no significant interaction between level of conflict and working memory load on performance in either task (auditory Stroop reaction times and change detection task accuracy). These findings suggest that the strong relationship between working memory maintenance and conflict resolution found



in individual differences work is *not* driven by overlapping, resource-limited processes between the two cognitive control functions.

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12:00-1:30 PM (2034)

Common or Distinct Attention Mechanisms for Contrast and Assimilation? HOPE K. SNYDER, SEAN M. RAFFERTY, JULIA M. HAAF and JEFF N. ROUDER, *University of Missouri - Columbia* (Sponsored by Clint Stober) — The ability to inhibit distractors while focusing on specific targets is crucial. In most tasks, like Stroop or priming, the to-be-ignored distractors affect the response to be more like the distractors. We call that assimilation. Yet, in some tasks, contrast tasks, the opposite holds. We ask here whether inhibition across contrastive and assimilative tasks is common or distinct. Assimilation and contrast are often thought to have different underlying psychological mechanisms, and we use a correlational analysis with hierarchical Bayesian models as a test of this hypothesis. We designed tasks with common stimuli that had large assimilation or contrast effects depending only on the surrounding context. Critically, a positive correlation was found - individuals who better inhibited contrast-inducing contexts also better inhibited assimilation-inducing contexts. These results indicate inhibition is common, at least in part, across contrast and assimilation tasks.

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12:00-1:30 PM (2035)

The Interplay of Attention- and Task-Switches in an Auditory Attention-Switching Paradigm. JULIA C. SEIBOLD, SOPHIE NOLDEN, JOSEFA OBEREM, JANINA FELS and IRING KOCH, *RWTH Aachen University* (Sponsored by Iring Koch) — The role of attention-switches in task-switching was examined in a combination of a cued attention-switching paradigm, and a task-switching paradigm. Participants heard a letter-, and a digit-word, dichotically presented, which were spoken by a male and a female speaker. A cue indicated how to identify the target-word in each trial- either by naming the target-speaker's sex, the ear of presentation, or the task. On a target-digit, participants performed a size-categorization-task, whereas on a target-letter, a consonant-vowel discrimination was required. Attention- and task-switch costs were both present, and interacted: in cued attention-switch trials the reaction time benefit of implicit task-repetitions was reduced, and similarly in cued task-switch trials, the reaction time benefit of implicit attention-repetitions was reduced. This extends findings from task-switching in hierarchical task structures, in which switching on higher task-chunk-levels only dominated switching on the lower task-levels. The present results suggest that every kind of instructed switch can eliminate repetition-benefits in other parts of the attention-, and task-set-compound, which are relevant for response selection.

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ATTENTION CAPTURE I

12:00-1:30 PM (2036)

Does Distraction by Deviant Sounds Always Reflect Attentional Capture? A Pupillometric Study. FRANÇOIS VACHON, MICHAËL LÉVESQUE-DION, ALEXANDRE MAROIS and ANNIE DESMARAIS, *Université Laval*, JOHN E. MARSH, *University of Gävle* — The occurrence of a sound that acoustically deviates from the auditory background typically captures attention and interferes with ongoing mental activity. A deviation of semantic nature is also endowed with distracting power. Yet, the semantic deviation effect, contrary to its acoustical counterpart, appears insensitive to top-down influences, casting doubt about its attentional nature, as attention-capture phenomena are usually amenable to cognitive control. The present study sought to determine if attentional capture subtends the disruptive impact of semantic deviants using the pupil dilation response (PDR), an index of the attentional response triggered by an acoustical deviant. To contrast the PDR to acoustical and semantic deviance, an unpredictable change of voice or of semantic category was randomly inserted in a to-be-ignored auditory sequence while monitoring the pupil diameter of participants performing visual serial recall. Whereas both types of deviant disrupted recall, only acoustical deviants elicited a PDR, suggesting that the semantic deviation effect cannot be explained in terms of attentional capture. These findings point toward two independent forms of auditory distraction driven by distinct mechanisms.

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12:00-1:30 PM (2037)

Reappearance of the Complete Representation is Necessary for Working Memory-Driven Attentional Capture. CHUN-YU KUO, *National Pingtung University*, YEI-YU YEH, *National Taiwan University* — The relationship between working memory and selective attention has been demonstrated by numerous studies which showed that the content of working memory biases attention. This effect, working memory-driven attentional capture, has been well demonstrated in the literature. However, few studies have investigated how the characteristics of the representation maintained in working memory may influence the capturing effect. Previous studies showed that the capturing effect was absent when memorizing more than one item in working memory. This goal of present study was to examine how chunking strategy modulated the capture effect driven by the individual component of the stimulus stored in working memory. The participants were required to remember letters which were arranged in different forms and then performed a motion judgment task. The results showed that the reappearance all letters captured attention whereas individual letters did not. Reappearance of the complete visual representation is necessary for inducing the capturing effect.

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12:00-1:30 PM (2038)

The Effects of Location Repetition and Shape Repetition in a Target-Target Paradigm: A Reaction Time Distribution Analysis. HSUAN-FU CHAO, *Chung Yuan Christian*



University — The present study aimed at investigating the benefits and costs of location repetition and shape repetition in a target-target paradigm of inhibition of return. A simple detection task was used in Experiment 1 while a Go/NoGo task with a discrimination component was used in Experiment 2. Vincentized cumulative reaction time (RT) distributions in each condition were computed for analyzing the data in both experiments. The results of Experiment 1 showed that the repetition costs of location repetition and shape repetition increased as the RT became longer. The results of Experiment 2 showed that when the location was repeated, there was a repetition cost when the RT was short and a repetition benefit when the RT was long. When the shape was repeated, the repetition benefit increased as the RT became longer. These findings suggest the importance of time-dependent memory retrieval and task demand.

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12:00-1:30 PM (2039)

The Causal Role of the Parietal Lobe in Facilitation and Inhibition of Return. ELISA MARTÍN-ARÉVALO, GIULIANA MARINO, JUAN LUPIÁÑEZ and ANA B. CHICA, *University of Granada* — In the present study, we will use a causal approach to investigate whether the *detection cost* is a necessary and/or sufficient condition to observe IOR. We will apply online TMS to the parietal cortex while the participants perform the same paradigm to the one previously used in our preceding study (Martín-Arévalo et al., 2014). Two experiments will be run, potentiating attentional facilitation (when no intervening event is presented) or IOR (when an intervening event is presented). TMS pulses will be applied to a parietal or control (vertex) site and locked to the P1 peak or to a control time window. We hypothesized that parietal TMS during the P1 peak would reduce the contribution of the *detection cost* to behavioral effects. Therefore, when behavioral facilitation is expected in the control TMS condition, we hypothesize that parietal TMS will increase behavioral facilitation effects by reducing the contribution of the *detection cost* to performance. When behavioral IOR is expected in the control TMS condition, we hypothesized that parietal TMS will reduce or abolish the IOR effect, since the *detection cost* is the only (or main) contribution of spatial cueing on behavior.

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12:00-1:30 PM (2040)

The Influence of Visual Load on Attentional Capture by Multimodal Signals. SANDRA MURPHY and POLLY DALTON, *Royal Holloway, University of London* — Previous research has suggested that multimodal stimuli can capture attention under conditions of high current task load in which capture by the constituent unimodal stimuli is not seen (Santangelo et al., 2007; Santangelo & Spence, 2008). However, this research has relied on indirect reaction time measures to assess attentional capture, leaving open the possibility that unimodal cues do indeed capture attention but that people are able to disengage from them faster than from multimodal cues. Here, we address this possibility by directly measuring people's detection of a task-irrelevant 'critical stimulus' occurring

on 50% of trials. Participants completed a letter search task under low or high visual perceptual load as well as reporting the presence or absence of a concurrent visual or visuotactile critical stimulus. The results suggest that attentional capture by multimodal stimuli is similarly susceptible to modulations by visual task load as capture by unimodal stimuli.

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12:00-1:30 PM (2041)

Probe Identification Reveals the Spread of Attention in Contingent Capture. BRYAN R. BURNHAM, *The University of Scranton* — A continuing debate is extent to which the capture of attention by salient items is moderated by top-down attentional settings. Folk, Remington and Johnston's (1992) contingent orienting hypothesis predicts only salient items that are relevant to a target template will capture attention, and studies have supported this prediction. To account for these findings, proponents of stimulus-driven capture have proposed alternative explanations (rapid disengagement, attentional dwelling) for the finding that target-relevant cues capture attention, but target-irrelevant cues do not. This study intermixed a probe identification task within a cuing task to examine where attention was focused after the onset of a cue that was relevant or irrelevant to the attentional set. Results showed a pattern of contingent capture in response times. More importantly, this pattern was observed also for probe identification performance: probes were identified more when they appeared in a location coinciding with a target-relevant cue, but not a target-irrelevant cue, which supports the contingent orienting hypothesis.

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12:00-1:30 PM (2042)

Theory of Mind as a Cognitive Reflex. ADAM S. COHEN, *University of Western Ontario* — Explaining behavior in terms of mental states is a staggeringly complex problem. Consider a behavior as simple as a man taking an umbrella. Did he *think* it was raining? Did he *think* it was sunny and only *pretend* it was raining? Mental state inference is an ill-posed problem because any action is consistent with many mental states. Computationally, how does the mind recover mental states if they are underdetermined by behavior? Two competing theories of the architecture underlying theory of mind (ToM) are considered. On the "classic" account, ToM operates without encapsulation, relying on top-down knowledge to constrain inferences from behavior to mental states. In contrast, on the "cognitive reflex" account, the system is encapsulated from top-down knowledge but draws on specialized, content-rich procedures to compute mental states. A series of experiments manipulating top-down knowledge to test these theories consistently supported the cognitive reflex account. The findings have implications for understanding the computational organization of ToM and how it enables efficient mental state attribution. The results also have consequences for recent claims about ToM development and for modularity in cognitive science.

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12:00-1:30 PM (2043)

Neural Mechanisms of Attentional Capture Driven by Selection History. HAENA KIM and BRIAN A. ANDERSON, *Texas A&M University* (Sponsored by Brian Anderson) — Stimuli associated with reward acquire the ability to automatically capture attention. It is also the case that, with sufficient training, former targets can acquire the ability to capture attention in the absence of extrinsic rewards. It remains unclear whether these two experience-dependent attentional biases share a common underlying mechanism. In the current study, participants completed a four-day training in visual search for a specific colour target. In a subsequent test phase, they performed visual search for a shape-defined target in which colour was task-irrelevant. Response times were slower when a former target-colour distractor was present than when it was absent, replicating attentional capture by unrewarded former targets. Neuroimaging results revealed a more right lateralised pattern of activation compared to attentional capture by reward cues, and no activation was found in the caudate tail. These results imply that reward history and selection history influence attention via dissociable underlying mechanisms. Email: Haena Kim, hannah.kim@tamu.edu

12:00-1:30 PM (2044)

Abrupt-Onset Attention Capture Within the Attentional Window. DANIEL TAY and JOHN J. MCDONALD, *Simon Fraser University* (Sponsored by John McDonald) — The present study used an event-related potential component associated with attention selection (N2pc) to investigate whether an irrelevant abrupt visual onset falling within the attentional window (i.e., a region in the visual field monitored for potential objects of interest) captures attention. Participants viewed displays containing a large-but-faint grey disk and a small-but-salient red line within the area of the disk. In Experiment 1, participants discriminated disk size or line length in separate blocks. Experiment 2 was similar except the disk-discrimination task was replaced by a disk-detection task so that the red line appeared alone on half of the trials. Unsurprisingly, the line was found to elicit an N2pc in the line-length tasks. Critically, the line elicited a smaller but significant N2pc in the disk tasks. These results suggest that abrupt onsets falling within the attentional window capture attention but that participants have some degree of top-down control to mitigate this distraction. Email: Daniel Tay, dta22@sfu.ca

12:00-1:30 PM (2045)

Looking to Avoid Looking: Evidence for Limited Goal-Directed Control Over Value-Modulated Oculomotor Capture. DANIEL PEARSON and MIKE E. LE PELLEY, *University of New South Wales Sydney* (Sponsored by Mike Le Pelley) — Recent findings suggest that a stimulus' relationship with reward can automatically influence attentional and oculomotor selection independently of, or even counter to, our current goals. The *Value-Modulated Oculomotor Capture (VMOC)* effect demonstrates that stimuli associated with high-value rewards come to involuntarily capture eye movements, even when such capture results in the omission of reward

that would otherwise have been received. Previous data from our lab suggest that VMOC is an automatic, low-level effect that is immune to goal-directed attentional control processes. Here, we will describe recent studies using a variation on the VMOC procedure which show that we do have limited goal-directed control over the attentional bias for reward cues. We demonstrate that while participants are often unable to *prevent* the initiation of saccades to stimuli associated with high-value rewards, they can preferentially *direct* those saccades to a "safe" destination (that will not result in the omission of reward) once they have been initiated.

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12:00-1:30 PM (2046)

Intentional Suppression of Attention to Spatial Locations Takes Time. RYAN S. WILLIAMS, JAY PRATT and SUSANNE FERBER, *University of Toronto* (Sponsored by Jay Pratt) — To determine whether foreknowledge of task-irrelevant locations can be used to intentionally ignore perceptually salient distractors, we employed spatial cueing tasks with either a single cue-target interval of 1400 ms (Experiment 1) or multiple intervals between 350–1050 ms (Experiment 2). Participants were explicitly told that targets would not appear at cued locations. Across all cue-target intervals, target discrimination was best when salient distractors were absent. Importantly, in Experiment 1, a benefit was observed when distractors were presented at cued relative to uncued locations. A similar benefit was observed in Experiment 2 at the longest cue-target interval, but not at shorter intervals. In Experiment 3, we used EEG to examine electrophysiological markers of suppression both in preparation and at the time of distractor presentation. Together, our results suggest that attention is attenuated, but not entirely inhibited, to locations cued as task-irrelevant, allowing for reduced target-distractor competition when given sufficient time.

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12:00-1:30 PM (2047)

Flexible Attentional Control Settings: Evidence From ERPs. BO YOUN PARK, JI YEONG NOH, YE EUN KIM and YANG SEOK CHO, *Korea University* (Sponsored by Jacqueline Shin) — It has been suggested that attention capture is contingent on top-down attentional control setting. To investigate characteristics of attentional control setting, the cue validity effects in behavioral measurements and the cue-induced N2pc component in event-related brain potentials (ERPs) were examined in the spatial cueing paradigm. In Experiment 1, in which participants were asked to respond to the target defined by a color and to ignore the distractor defined by two different colors, both behavior and N2pc measurements showed that a specific attentional control setting was formed in terms of the target color. In Experiment 2, in which the target was defined by two colors and the distractor was defined by one color, an attentional inhibitory setting regarding the distractor color was built rather than one broad attentional control setting towards



the target colors. These results suggest that attentional control setting is constructed in an efficient way at any given task environment.

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12:00-1:30 PM (2048)

Attentional Selectivity Increases for Visual Stimulus Sets That Combine Two Dimensions of Variation. KIER R. GROULX, TINA TRAN and CHARLES E. WRIGHT, *University of California - Irvine* (Sponsored by Charles Wright) — Previous work (Sun et al, 2016) used the centroid paradigm and local differences between stimuli (in JNDs) to explore selectivity for sets of lights. They found that lights with equal luminance and saturation that vary in hue (i.e., simultaneous red-green and blue-yellow activation) possessed extremely high selectivities and that the selectivity magnitudes were almost independent of local differences. By contrast, sets of lights varying in only one dimension (red-green, blue-yellow, or achromatic luminance activations) possessed lower selectivities that were strongly correlated with local distances. Here we explore the hypothesis that the hue set differs because these lights vary in two dimensions. We do this by examining lights varying in both red-green and luminance activation. As expected, lights from this set possess high selectivities; however, unlike hue, selectivities were only moderately correlated with local distances. This suggests that combining information across more than one dimension of activation greatly increases achievable selectivity.

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ATTENTION

12:00-1:30 PM (2049)

Neglect Patients Exhibit Egocentric or Allocentric Neglect for the Same Stimulus Contingent Upon Task Demands. LOUISE-ANN LEYLAND, *University of Reading*, HAYWARD J. GODWIN, VALERIE BENSON and SIMON P. LIVERSEDGE, *University of Southampton* — Hemispatial Neglect (HN) is a failure to allocate attention to a region of space opposite to where damage has occurred in the brain. It is widely documented that there are two types of neglect: *egocentric* neglect (neglect of information falling on the individual's left side) and *allocentric* neglect (neglect of the left side of each object, regardless of the position of that object in relation to the individual). We investigated whether neglect presentation could be modified from egocentric to allocentric through manipulating the task demands whilst keeping the physical stimulus constant. We recorded eye movement behaviour for a group of neglect patients who engaged in copying and tracing tasks. The data demonstrated that patients exhibited symptoms consistent with *egocentric* neglect in one task (tracing), and *allocentric* neglect in another task (copying). The findings show that task requirements influence the nature of the neglect symptoms produced by the same individual.

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12:00-1:30 PM (2050)

Exploring With the Eyes and Exploiting With the Hands: Responses Determine Performance in Attentional Cueing Tasks. MATTHEW D. HILCHEY, JASON RAJSIC and GREG HUFFMAN, *University of Toronto*, RAYMOND M. KLEIN, *Dalhousie University*, JAY PRATT, *University of Toronto* — The intention behind a manual response to a target has an enormous impact on performance in standard cueing tasks with long cue-target intervals. While manual detection and localization responses are slower for cued relative to uncued targets, the reverse is true if responses are based on identity. Thus, manual responses are either facilitated or inhibited depending on the task. Across experiments, we examined whether these facilitatory response tendencies extend to oculomotor responding by also requiring an eye movement to both cues and targets, whose identities were discriminated with manual responses. Manual responses were facilitated for targets at the cued location. In contrast, eye movements were inhibited for targets at the cued location. The data reveal another dissociation between the eyes (explore the visual field by moving away from fixated locations) and the hands (exploit locations that recently bore fruit).

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12:00-1:30 PM (2051)

Mine is Worth More (Attention) Than Yours: Self-Relevance and Reward. GRACE TRUONG, TODD C. HANDY and REBECCA M. TODD, *University of British Columbia* — Does self-relevance tap into the same reward system that money does? There is evidence that self-relevance (via ownership) is intrinsically rewarding, and our own research has shown that self-owned objects are also better remembered. If self-relevance and money are fungible, endowing other-owned stimuli with higher levels of reward should reduce the memory advantage for self-owned stimuli. After being told that they would be rewarded for each item later remembered, participants learned that images belonged to either themselves or the experimenter. Reward payout was either equal for each ownership category or unequally weighted for other-owned objects (equal condition: \$0.10 for self/\$0.10 for other; unequal condition: \$0.10 for self/\$0.11 for other). A subsequent recognition memory test revealed higher recognition for self-owned objects regardless of reward condition. These results suggest two competing possibilities: altering the ownership effect may require a larger reward, or self-relevance and money may differentially affect the reward system.

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12:00-1:30 PM (2052)

First Direct Evidence of Cue Integration in Reorientation: A New Paradigm. ALEXANDRA D. TWYMAN and MARK P. HOLDEN, *University of Nebraska-Lincoln*, NORA S. NEWCOMBE, *Temple University* — There are several models of the use of geometric and feature cues in reorientation (Cheng, Huttenlocher & Newcombe, 2013). The adaptive combination approach posits that people integrate cues with weights that depend on cue salience and learning, or, when discrepancies are large, choose between cues based on these variables (Cheng,



Shettleworth, Huttenlocher & Rieser, 2007; Newcombe & Huttenlocher, 2006). In a new paradigm designed to evaluate integration and choice, disoriented participants attempted to return to a heading direction, in a trapezoidal enclosure in which feature and geometric cues both unambiguously specified a heading, but later the feature was moved. With discrepancies greater than 90 degrees, participants choose geometry. With smaller discrepancies, integration appeared in 3 of 5 situations; otherwise, participants used geometry alone. Variation depended on direction of feature movement and whether the nearest corner is acute or obtuse. The results have implications for theory and future research.

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12:00-1:30 PM (2053)

Evidence of a Serial Process in Visual Word Recognition.

ALEX L. WHITE, JOHN PALMER and GEOFFREY M. BOYNTON, *University of Washington* — Can we process two written words in parallel, or is there a serial bottleneck to word recognition? To investigate this question, we presented pairs of words in masked displays and asked observers to judge various aspects of them, from the color of the text to their semantic category. In dual-task conditions, the observer judged the same attribute of both words. In single-task conditions, the observer judged only one word and ignored the other. For semantic judgments, the dual-task deficit was so large that it supported serial processing: observers could only recognize one word and had to guess about the other. This serial model was also supported by a negative correlation between accuracy on the two sides. In contrast, low-level aspects of the same stimuli could be processed in parallel. In discussion, we will relate our results to the ongoing debate about serial processing in reading.

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12:00-1:30 PM (2054)

Do You Believe Foreigners? Impact of a Foreign Accent on Cognitive Processes.

ALICE FOUCART, *Ghent University*, HERNANDO SANTAMARÍA-GARCÍA, *Pontificia Universidad Javeriana - INCyT*, ROBERT HARTSUIKER, *Ghent University* — We examined the impact of a foreign accent (FA) on sentence processing, credibility and memory using ERPs. First, participants saw videos of four speakers with different social status (high/low status) and accents (native/foreign accent). Then they had to assess written sentences containing true, false or unknown information ('One of the colours of the French/Gabonese flag is blue/green), presented along with the photo of one of the speakers. Finally, participants had to indicate who had said what. Results show that unknown information was assessed equally true independently of the speaker. ERPs revealed more negative deflections for unknown and false information compared to known information for the Superior-Native speaker; this deflection was absent for the Inferior-Native speaker and only present for false information for the FA-ed speaker. Recollection was better for Superior-Native > Superior-FA > Inferior-Native speakers. Overall, FA seems to have a long-lasting impact on cognitive processes.

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12:00-1:30 PM (2055)

Sleep Deprivation and Covert Orienting of Attention: Disengaging Makes the Difference.

CORRADO CAVALLERO and LAURA RIONTINO, *University of Trieste* — Research on the effects of sleep deprivation on covert orienting of attention have shown either a negative or a null impact of sleep loss. Performance decrements, when detected, have been usually attributed to generic attentional deficits. We studied the effects of one night of sleep deprivation on the three subcomponents of covert orienting of attention: engaging, shifting, and disengaging (*Posner and Raichle*, 1994). Forty-five participants completed the Revised Attention Network Test (ANT-R), the Stanford Sleepiness Scale (SSS), and the Global Vigor-Affect Scale (GVAS) at 09:00 a.m. following two different sleep conditions: base-line (a regular night of uninterrupted sleep) and Deprivation (24 hours of sustained wakefulness). We found a significant slowing down of disengaging, while engaging and shifting were virtually unaffected by sleep deprivation. Our data show that sleep deprivation selectively affects the three subcomponents underlying covert orienting of attention. They thus suggest that performance deficits following sleep curtailment should no longer be accounted for in terms of a general reduction of alertness or global attentional deficits.

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12:00-1:30 PM (2056)

The Effect of Endogenously-Directed Touch on Multiple-Object Tracking.

LANA M. TRICK and MALLORY TERRY, *University of Guelph* — Multiple-object tracking (MOT) involves mentally keeping track of the positions of multiple moving targets among other identical moving distractors. Pylyshyn, the originator of the MOT task, proposed that the mechanisms behind MOT are called upon when touching specific items among others in complex dynamic visual scenes. If that is true, then touching specific moving items should interfere (reducing tracking accuracy), but the interference should be more pronounced when the task is to touch moving distractors rather than targets. Simple MOT was compared to MOT when participants were required to touch either targets or distractors as they moved. As predicted, touching distractors interfered more than targets though touching moving items always interfered, a result that is discrepant with other studies that found no such interference when participants were required to touch targets and distractors that changed colour as they moved in MOT (an exogenous cue).

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12:00-1:30 PM (2057)

Individual Differences Among Novices in Attention Allocation in Multitasking: An Eye-Tracking Study.

JAAKKO KULOMÄKI, *Finnish Defence Research Agency*, LAURI OKSAMA, *National Defence University/Academy of Finland*, JUKKA HYÖNÄ, *University of Turku* (Sponsored by Jukka Hyönä) — In multitasking, it's essential to allocate attention efficiently and flexibly between subtasks of different priorities. Significant differences have been found in this regard between novices and experts. We measured novice participants' performance and attention allocation in a demanding monitoring



task consisting of four subtasks requiring continuous attention. Subtasks had distinct event rates defining their priorities. The task was presented in a condition where subtask priorities remained constant and in a condition in which priorities changed continuously requiring rapid reallocation of attention. Participants allocated their attention (measured as total fixation time) to subtasks in proportion to priorities in both conditions, but allocation was biased away from the subtask of highest priority towards tasks of lower priority. High performers' allocation was close to optimal and remained unchanged after the first trial, whereas low performers' allocation was initially severely suboptimal but improved during the task. We conclude that significant individual differences can be found in novices' ability to allocate attention in multitask situations.

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12:00-1:30 PM (2058)

Sequence Effects in Stage-Specific Desirable Difficulty. MELISSA J. PTOK, BETH COHEN, KARIN K.R. HUMPHREYS and SCOTT WATTER, *McMaster University* — The desirable difficulty effect is described by instances where increasing difficulty during initial task performance leads to better encoding of the targeted information. We take a stage-specific approach to investigate what particular task elements should produce this desirable difficulty benefit. Across several experiments, we have found that enhancing cognitive control demands at a semantic categorization stage of processing elicits this effect. As cognitive control mechanisms often show carryover effects of high-level attention demands from previous trials, the objective of this study was to investigate the presence of sequence effects in memory of the desirable difficulty effect – providing us with a better understanding of the mechanisms involved. Participants completed a congruency-priming task where they categorized male and female names while ignoring distractor primes (the words “male” or “female”). This was followed by a subsequent memory test. The results discuss a simple model of cognitive control allocation and the sequence effects involved that account for and predict when desirable difficulty effects occur.

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12:00-1:30 PM (2059)

Examining the Effects of Valence and Arousal in an Emotional Stroop Task. SAMANTHA E. TUFT and CONOR T. MCLENNAN, *Cleveland State University* (Sponsored by Conor McLennan) — Effects of valence and arousal on lexical processing have been examined in several studies. However, previous investigations have resulted in mixed findings. Some studies find performance is worse for stimuli with negative valence, and other studies find performance is worse for both positive and negative emotional words. Other studies find that performance is affected by differences in arousal, rather than valence. Inconsistent findings could be due to differences in task (e.g., lexical decision, emotional Stroop), presentation (e.g., blocked vs. mixed), or a lack of sensitivity in traditional measures (e.g., reaction time and accuracy). In the present study, we used computer mouse tracking to examine effects across all levels of valence (negative, neutral, positive) and arousal (low, medium,

high) in an emotional Stroop task. Mouse tracking allowed us to evaluate the continuous dynamics throughout each trial. Results of the current study have important theoretical implications for theories of emotional language processing.

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12:00-1:30 PM (2060)

The Mystery of Fascination: Understanding the Mechanisms of Fascination in Natural Restorative Settings. ALEXANDRE MAROIS, *Université Laval*, ANDREW M. SZOLOS, *Ohio University*, JASON M. WATSON, *University of Colorado Denver* (Sponsored by Jason Watson) — Continuously directing attention toward the environment is effortful. In such challenging context, nature can exert a beneficial impact and replenish attention. Mysterious and fascinating settings are deemed particularly efficient at having this positive outcome. Yet, mechanisms underpinning fascination's positive effect and the role of attention in restoration are still unclear. The goal of this study was to verify whether fascination and mystery could be related to other image properties and whether restoration was an active process. Participants were asked to rate 80 images (40 high- and 40 low-mystery; Szolosi et al., 2014) on four characteristics (likeability, fascination, mind wandering, and mood). Results first replicated ratings on fascination and the mystery-fascination relationship. Further analyses showed that both mystery sets differed on some visual properties and that high-mystery images were significantly more fascinating, liked, and elicited more positive affects, but less mind wandering than low-mystery pictures. This suggests that both top-down (subjective ratings) and bottom-up (visual properties) processes could affect the extent to which nature may trigger fascination and play a role in attention restoration.

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12:00-1:30 PM (2061)

How to Direct Attention to Favor Memory Formation. GEORGIA JENKINS, COLIN NOE and SIMON FISCHER-BAUM, *Rice University* (Sponsored by Simon Fischer-Baum) — In the current project, we explore how directing attention in different ways during encoding affects subsequent memory. In a level of processing experiment, attention was directed both with a pre-stimulus cue, indicating that the trial was going to be either a semantic or a form-based processing trial, and with a post-stimulus question probing that level of processing. On 60% of the trials the pre-stimulus cue and the post-stimulus question matched on level of processing. The remaining trials were evenly split between mismatches (e.g. pre-stimulus cue indicated semantic processing, post-stimulus question was form-based) and trials in which no question was presented. A level of processing effect based on the pre-stimulus cue was observed, but there was no additional effect of the post-stimulus question. Indeed, performance was best on those trials in which no question was presented. These results will be discussed in terms of competing theories of memory encoding.

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12:00-1:30 PM (2062)

Alpha-Band Activity Tracks Size and Resolution of Attentional Focus. TOBIAS FELDMANN-WÜSTEFELD and EDWARD AWH, *University of Chicago* — Past work suggests an inverse relationship between size of an attended region and the efficiency of processing within that region (zoom lens model). Here we show that rhythmic brain activity in the alpha frequency band can be used to track both the locus and the breadth of covert attentional orienting. Observers were cued to attend narrow or broad regions of space while EEG was used to measure the scalp topography of neural activity in the alpha band. We then applied an encoding model of spatial selectivity to decode activity in spatial channels that tiled the possible display locations. Channel activity was centered on the cued locations, and the graded profile of channel activity was broader and lower in amplitude when a larger region of space was cued. Target discrimination accuracy showed a parallel pattern. Thus, rhythmic brain activity tracks the breadth of covert spatial attention with high temporal precision.

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COGNITIVE AGING II

12:00-1:30 PM (2063)

Can Age Effects on Episodic Memory be Explained by Changes in Frontal or Medial-Temporal Lobe Function?

ANJALI THAPAR and ALLEN OSMAN, *Bryn Mawr College* — Neuropsychological tests sensitive to frontal lobe (FL) and medial temporal lobe (MTL) functioning are often used to characterize older adults' neuropsychological functioning which, in turn, has been used to explain age-related changes in episodic memory. A major limitation of this research is that variability in young adults' test scores has generally been ignored. The current study evaluated individual differences in FL and MTL functioning for both young and older adults, as well as examined the association between each and two types of memory performance. Participants (150 young and 150 older adults) completed a test battery that evaluated FL and MTL functioning. They also completed a yes/no item recognition and an associative memory task. Results indicate considerable variability in FL and MTL function for both age groups, as well as bear on whether age-related changes in episodic memory can be accounted for fully by changes in MTL and FL functioning.

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12:00-1:30 PM (2064)

Activating Aging Stereotype Threat in the MRI Scanner Impairs Cognition. YUNG-TSEN CHEN, GABRIELLA V. HIRSCH and DAVID A. GALLO, *University of Chicago* — Older adults perform more poorly on memory tasks that are explicitly framed as a study of aging, an effect that has been attributed to stereotype threat. Here, we report the first experiment to directly compare stereotype effects on episodic memory and working memory while in the MRI environment. Just prior to an MRI scan, we manipulated the activation of aging stereotypes by having older adults read about aging-related neurocognitive decline (stereotype condition) or an aging-neutral passage (control condition). Next, during the MRI scan, participants

were given alternating blocks of an N-back task (working memory) and the encoding of categorized word lists (episodic memory). Compared to the control condition, activating aging stereotypes impaired performance on the N-back task, with little effect on memory for the categorized word lists. These findings indicate that stereotype activation may play an important – yet poorly understood – factor in neuroimaging studies of aging cognition.

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12:00-1:30 PM (2065)

Bullying Among Students With Intellectual Disorders.

ELENA V. KONEVA, *P.G. Demidov Yaroslavl State University* — Manifestations of “hazing” are found across various social organizations, and there is a quantitative and qualitative specificity of the phenomenon, depending on the organization in which they are manifested and composition of the work or student group. The aim of our research was to find out what are the specific characteristics of “hazing” (in education called bullying) in student groups with subjects characterized by mixed psychological (mental) developmental disorders. It was found that developmental disorders alone do not influence the degree and structure of bullying manifestations. Microsocial conditions (learning conditions, in our case) are a stronger determinant of “hazing” (bullying) than the intellectual status of students. In addition, the manifestations of bullying are probably determined by some group characteristics, like aggression or the need of guaranteeing its functioning in case the official administration's actions to this end are ineffective. Supported by RFH, 15-06-10643.

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12:00-1:30 PM (2066)

Learned Predictiveness and Rapid Attentional Capture in Young and Older Adults.

CODY MASHBURN, *Young Harris College*, SHARON A. MUTTER, CATHERINE W. LUNA and KEELY LAWRENCE, *Western Kentucky University* — The purpose of this experiment was to determine whether there are age differences in the modulation of attention through learned predictiveness. Young (YA) and older adults (OA) learned predictive cue–outcome relationships in a category learning task. The blocks of this task were interspersed with a dot probe task designed to assess attentional capture by predictive and non-predictive cues. These cues appeared on either side of a fixation point within the participants' central visual field and a small white dot was briefly presented on one of the cues. Participants responded as quickly as possible to the dot location without moving their eyes from the fixation point. As participants learned the cue–outcome relationships, they began to respond more quickly to dot probes appearing on predictive than non-predictive cues. Importantly, both YA and OA exhibited this attentional capture effect, suggesting there is no age-related deficit in learned attention to predictive cues.

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12:00-1:30 PM (2067)

Why Could Reminiscence Ward off Cognitive Impairment? Content Analyses of Autobiographical Narratives.

AYA HOSOKAWA, *National Center for Geriatrics and Gerontology* — Reminiscence is considered an evidence-based intervention for cognitive impairment. The current study investigated effects of reminiscence on cognition and memory in later life to figure out what themes of autobiographical narrative would be attributed to outcomes based on content analyses of life narratives. Community dwellers participated in 5 series of bi-weekly intensive group session for 10 weeks and 5 series monthly intermittent session for 5 months. They took cognitive tests before, after, and one year after the intensive session. The reminiscence group significantly improved their performance in the verbal paired associates in the post-test than in the pre-test but slightly deteriorated in the follow-up tests compared to the control group. The content analyses of the narratives found 11 thematic categories in autobiographical components and 20 categories in psychological components which was frequently produced in every session. Reconstruction of reminiscence with personal interpretation could tap cognition and memory in later life.

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12:00-1:30 PM (2068)

Age-Related Differences in Episodic and Working Memory: Role of Self-Reported Internal Memory Strategy Use.

MICHEL ISINGRINI, LINA GUERRERO, LAURENCE TACONNAT, LUCIE ANGEL, SEVERINE FAY and BADIAA BOUAZZAOU, *University of Tours* — The main aim of this study was to investigate the role of self-reported internal memory strategy use in age-related differences in episodic memory, and in working memory. A sample of 108 participants aged 21 to 80 divided into two age groups (21–45, $n = 44$, and 61–80, $n = 64$) completed the two strategy subscales of the Metamemory in Adulthood (MIA) questionnaire, allowing to differentiate between internal and external everyday memory strategy uses, and were submitted to two tasks of episodic memory (free recall, and recognition), and to a working memory task (reading span). The results showed that only free recall and reading span tasks, defined as effortful memory tasks, appeared to be positively related to internal strategies; and that the individual level of internal strategy use interacted with age variable, and accounted for a sizeable proportion of the age-related variance in free recall and reading span tasks. These findings support the view that the age-related decrease in the implementation of internal memory strategies can explain the age-related differences in effortful episodic memory and working memory tasks, paralleling results observed using objective laboratory memory strategy measures.

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12:00-1:30 PM (2069)

Age-Related Differences in Time Reproduction Under Multisensory and Divided Attention Conditions. ROHINI THUMMA, MATTHEW C. COSTELLO, EMILYSIA ALMONACY and MENASHE SHERSHOW, *University of Hartford* — Although simple time perception is often

considered preserved in older adults, research results are uneven and aging effects frequently show under more demanding time monitoring conditions. The present study explores how aging affects time reproduction with two experiments. In the first experiment, younger and older adults were asked to reproduce the temporal durations under varying multisensory conditions: either a white block, an auditory tone, or a white block & tone together. The second experiment was a divided attention task in which younger and older adults viewed stimuli with embedded numbers and were randomly asked to either reproduce the temporal duration or recall the numbers shown. Analyses indicated a range of age group differences but confirmed an age-related preservation of time reproductions under multisensory conditions. These findings are discussed with reference to aging effects on time perception in the context of both multisensory processing and cognitive load.

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12:00-1:30 PM (2070)

Neural Signatures of Landmark Location Memory in Aging.

LAUREN L. RICHMOND, *Washington University in Saint Louis*, JESSE Q. SARGENT, *Francis Marion University*, JEFFREY M. ZACKS, *Washington University in Saint Louis* — Compared to younger adults, older adults show poorer performance in spatial navigation tasks, but there is a large degree of variability in navigational skill across individuals. Here, we investigated the neural signature associated with accurate landmark location memory in a sample of healthy older adults. During fMRI scanning, participants viewed first-person movies of three routes, and were told to try to remember the location of landmark objects that were called to their attention. They then performed a task in which they were asked to point, using a simple virtual reality interface, in the direction of unseen landmark objects from various points on the route. In a within-subjects analysis, the intraparietal sulcus (IPS) was found to be more deactivated in trials for which subjects had better pointing performance. A similar region and pattern were found in a complimentary between-subjects analysis. Reduced IPS activity may reflect more efficient spatial transformation processing.

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12:00-1:30 PM (2071)

The Direct Influence of Judgments of Learning on Memory for Young and Older Adults.

AMBER E. WITHERBY and SARAH “UMA” K. TAUBER, *Texas Christian University* — Judgments of learning (JOLs) can directly influence one’s memory. In some cases JOLs contribute to substantial improvement in memory performance (e.g., Soderstrom, Clark, Halamish, & Bjork, 2015). However, in other instances JOLs can impair memory performance (Mitchum, Kelley, & Fox, 2016). Such effects are in evidence with college-aged students; however, little is known about JOL reactivity in older adults. Thus, in the present research we evaluated JOL reactivity in younger and older adults. Participants were presented with word pairs to study. Half of the participants made a JOL for each pair and half did not. Following study, participants took a cued-recall test. JOLs benefited memory performance for young



adults. However, JOLs did not benefit memory for older adults. These results suggest that JOLs can directly influence memory, but perhaps only for young adults.

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12:00-1:30 PM (2072)

Item-Specific Processing Reduces False Recognition in Older and Younger Adults: Evidence From Signal Detection and the Diffusion Model. MARK J. HUFF, *The University of Southern Mississippi*, ANDREW J. ASCHENBRENNER, *Washington University in St. Louis* — We evaluated the effects of item-specific and relational encoding instructions on false recognition in younger and older adults using a categorized-list paradigm. Item-specific and relational encoding generally improved correct recognition versus a read-only and item-specific encoding decreased false recognition, but only relative to relational encoding—patterns found in both younger and older adults. This pattern was found in spite of older adults' elevated rates of false recognition overall. We then estimated independent effects of encoded memory information and strategic test-based monitoring (i.e., a distinctiveness heuristic) using signal-detection and diffusion modeling analyses. Converging evidence demonstrated that the item-specific reduction in false recognition was due to reduced memory information encoded about categorical lures (i.e., impoverished relational encoding) and an increase in test-based monitoring for both age groups. Thus, despite general age-related deficits in episodic memory, older adults were similarly able to benefit from item-specific processing at encoding and test.

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12:00-1:30 PM (2073)

Genetic Variance in Cholinergic Efficiency Interacts With Depression to Impact Cognition in Later Life. TIFFANY K. JANTZ, LINGJIE ZHOU and CINDY LUSTIG, *University of Michigan-Ann Arbor* (Sponsored by Cindy Lustig) — The cholinergic system regulates arousal, mood, attention and memory. It also plays an important role in depression, with genetic polymorphisms that impact cholinergic efficiency linked to depression severity. Depression is known to impair cognition even after remission, but potential interactions of these effects with cholinergic genetics have not been previously examined. Using data from the national Health and Retirement Study of adults age 50+ we compared carriers and non-carriers of a genetic variant that limits the efficiency of the high affinity choline transporter on standardized cognitive tests and self-report measures of cognitive function in everyday life. For participants with a history of depression, the reduced-efficiency variant was associated with greater impairment on tests of immediate and delayed memory recall, and self-reported difficulty meeting mental demands at work. These results indicate that reduced cholinergic efficiency may increase vulnerability to the long-term cognitive effects of depression, with implications for the workplace.

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12:00-1:30 PM (2074)

Age Differences in Hot and Cold Decisions Under Risk. ERIKA P. SPARROW, *Ryerson University*, LAURA GIESSING, *Heidelberg University*, JULIA SPANIOL, *Ryerson University* (Sponsored by Julia Spaniol) — Older adults are stereotypically viewed as more risk-averse than younger adults. While psychological research does not support this generalization, little is known about the factors that moderate age differences in risky choice. The current study examined two dimensions of theoretical relevance: decision process (affective/'hot' vs. deliberative/'cold') and reward type (selfish vs. altruistic). Thirty-six younger and 36 older adults completed the Columbia Card Task (CCT), a dynamic risk-taking task with parallel hot and cold versions that differed with respect to the immediacy of post-decision feedback. Points earned in the CCT resulted in financial rewards for the participant (selfish) or a charity (altruistic). Older adults were less risky than younger adults in the hot, but not the cold version. Reward type (selfish vs. altruistic) did not modulate risk taking. These results are consistent with an age-related reduction in reliance on affective decision processes in the face of both selfish and altruistic rewards.

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12:00-1:30 PM (2075)

Using Bayesian Tests of Invariance to Examine Age-Related Decline in Spatial Working Memory. KYLE G. FEATHERSTON, JOEL MYERSON, CYNTHIA FLORES, YOUNG BUI and SANDRA HALE, *Washington University in St. Louis* (Sponsored by Sandra Hale) — We reanalyzed data from laboratory and online experiments to answer two questions, one theoretical and the other practical. The former concerns the difference between simple and complex working memory spans. It is hypothesized that resistance to interference declines with age, and so complex spans should decline more rapidly with age than simple spans. We compared two regression models, one with separate slopes and intercepts for simple and complex spatial spans and one in which only the intercepts differed. Bayesian analyses revealed the latter was more likely the true model, implying age does not decrease the ability to resist interference. Comparison of models in which slopes were free parameters with models using the slope from a lab study revealed the latter were better, indicating older adults tested online show the same effect of age as those tested in the lab and therefore offer a more efficient way to study cognitive aging.

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12:00-1:30 PM (2076)

Self-Initiated Spatial Working Memory in Young and Older Adults. GAL MILCHGRUB and HAGIT MAGEN, *The Hebrew University of Jerusalem* (Sponsored by Hagit Magen) — Cognitive aging is associated with a decline in visuospatial working memory (WM). Studies in WM in aging thus far have focused mainly on one aspect of memory, in which people memorize information provided to them, neglecting the frequent everyday behavior in which memory is self-initiated (SI), meaning that people memorize information they selected themselves. Given that older adults are impaired in SI encoding



processes, they may be particularly impaired in constructing efficient SI memory representations. The present study used a modified spatial span task in which young and older adults memorized spatial sequences they constructed themselves, or random computer-generated sequences provided to them. The results revealed that young and older adults planned and constructed equally efficient spatial sequences that in some aspects were more efficient in older adults. Older adults benefited from self-initiation to the same extent as young adults, yet overall their memory accuracy was lower. The study shows that when given control over encoding, older adults similar to young adults, construct efficient WM representations that benefit accuracy. The age-related decline in WM is nevertheless observed in SI WM as well.

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12:00-1:30 PM (2077)

False Memory and Aging: The Role of Cognitive Reserve in Young-Old and Old-Old Adults. TASNUVA ENAM and KYLE KRAEMER, *University of Alabama*, DAVID A. GALLO, *University of Chicago*, IAN M. MCDONOUGH, *University of Alabama* (Sponsored by Ian M. McDonough) — False memory rates differ in individuals with high versus low cognitive reserve and between young-old and old age groups. Here we tested how two types of false memory (false alarms to new items and source memory) in two age groups differed with cognitive reserve. Subjects were presented words and had to generate either a past memory or imagine a future event. At test they had to determine whether the word was a past, future, or new event. Results showed false memory rates were lower for those with high reserve, but did not differ in low reserve groups regardless of age. Source memory errors were lowest in the young-old with high reserve and highest in the old-old with low reserve. These results seem to suggest two different classes of false memories in old age. Moreover, cognitive reserve may help to reduce false memory rate in old-old adults.

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12:00-1:30 PM (2078)

Manipulation of Inter-Pair Presentation Time in Younger and Older Adults: Testing Predictions From Hyper-Binding and the Associative Deficit Hypothesis. REED DECKER and MOSHE NAVEH-BENJAMIN, *University of Missouri* (Sponsored by Moshe Naveh-Benjamin) — Two different hypotheses may account for the decreased associative episodic memory of older adults, compared to younger adults. The associative deficit hypothesis (ADH) proposes a major role of decreased binding ability with age (Naveh-Benjamin 2000), whereas hyper-binding proposes excessive binding between items in short term memory leading to confusion at retrieval, as shown by poorer performance on recombined item pairs for older adults when items were close at study (Campbell, Trelle, and Hasher 2014). The ADH could explain these findings as the result of poorer temporal memory, leading to increased confusion for items that were less temporally distinct. To test these two hypothesis, we presented item and associative tests to older and younger adults, manipulating time between presentation of pairs, and how close the recombined items were

at study. While we found the expected associative memory deficit, we were unable to replicate previous hyper-binding findings in baseline conditions.

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12:00-1:30 PM (2079)

Pattern Separation in Remote Spatial Memory in Healthy Aging. SARA PISHDADIAN, *York University, Rotman Research Institute*, MARILYNE ZIEGLER, *University of Toronto*, MORRIS MOSCOVITCH, *University of Toronto, Rotman Research Institute*, SHAYNA ROSENBAUM, *York University, Rotman Research Institute* (Sponsored by Shayna Rosenbaum) — Hippocampal function and new spatial learning declines in healthy aging, however remote spatial memory is surprisingly intact. The ability to discriminate between newly learned stimuli that are highly similar with overlapping representations (i.e., pattern separation) is also compromised following hippocampal dysfunction. It is unclear whether these abilities are orthogonal or if pattern separation would be diminished if stimuli and their underlying representations were learned remotely. In this study, we investigated older adults' ability to make distance discrimination judgments in well-known environments, and complete other tasks which involve discriminating between similar representations based on prior knowledge, specifically object and numerical judgments. Results showed older adults had greater difficulty discerning distances and size when they were closer together or more similar. These data extend previous research by suggesting accurate judgments depend on representation similarity, even when the representations were established long ago.

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MUSIC COGNITION

12:00-1:30 PM (2080)

A Diffusion Model Account of Performance Differences on a Musical Ability Test. BROOKE OKADA and L. ROBERT SLEVC, *University of Maryland, College Park* — Musical ability is often operationalized as accuracy on same/different judgments of musical stimuli. Although these tasks differentiate musical experts from non-experts, the nature of performance differences on these tasks has not yet been well specified. We administered one such task (Wallentin et al., 2010) to self-identified musicians and non-musicians and modeled response time (RT) and RT distributions with the Drift Diffusion Model (DDM; Ratcliff et al., 2015). The DDM models decision processes as an accumulation of noisy information supporting the two choices, and estimates parameters related to different underlying perceptual/cognitive processes. Musicians in our sample were more accurate than non-musicians ($M = 78\%$ vs. 65% correct), and also responded more quickly ($M = .67$ sec vs. $.80$ sec). DDM analyses suggest that musicians perform accurately even with less conservative decision criteria, allowing for quick, accurate responses even with more involved decision processes, illustrating the complex nature of musical expertise.

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**12:00-1:30 PM (2081)****Hemispheric Differences Between Left and Right Supramarginal Gyrus for Pitch and Rhythm Memory.**

NORA K. SCHAAL and BETTINA POLLOK, *Heinrich-Heine-University, Düsseldorf*, MICHAEL J. BANISSY, *Goldsmiths, University of London* — Functional brain imaging studies and non-invasive brain stimulation methods have shown the significance of the left supramarginal gyrus (SMG) for pitch memory in non-musicians. Here, we sought to investigate the role of the left and right SMG in pitch and rhythm memory. Anodal or sham transcranial direct current stimulation (tDCS) was applied over the left (Experiment 1) and right SMG (Experiment 2) in two different sessions. In each session participants completed a pitch and rhythm memory task immediately after tDCS. A significant facilitation of pitch memory was revealed when anodal stimulation was applied over the *left* SMG. For rhythm memory, anodal tDCS over the *right* SMG led to an improvement in performance, but anodal tDCS over the *left* SMG had no effect. These results highlight a different hemispheric involvement of the SMG in auditory memory processing depending on auditory material.
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12:00-1:30 PM (2082)

Tonal Grounds for Short-Term Memory for Melodies. ESRA MUNGAN and ALPEREN KARAN, *Bogazici University* — Taylor & Pembroke (1983) proposed several factors to affect short-term memory for melodies. We reassessed their findings using a controlled stimulus set and a 2AFC test instead of a dictation or singing-back task. Nonmusicians listened to a total of 158 five-note melodies. Each melody was followed by a same-length filled (Experiment 1) or silent (Experiment 2) interval and a subsequent 2AFC test with same-contour lures. In both experiments participants performed above chance. Yet, we did not replicate most of Taylor & Pembroke's (1983) findings, e. g., number of note direction changes did not aggravate performance, ascending sequences were not better identified than descending ones. An interesting finding of Experiment 2 was that participants performed better when the lure alternative had a replaced note at a location where *no* change in note-direction occurred. Results are discussed in reference to related STM studies in music.

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12:00-1:30 PM (2083)**Effects of Music Training and Familiarity on the Time Course of Responses to Modulations in Classical Music.**

RACHNA RAMAN, *The University of Texas at Dallas*, ZACHARY WALLMARK, *Southern Methodist University*, W. JAY DOWLING, *The University of Texas at Dallas* — We investigated listeners' responses to modulations in the first 2 min of the finale of Dvorak's "American" string quartet, op.96. Five groups (student orchestra members, music majors, expert musicians, moderate musicians, nonmusicians) continuously rated how well the 12 possible probe tones fit the music, for 12 trials, providing tonal hierarchy profiles for 5-s samples aligned with modulations throughout the excerpt. We correlated these profiles with the standard profiles of the keys involved. We

manipulated familiarity strongly for orchestra members, who rated the piece before encountering it, again in the middle of rehearsals, and after performing the piece 3 months later. The other groups followed the same schedule but without studying the piece. The 3 highly trained musician groups responded analytically, accurately reflecting modulations throughout the 3 sessions. The less experienced listeners initially responded similarly, but responded more globally in Sessions 2 and 3. This contrasted with our earlier results (ICMPC, 2016).

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12:00-1:30 PM (2084)

The Auditory Driving of Cinematic Mood. MARILYN BOLTZ, *Haverford College* — Past research has shown that variations in musical tempo influence the perceived rate of visual action but not vice versa. The goal here was to investigate whether the magnitude of this effect is influenced by the mood of audiovisual information. Participants were presented with montages (slideshow) of positive or negative photos accompanied by positive or negative music whose rate was either the same as, or faster or slower than that of the montage. Relative to a no music control condition, the results of a subsequent recognition task showed a higher false alarm rate to faster and slower visual scenes in the presence of accelerated and decelerated soundtracks, and especially when music-film pairs both displayed a positive and negative affect, respectively. In contrast, the results of a second experiment revealed that variations in visual rate exerted no influence on auditory rate recognition. These findings have implications for both cinematography as well as theories of cross-modal perception.

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12:00-1:30 PM (2085)

Musical Influences on Temporal Perception. MICHAEL S. GORDON, JITWIPAR SUWANGBUTRA, ANDREW LUCILA and FRANKLIN ROQUE, *William Paterson University* — This research investigates how metrical structure in background sounds and music might relate to the perception of time. Participants were tested in an auditory temporal bisection task using referents of short (4 s) and long (8 s) durations. Test tones were within the range set by the referents (4, 4.5, 5, 5.5, to 8 s). The task was completed in five-minute blocks, each with a continuous background sound. Acoustic conditions included ambient ocean sounds, rhythmic hip-hop music, meditative-trance music, arrhythmic jazz, and silence. The meditative and arrhythmic music tended to induce time underestimation relative to rhythmic music, ocean sounds (with rhythmic waves), and silence. Results suggest that more metrical sounds (hip-hop, ocean waves) induce a foreshortened experience of time relative to more expansive meditative and arrhythmic music. Implications for immersion in video games are discussed as a function of the metrical structure induced by background acoustics.

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12:00-1:30 PM (2086)

Auditory Tuning Judgments Are Influenced by Visual Brightness. RYAN M. BRIGANTE, *University of Texas at Dallas*, TIMOTHY L. HUBBARD, *Arizona State University*, W. JAY DOWLING and BART RYPMA, *University of Texas at Dallas* (Sponsored by Bart Rypma) — Participants listened to pairs of sine-wave tones and judged the tuning of probe tones compared to target tones. At the same time, they viewed colors varying in brightness and judged the level of brightness. Participants were more likely to judge the tones as sharp when the color was bright, and they were more likely to judge the tones as flat when the color was dark. However, judgments of color brightness were not influenced by the sharpness or flatness of tones, indicating an asymmetry in the cross-modal mapping. These findings support the hypothesis that cross-modal correspondence can be mediated by semantic meaning, as there is a metaphorical relation between auditory “sharpness” and visual brightness. Just as conceptual metaphor theory would predict, the source domain (brightness) provides conceptual structure for the target domain (pitch), but not necessarily vice versa. These findings also provide further evidence for the reliable pitch-brightness correspondence in the context of a novel task.

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12:00-1:30 PM (2087)

The Effect of Pitch Complexity on Eye Movements During Musical Sight-Reading. EMILY R. BARKER, *State University of New York, Buffalo*, ELIZABETH R. SCHOTTER, *University of South Florida*, MALLORIE LEINENGER, *Denison University* (Sponsored by Elizabeth Schotter) — Recognizing pitch intervals is critical for music reading and performance. To examine how the complexity of pitch intervals affects eye movements during sight-reading (i.e., performance of a piece of music without previous practice), we recorded the eye movements of 15 singers (7 alto, 8 soprano) sight-reading 12 Bach chorales containing 4-part harmonies. Half of the chorales were manipulated to contain some complex intervals (e.g., a diminished 5th vs a 3rd in the original condition). Rhythm of manipulated areas and tempo were held constant across trials (4 quarter-notes, 60 bpm). Results indicate that while first fixation duration is shorter for complex intervals, they require more returns and longer overall processing time than simple intervals, suggesting a need to gather more information. Additionally, simple intervals are more likely to be skipped entirely, which is associated with ease of processing. These results suggest that complex pitch intervals are more difficult to process.

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12:00-1:30 PM (2088)

Predicting Working Memory From Musicality: Subjective and Objective Measures. JUAN A. VENTURA, EMILY M. ELLIOTT, DAVID J. BAKER and DANIEL T. SHANAHAN, *Louisiana State University* (Sponsored by Emily Elliott) — There has been a surge of interest in recent decades regarding the relationship between musical skills and cognitive abilities (e.g., Slevc et al., 2016). However, measurement of musicality has been inconsistent in the literature. Previous studies have used either

a subjective questionnaire or objective behavioral measures to determine individual differences in participants’ musicality. It is unclear whether these inconsistencies have a significant impact on the outcomes across studies. We used structural equation modeling to examine the prediction of working memory using subjective and objective measures of musicality. We measured working memory with commonly utilized complex span tasks and musicality with the Goldsmith’s Musical Sophistication Index (Müllensiefen et al., 2014) in a diverse population of non-musicians and musicians. The Gold-MSI includes a self-report inventory and objective measures of beat discrimination, melodic memory, and sound similarity. The results suggested that the combination of measurement tools led to the best prediction of working memory, which has implications for the assessment of musicality for future research.

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AUTOBIOGRAPHICAL MEMORY

12:00-1:30 PM (2089)

Musical Cues and Emotionality in Autobiographical Memory. KRYSTEN D. ZATOR and ALBERT N. KATZ, *University of Western Ontario* — Autobiographical memories (AMs) were cued to popular music using a 2 [cue type: popular music vs. blank computer screen] x 2 [instruction type: recall emotional memory vs. recall memory (no emotionality mentioned)] between-subjects design. In Phase 1 undergraduate participants (n = 123) described seven AMs to either short music clips or a blank computer screen. In Phase 2 they answered questions about these events (including both emotional valence and intensity). In Phase 3, participants rated musical clips (including Phase 1 stimuli) on various measures (including emotional valence and intensity). Contrary to expectations, memories cued to music were less salient and did not differ emotionally from those cued to a blank screen. However, for music-cued participants, the emotional experience (valence and intensity) of listening to the music cue was congruent with the emotionality of the produced memory on both objective and subjective measures. These findings support emotion-congruent memory retrieval in AMs cued to popular music.

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12:00-1:30 PM (2090)

Effects of Genre and Music Experience in Music-Evoked Autobiographical Memories. NAZIKE MERT and ALI TEKCAN, *Bogazici University* — Music is thought to be a strong cue in eliciting vivid and emotional autobiographical memories. The present study investigated effects of genre and musical experience on retrieval and characteristics of music-evoked autobiographical memories. The two genres were Rock music and Turkish Art music, exposure to which differ in terms of the life-time periods and contexts in participants’ lives. Musician (Rock) and non-musician young adults were asked to report an autobiographical memory in response to 16 Rock music and 16 Turkish Art music excerpts, with equal number of low- and high-familiarity pieces. Musicians recalled more autobiographical memories than non-musicians in response to familiar Rock songs, but there was no group difference



for unfamiliar Rock excerpts. Moreover, musicians reported stronger auditory imagery and emotion than non-musicians for familiar Rock songs. Neither expertise nor familiarity affected number of memories in response to Turkish Art Music. Music type also affected memory content. memory content.
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12:00-1:30 PM (2091)

Impact of Sociopolitical Identity on Memory for Public Events. AYSECAN BODUROGLU and ALI İ. TEKCAN, *Bogazici University*, REYYAN BILGE, *Sehir University*, MEYMUNE TOPCU, *The New School*, ASLIHAN IKIZOGLU and ELIF ECE SOZER, *Bogazici University* — The aim of the present study was to investigate how collective memory changes in response to new significant public events and how political identity might affect collective memory. Previous work (e.g., Mutlutürk & Boduroglu, 2016) showed that the same few events dominate Turkish collective memory of the last 70 years. We investigated how the recent (July 15th 2016) Military Coup Attempt in Turkey, an event with tremendous impact on different sections of the society, impacted memory of public events across different political identity groups. We asked a sample of undergraduates to report the most important public event as well as public events associated with different emotions (e.g., happiest, saddest) in the last 70 years of Turkish history. In addition participants provided ratings on a number of dimensions including relation to identity, impact, vividness and other phenomenology ratings. Findings indicated clear effects of identity events in collective memory.
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12:00-1:30 PM (2092)

Egocentric Biases in the Collective Remembering of United States History. ADAM L. PUTNAM, MORGAN ROSS and LAURA SOTER, *Carleton College*, HENRY L. ROEDIGER, *Washington University in St. Louis* — Collective memory and social psychology research suggests that people show egocentric biases when remembering historical events and overestimate their contributions to shared endeavors (Ross & Sicoly, 1979). We examined how natives from the 50 U. S. states (total n = 2,900) remembered United States history by asking them, “In terms of percentage what do you think was your home state’s contribution to the history of the United States?” The average rating for individual states ranged from 9% (Iowa) to 41% (Virginia), with the total contribution for all states equaling 907%, indicating a strong egocentric bias. In comparison, ratings provided by non-residents for others’ states were much lower. Surprisingly, reminding people of the breadth of United States history before they made their judgment did not lower estimated contributions. We argue that this egocentric bias is due to a combination of selective memory retrieval processes, in-group favoritism, and poor statistical reasoning.
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12:00-1:30 PM (2093)

Predicting Young Adults’ Episodic Memory Performance From Resting State Functional Connectivity. OLIVIA C. REYNOLDS, *Wake Forest University*, ROBERT G. LYDAY and

PAUL J. LAURIENTI, *Wake Forest University School of Medicine*, DALE DAGENBACH, *Wake Forest University* — Recent studies have shown that resting state functional connectivity (rsFC) can be used to predict some aspects of cognition such as fluid intelligence and attention (Finn et al., 2015 & Rosenberg et al., 2016). Employing a similar methodology, we examined the predictive relationship between rsFC and episodic memory using fMRI data from the Human Connectome Project. First, resting state functional connectivity edges correlated with episodic memory performance were identified. These were then used to create a model predicting individual differences in performance on the Picture Sequence Memory Task. The model predicted episodic memory performance reasonably well in the data set used to create it, and it also predicted individual differences in performance on the PSMT when applied to new participants’ rsFC data that were not used to create the model.
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12:00-1:30 PM (2094)

Notated or Not: Musical Thinking is Situated. LINDA T. KAASTRA, *University of British Columbia* — The concepts represented in standard musical notation (e.g. melody, harmony, rhythm, texture) are often assumed to be basic categories of musical thought. However, even the most detailed musical score is underspecified for performance (Kaastra, 2011). Research on notation focuses on sight reading and pattern recognition tasks (Brodsky et al. 2008), while research on creativity focuses on improvisational styles (Sawyer, 2009). This paper takes a broader perspective on notation, exploring the situated use of impromptu music charts in instrumental lessons. Five music charts are analyzed in terms of their context of creation, their visual characteristics, and their use in music practice. The charts are then compared to notated versions of the same musical material created in standard musical notation. The analysis further demonstrates a process of grounding (H.H. Clark, 1996) that takes place in music lessons, extending earlier work on tacit knowledge in orchestral performance (Kaastra, 2016). This analysis of lesson charts emphasizes the functional role (Elman, 2014) of notation in music performance, notation as a cue for musical goals, events, and activities. Musical thinking is situated: notated or not.
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12:00-1:30 PM (2095)

Imagining a Rosy Future Leads to a Rosy Memory. ALEEA DEVITT and DANIEL SCHACTER, *Harvard University* — Episodic future simulation allows us to prepare for upcoming events, the majority of which tend to eventually take place. Future imagination can alter behavior during an event, yet it is unknown about whether future imagination also influences memory for that event once it comes to pass. In the current study we explored whether the emotional valence of future simulation influences memory for emotional details in a subsequent similar event. Results show that positive imagination resulted in a liberal response bias for positive details of a subsequent event, and a conservative bias for negative details. Negative imagination did not bias subsequent memory responses. Events were rated as more positive overall if they were preceded



by positive imagination. These results are reflective of the optimism bias, and suggest that an optimistic view of the future can transfer into a rosy view of the past.

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12:00-1:30 PM (2096)

Emotion Regulation and Reduced Episodic Re-Experiencing During Mental Time Travel. LISA EMERY and REBEKAH KNIGHT, *Appalachian State University* — In a prior study, we found that asking people to focus on semantic (rather than episodic) content during Mental Time Travel (MTT) made them feel happier. In the current study, we asked whether asking people to regulate their emotions during MTT would result in both reduced negative emotion and reduced episodic re-experiencing. Participants were asked to describe a recent past or likely future event in which they were (or would be) extremely angry with another person. They were asked to describe the event either under standard autobiographical recall instructions (Control Condition), or were asked to either concentrate on the accuracy of their description (Accuracy Condition), or to recall the event while remaining upbeat (Emotion Regulation Condition). The results supported the hypothesis: participants in the Emotion Regulation Condition reported less negative emotion and less first-person perspective than people in the control condition. Unexpectedly, however, the Accuracy condition had the same effect. Therefore, although reduced episodic re-experiencing is linked to reduced negative affect, there are likely multiple motivational routes to reduced re-experiencing.

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12:00-1:30 PM (2097)

Effects of Elicitation Method and Self-Construal on Age at Earliest Memories. SELEN KÜÇÜKTAŞ and ALI TEKCAN, *Bogazici University* (Sponsored by Ali Tekcan) — Adults' recall of earliest memories can be affected by the methodology used to elicit these memories. One method that leads to earlier childhood memories is the timeline method where participants recall memories from different parts of their lives before asked for the earliest memory. We investigated effects of methodology and self-construal on earliest memories. University students were randomly assigned to two conditions, where they remembered their earliest memories either before or after they tried to remember an autobiographical memory from three age periods. Results showed that age at earliest memory was younger ($M = 3.41$ yrs) when it was recalled last (after remembering a memory from ages 14-20, 7-13, and 0-6) than when it was recalled first ($M = 4.02$). There was no gender effect. We also addressed the relationship between age at earliest memories and self-construal (measured by the Balanced Integration-Differentiation Questionnaire) in terms of individuation and relatedness orientations.

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12:00-1:30 PM (2098)

Memories and Clothes. AMY WOY, *University of Westminster*, MARTIN A. CONWAY, *City, University of London*, CATHERINE LOVEDAY, *University of Westminster*

(Sponsored by Martin A. Conway) — Autobiographical memory research consistently reveals a reminiscence bump, i.e. easier access to memories between the ages of 10 and 30. The reminiscence bump has been evoked by a range of stimuli, including music, books, films and odours, but has yet to be examined in relation to clothes – tangible items that are often associated with personal and cultural identity. In this free recall paradigm, 31 participants between the ages of 39 and 78 years were asked to name 10 items of clothing that they had worn at any point in their life, to state what age they owned these items, and explain their choices. There was a clear reminiscence bump (age 10 – 24) and females showed a significantly earlier bump. Items were largely chosen because of their associations with important memories, particularly of people. This study suggests that clothing may provide a novel and useful way to access personal autobiographical memories.

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12:00-1:30 PM (2099)

Staying Positive in a Dystopian Future: A Novel Dissociation Between Personal and Collective Cognition. SUSHMITA SHRIKANTH, *University of Illinois at Chicago*, PIOTR SZPUNAR, *University of Albany at State University of New York*, KARL SZPUNAR, *University of Illinois at Chicago* (Sponsored by Karl Szpunar) — Within the past decade, psychologists and neuroscientists have shed light on various mechanisms that support the ability to think about the personal future. However, less is known about the how people think about the collective future of groups, and whether personal and collective future thinking represent distinct domains of future-oriented cognition. In two studies ($N = 298$), we used an adapted future thinking task to demonstrate a novel domain-by-valence interaction between personal and collective future thinking, such that people were positively biased about their personal future while at the same time being negatively biased about the future of their country. This interaction emerged as a function of age, gender, and political affiliation. In a third experiment ($N = 23$), we showed that negativity biases about the future of groups only emerged in contexts for which participants lacked access to tangible past experiences. We interpret our findings as reflecting differential contributions of episodic and semantic memory to personal and collective future thinking. Implications for teasing apart personal and collective future thinking, and the study of collective cognition in psychology and related disciplines, are discussed.

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12:00-1:30 PM (2100)

Interference in Autobiographical Memory. BUSRA TANRIVERDI OZKAN, BEYZA OZEN, ECE MINA CETIN, NESIBE ALIC and SAMI GULGOZ, *Koc University* (Sponsored by Sami Gulgoz) — Although interference has been studied extensively interference in autobiographical memory received little attention. In this study, interference in recent and remote memories of repeated and unique events were compared as consolidation, rehearsal, and source monitoring approaches make incompatible predictions. In the first session, participants were asked to recall three memories, one recent



and one remote holiday, and a car accident. The following week, they were subjected to interference conditions and had to retell the memories in the first session. Participants (N=100) were randomly assigned to one of the five interference conditions: another holiday memory, imagined future holiday, another person's holiday, irrelevant memory, and no interfering event. The analyses suggested that neither time nor place details change with interfering information and this is true for recent and remote memories, as well as repeated and unique event memories. The results will be discussed on the basis of source monitoring theory.

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12:00-1:30 PM (2101)

The Coherence of Memories Over Repeated Recall.

ANDREA TAYLOR and MARYANNE GARRY, *University of Waikato*, RACHEL ZAJAC, *University of Otago*, MELANIE TAKARANGI, *Flinders University* (Sponsored by Elizabeth Loftus) — Victims of trauma often describe their memories as fragmented, yet scientific evidence suggests traumatic memories are no more fragmented than other emotional memories. Resolved fragmentation of the traumatic memory is a desired outcome of therapy, but given traumatic memories are not uniquely fragmented, perhaps this resolution is not due to trauma-specific therapeutic techniques per se. One possibility is repeatedly recalling memories—as happens in therapy—fills in gaps, producing a feeling of resolving fragmentation for traumatic and non-traumatic memories alike. To investigate, we asked subjects to describe either a traumatic event or an intense but positive event, daily. We predicted that both kinds of memory would feel less fragmented over time, and the reduction would be associated with a decrease in trauma-related symptoms for negative events. This research will shed light on the mechanism by which exposure therapy reduces PTSD symptoms in trauma victims.

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METAMEMORY

12:00-1:30 PM (2102)

Honey, Did You Remember the Milk? Metacognitive Insight and Accuracy in Couples.

SHANNON MCGILLIVRAY, TIFFANY M. PAGE, SABRINA BADALI, TESS A. KENDALL, MONIKA T. SAHLEEN and GIUSEPPE PAUCARPURA, *Weber State University* — Couples often divide and conquer when it comes to what information each person remembers. For example, maybe one person is good at remembering directions, so the other does not need to. Despite how common this behavior is among couples, an important question is, do we really know what our partner will remember? The current study recruited romantic couples who had been cohabiting at least 6 months. Each person in the couple was given eight memory tasks meant to reflect real-life scenarios that one would likely encounter such as remembering directions or a grocery list. For each set of materials, individuals gave a prediction (i.e., a global judgment of learning) regarding how many items they thought they and their partner would recall. These predictions were

compared to actual performance and the data revealed that participants were roughly as accurate at predicting their own performance as they were their partners' performance.

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12:00-1:30 PM (2103)

Presentation Modality and JOL. ZEHRA F. PEYNIRCIOGLU and JOSHUA R. TATZ, *American University* — Items presented auditorily or visually were given similar JOLs, although the latter were recalled better. The typical font-size and loudness illusions also emerged in that large-font visual presentations and loud auditory presentations elicited higher JOLs than their normal counterparts. One modality was not weighted more than the other in creating the illusion; items presented together in large-font/normal-sound or loud-sound/normal-font were given similar JOLs (and recalled similarly). When the intensity manipulation was compounded across modalities, however, the magnitude of the illusion increased beyond that observed in a single modality. While recall was still the same, items presented loudly and in large font together were given higher JOLs than either loud-sound/normal-font items or large-font/normal-sound items, and normal-sound/normal-font items were given very low JOLs. Interestingly, these differences emerged only when all conditions were presented to the same subjects and not when a between-subject manipulation was used, underscoring the importance of comparative judgments.

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12:00-1:30 PM (2104)

Examining Metacognition During Internal and External Storage and Retrieval. EVAN F. RISKO, CONNOR GASPAS, DAVE MCLEAN, TIMOTHY DUNN and DEREK KOEHLER, *University of Waterloo* — The ability to monitor our cognitive performance (i.e., metacognitive monitoring) is central to efficient functioning. Research investigating this ability has focused largely on tasks that rely exclusively on internal processes. However, our day-to-day cognitive activities often consist of mixes of internal and external processes. For example, we can offload memory demands onto external media (e.g., computers, paper). In the present investigation we expand research on metacognition to this domain. Specifically, we examine participant's ability to accurately predict and evaluate their performance in tasks that require them to rely on only their internal processes (e.g., short term memory to remember a series of letters) and tasks that require them to rely on both (e.g., paper and pencil to remember a series of letters). Results suggest that the former results in superior monitoring relative to the latter. Implications for understanding metacognition in more distributed cognitive domains will be discussed.

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12:00-1:30 PM (2105)

The Effect of Stereotypes About Online News Sources on Memory for the Source of News Stories. KAREN J. MITCHELL and JEFFREY J. GUALTIERI, *West Chester University of Pennsylvania*, DIANA STILLEY, *New York University* — We asked the novel question of whether stereotypes about the credibility of online news sources can bias memory for the



source of news information. We sequentially presented actual news stories with headlines. Participants were told that each story came from a normatively more credible source (the *New York Times*) or a less credible source (*Buzzfeed*). The stories ranged in rated typicality with respect to the sources. We later tested source memory. As predicted, regardless of actual source, stories were attributed to the more typical source. For example, stories such as “Tentative deal is reached to raise taxes on the wealthy” were attributed to the *New York Times*, and stories like “Olympic diver covers ‘single ladies’” were attributed to *Buzzfeed*. This resulted in significant stereotype-driven source memory errors. One practical concern is that such errors may lend uncredible information legitimacy, which may increase the chances people will pass along the information.

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12:00-1:30 PM (2106)

Endogenous Variation in Estradiol Affects the Weighting of Metric and Categorical Information in Spatial Location Memory. MARK P. HOLDEN, *University of Nebraska - Lincoln*, ELIZABETH HAMPSON, *University of Western Ontario* — According to the Category Adjustment model, spatial memory involves the Bayesian combination of fine-grained and categorical information, with each type of information weighted by its relative certainty. Previous work has demonstrated sex differences in the relative weighting of these cues in location memory (Holden, Duff-Canning, & Hampson, 2015) and judgments of line angle (Holden & Hampson, 2014). Furthermore, research suggests that, in women, circulating levels of estradiol seem to facilitate tasks that require spatial working memory (e.g. Duff & Hampson, 2000), but have an inhibitory effect on mental rotation and certain other spatial functions (e.g. Hampson, Levy-Cooperman, & Korman, 2014). The current study specifically examines the effects of endogenous estradiol levels on the relative weighting of categorical and fine-grained information in a location memory task. The results confirm previous findings of a sex difference in the relative weighting of these cues, with women placing more emphasis on categorical information. Furthermore, objective measures of estradiol in women positively correlated with the relative emphasis placed on categorical information in estimates of location memory.

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12:00-1:30 PM (2107)

Halo and Devil Effects Demonstrate Credibility-Based Influences on Source-Monitoring Decisions. CHRIS BLAIS, ADAM COHEN and GENE A. BREWER, *Arizona State University* — We examined the degree to which source memory is impacted by the source credibility. Subjects were presented with two profiles that varied in credibility (e.g. Source A is skilled, wise, and competent while Source B is deceitful, combative, and ignorant). Afterwards, they rated the degree to which trivia statements told by each source were truthful. After a brief delay period, they completed a surprise source memory test in which they made three sequential decisions to all the old trivia statements as well as some new statements. The first decision involved rating the truthfulness of the trivia statement.

This was followed by a source decision and a confidence rating to that source decision. At study, we found that truthfulness judgments were influenced by source credibility. At test, we found that source memory was similar for the credible and not credible sources. Interestingly, we found that subjects were more likely to attribute statements they themselves rated as truthful to the credible source and statements rated as non-truthful to the not credible source. Signal detection analyses suggest that these biases are criterion-based rather than memory-based.

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12:00-1:30 PM (2108)

The Dark Side of Interpolated Testing: Switching From Learning Capitals to Retrieving Countries Impairs Learning. MIKO M. WILFORD and YANA WEINSTEIN, *University of Massachusetts Lowell*, SARA D. DAVIS, *Iowa State University*, ANNMARIE KHAIRALLA, *University of Massachusetts Lowell* — Retrieval practice strengthens memory retention and updating. However, interpolating testing with new learning enacts a cost on new learning, relative to restudying. According to our task-switching hypothesis, the frequency of switching between testing and new learning should determine whether a cost of testing emerges relative to restudying. We used educationally-relevant materials to test this hypothesis. In the original learning phase, participants studied 18 flag-country pairs. In the new learning phase, participants studied the country capitals associated with the same 18 flags, in conjunction with either restudying or practicing retrieval on the flag-country pairs. In a 2 (test condition: test/restudy) x 3 (task-switch frequency: 0/5/17-switch) between-participants design, we found an interaction between task-switch frequency and test condition, $F(2, 175) = 4.26, p = .016, \eta^2 = .048$. The frequency of interleaving negatively impacted new learning for those in the test conditions, but not the restudy conditions.

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12:00-1:30 PM (2109)

Are Beliefs About Ease of Processing and Item Memorability Related to Directed Forgetting? NATHANIEL L. FOSTER and ELIJAH BARONCINNI, *St. Mary's College of Maryland*, MARIA JIMENEZ, *University of Chicago* — Research using the item method of directed forgetting shows that participants continue to rehearse remember-cued items but stop rehearsal for forget-cued items (see MacLeod, 1998, for a review). Furthermore, this rehearsal mechanism may be driven by metacognitive beliefs (Foster & Sahakyan, 2012). How are beliefs used to engage forgetting? Participants in five experiments were given false instructions about features of to-be-studied items (e.g., blue words are easier to process than green words). Participants then performed item-method directed forgetting on a new list of items. After each remember or forget cue, participants selected to re-study a blue word or a green word from earlier to help them with the task of remembering or forgetting the preceding item. Results indicated participants were more likely to select the earlier difficult-to-process items or difficult-to-remember items after receiving a forget cue compared to after receiving a remember cue. Importantly, the process of selecting items to aide in forgetting did not affect recall of forget items later on.



These outcomes suggest that people may rely on beliefs about the difficulty of processing or remembering as a way to engage in intentional forgetting.

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12:00-1:30 PM (2110)

Political Metamemory: Do Political Orientation and Expertise Matter? ERIKA K. FULTON, *Idaho State University*, GREGORY P. CORRY, *California State University, Long Beach*, WILLIAM L. KELEMEN, *Texas State University, San Marcos* — Accurately judging one's political knowledge is essential to intelligent political debate, informed voting, and personal activism, but no studies of political metamemory have yet been published. Just before the 2008 presidential election, we measured the relationship between political orientation, political expertise, and judgments of political knowledge in a sample of psychology students at California State University, Long Beach. We predicted that the distribution of judgment magnitudes would be more polarized for conservatives than liberals based on their lowered tolerance for ambiguity (Amodio et al., 2007; Jost et al. 2003), but this difference was not found. Furthermore, although metacognitive accuracy did not differ between conservatives and liberals, it was lower for questions about conservative politics than about liberal politics or general knowledge questions, overall. Political experts had greater metacognitive resolution than non-experts on both political and general knowledge questions.

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12:00-1:30 PM (2111)

“Treasure This, Trash That”: How Subjective Recollection Guides Memory Decisions. DIANA SELMECZY, *University of California, Davis*, EMILY HEMBACHER, *Stanford University*, SIMRAN JOHAL and SIMONA GHETTI, *University of California, Davis* — Memory signals and subjective assessments of these signals are often highly correlated, making it difficult to establish whether subjective assessments causally contribute to decision-making or are epiphenomenal. In the current study we dissociated memory accuracy from subjective recollection and examined children's (6-7 and 9-10 year-olds) and adults' decisions to select their best memories in anticipation of a reward. Results revealed a larger dissociation in adults relative to children but subjective recollection guided decision-making beyond accuracy in all age groups (Experiment 1: N=114). When limits were placed on how many responses could be selected, subjective recollections continued to guide decision-making, but young children (6-7 year-olds) experienced a cost in accuracy (Experiment 2: Projected N=80). These results suggest that subjective memory states support memory decisions but this process comes at a cost for young children.

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12:00-1:30 PM (2112)

Cognitive and Motivational Appraisals of Study Strategies: The Importance of Experienced Effort Within Self-Regulated Learning. AFTTON R. KIRK, SCOTT H. FRAUNDORF and BRIAN M. GALLA, *University of Pittsburgh* — Learners make ineffective decisions about how to study. For example,

they reread material rather than test themselves, even though testing substantially enhances later memory. These ineffective decisions have been attributed to learners' ignorance of what constitutes effective studying. Here, we test an additional, motivational factor: the experience of mental effort. In each of two counterbalanced blocks, participants ($n=80$) read a science passage and were assigned to either reread or test 20 facts from the passage. After each study strategy, participants rated their perceptions of mental effort and judgments of learning. Finally, participants chose a study strategy for an additional science passage. Participants judged they would be less likely to remember tested facts as compared to reread facts (replicating past work), but also rated testing as more tiring, mentally exhausting, and difficult than rereading. Critically, it was these motivational judgments, not cognitive judgments, that predicted participants' choice of final study strategy.

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12:00-1:30 PM (2113)

Understanding Metamemory: A General Ability or Separate Systems? KYLE RHOADS KRAEMER (Graduate Travel Award Recipient) and TASNUVA ENAM, *University of Alabama - Tuscaloosa*, DEBORAH K. EAKIN, *Mississippi State University*, IAN MCDONOUGH, *University of Alabama - Tuscaloosa* (Sponsored by Edward Merrill) — Metamemory refers to knowledge of one's own memory, and it is critical in understanding and directing memory processes. Different measures have been used to capture metamemory, including ease-of-learning judgments, feeling-of-knowing judgments, judgments-of-learning, and retrospective confidence judgments. While metamemory is usually conceived as one general ability, these judgments rely on different types of information, and they are made at different stages in the memory process. Therefore, they may reflect two distinct memory abilities—one metacognitive ability at encoding and one at retrieval. We used confirmatory factor analysis (CFA) on data from a paired-associates task to compare two models of metamemory. While a one-factor model showed a relatively poor fit, a two-factor model showed a substantially better fit. Furthermore, the two encoding-based measures and the two retrieval-based measures showed the strongest relationships with each other. Thus, metamemory may reflect related metacognitive abilities occurring at encoding and retrieval, rather than one general ability.

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12:00-1:30 PM (2114)

Metacognition and Memory For Medication Side Effects: The Role of Aging and Task Experience. MARY B. HARGIS and ALAN D. CASTEL, *University of California, Los Angeles* (Sponsored by Alan Castel) — The current study examined how younger and older adults' memory accuracy and perceptions about memory are influenced by a challenging memory task, with the goal of exploring high-confidence errors in the medical domain. Younger and older adults made a series of metacognitive judgments about their and others' expected performance before completing a cued-recall task testing their recall of a series of medication-side effect pairs. After four study-test cycles,



participants again made post-task metacognitive judgements, which allowed for the examination of how experience with a difficult memory task may decrease overconfidence in memory for medication information. Both groups gave relatively high predictions of accuracy before the test, but these judgments were adjusted such that they were significantly lower after task experience. Practical implications of this work relate to the ways in which important medical information is relayed, while theoretical implications include examinations of age-related associative deficits, value-directed remembering, and metacognitive monitoring.

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12:00-1:30 PM (2115)

Is the Influence of Judgments of Learning on Memory Performance Positive or Negative? It Depends. JESSICA JANES, MICHELLE RIVERS and JOHN DUNLOSKY, *Kent State University* (Sponsored by John Dunlosky) — Can the act of assessing one's memory ultimately influence memory? A common metamemory measure – judgments of learning (JOLs) – have recently been shown to have reactive effects. Whereas some work has shown that making JOLs (vs. not making them) improves memory performance, other work has shown that making JOLs impairs memory performance. In the present research, we investigated the extent to which these different influences could be attributed to differences in experimental design. Participants studied a series of cue-target word pairs, half of which were strongly related and half of which were weakly related. Study time (self-paced vs. experimenter-paced) and judgments (JOLs vs. no JOLs) were manipulated between participants. Regardless of study pace, participants who made JOLs showed improved memory performance for strongly related items and impaired memory performance for weakly related items. Potential mechanisms underlying both positive and negative reactivity will be discussed.

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12:00-1:30 PM (2116)

Do Learners Have Insight Into the Levels of Processing Effect? Exploring Unresolved Issues of the Levels of Processing Effect With Judgments of Learning. EYLUL TEKIN and HENRY L. ROEDIGER, *Washington University in St. Louis* (Sponsored by Jonathan Peelle) — The levels of processing (LOP) effect is routinely obtained on many types of memory tests, but its mechanisms are still debated. In two old/new recognition experiments, we investigated possible reasons for the effect. We employed the standard LOP paradigm (the orienting question appears before the word) and a reversed order paradigm (the word appears before the orienting question). In both cases, subjects made judgments of learning (JOLs). We asked: Do subjects have insight into their learning under different orienting conditions? Does the reversed order paradigm eliminate the effect? Does providing explicit instructions to learn eliminate the effect? The results suggest that the effect is robust even with explicit study instructions, that it still occurs in the reversed order paradigm, and that subjects do not accurately predict

the levels of processing effect. In addition, the act of making JOLs enhanced performance, adding to evidence that JOLs are reactive measures.

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12:00-1:30 PM (2117)

Recognizing the Word Frequency Effect: Evidence for Knowledge Updating of how Word Frequency Affects Recognition. ETHAN FLURRY and DEBORAH K. EAKIN, *Mississippi State University* (Sponsored by Deborah Eakin) — Knowledge updating occurs when metamemory judgments change to reflect experience with the effect of an experimental factor on memory. One such factor is word frequency. Although recognition is better for low frequency words and recall is better for high frequency words, people typically give higher predictions for high than low frequency words, regardless of the test type. However, after experiencing superior recognition for low frequency words on a single-item recognition test, recognition predictions were updated to coincide with the effects of frequency on recognition, whereas recall predictions remained higher for high frequency words (Benjamin, 2003). The purpose of this study was to determine whether people updated their knowledge of word frequency effects on memory in general, or specifically how word frequency affects memory on recognition versus recall tests. This study used the Benjamin (2003) paradigm, but collected predictions about forced-choice recognition, rather than recall, after the initial single-item recognition test. Knowledge updating was still evidenced on this new-format recognition test, indicating that participants did update their knowledge of how word frequency affects recognition.

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12:00-1:30 PM (2118)

Memory For Metacognitive Confidence Judgments During Team Trivia. BRIELLE JAMES, KRISTIN FRENCH, VICTORIA KELLY and REBECCA MOSS, *Georgia State University*, ANDREW KELLY, *Georgia Gwinnett College*, AUDREY PARRISH, *The Citadel*, MICHAEL BERAN, *Georgia State University* (Sponsored by J. David Smith) — There are many assessments of metacognition in humans, but less research about how well people remember earlier metacognitive judgments. We presented participants with trivia questions to answer, during which they also provided confidence judgements in the form of monetary bets and rating scores. Participants answered questions individually and then again as a group. Participants then saw each trivia question a second time and were asked to report their original, individual wagers. The size of wagers was positively correlated with performance, indicating that participants were accurately aware of what they knew. Memory for wager amounts was best for the highest and lowest wagers, and was improved when the group and the individual experienced the same outcome (correct or incorrect answers). These results suggest that there may be differential effects on memory for wagers based on the outcome of wagers and on the extent to which social decisions align with individual decisions.

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**12:00-1:30 PM (2119)**

Does Response Scale Affect the Quality, Distribution, or Predictive Validity of Metacognitive Judgments? ELIZABETH A. GREEN, BRITT K. GORRALL, YOUNGHA W. OH and MICHAEL J. SERRA, *Texas Tech University* (Sponsored by Kenneth DeMarree) — Statisticians have criticized the practice of treating Likert-type categorical responses as continuous data. While methods for handling some consequences of this practice exist, the convenience of implementation and analysis when using Likert-type scales often overshadows such concerns. Despite the known advantages of using continuous measures, the most common response format used in contemporary research remains the Likert scale. Previous research demonstrates that visual analog scale responses are adjusted more frequently and elicit greater participant time on task, suggesting increased response consideration. In multiple experiments, we investigated the impact of different response scales (Likert, visual analog, numerical scales) on data information quality, distributional properties, and predictive validity. We suggest that information loss caused by constraining responses limits information quantity and quality. Additionally, we propose that response-scale differences alter the scale on which participants reflect about their experiences and beliefs, potentially leading to downstream differences in on- or offline metacognitive processes.

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12:00-1:30 PM (2120)

Downstream Consequences of Forcing Retrieval During Metacognitive Monitoring in Older and Younger Adults. RENEE DECARO and AYANNA K. THOMAS, *Tufts University* (Sponsored by Ayanna Thomas) — The way in which monitoring is elicited impacts metacognitive processes (Mitchum, Kelley, & Fox, 2016), which, in turn, may have consequences for subsequent learning. Further, when tasks differ in cognitive demands, older adults may be differentially impacted. We evaluated age differences in the relationship between judgments of learning (JOLs) and item selection decisions under two task conditions: 1) when retrieval was explicitly required during monitoring; 2) when retrieval was not explicitly required. Participants studied 30 unrelated word pairs. Item-by-item cue-only judgments followed, where participants either attempted to recall the target before providing the JOL or only provided the JOL. After providing JOLs for every item, participants reported how many items they wanted to restudy. Participants selected a fixed number of items to restudy, and after restudying selected items, were given a final recall test. Results suggest that task demands differentially impacted older and younger adult monitoring, control, and final test performance.

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12:00-1:30 PM (2121)

A Metacognitive Approach to Associative Memory. MARIO E. DOYLE and WILLIAM E. HOCKLEY, *Wilfrid Laurier University* (Sponsored by William Hockley) — The purpose of this study was to examine whether people can accurately monitor and control their associative memory. Participants studied a list of word pairs, consisting of compound (CANDLE-

WAX), high strength (BELOW-ABOVE), and low strength (BROTHER-SIBLING) pairs in Experiment 1, and compound and unrelated (CANDLE-SIBLING) pairs in Experiment 2. Judgments of learning (JOLs) and presentation time were recorded during study, while confidence judgments (CJs) and response time were recorded during the yes/no associative recognition test. Additionally, Experiment 2 had two study-test blocks. Overall the results indicated that compared to weakly or unrelated pairs, highly related pairs had higher hit rates, false alarm rates, JOLs, CJs, but lower study time. Surprisingly, there were no differences in discriminability, even with a second study-test block. Future research will examine the effects of test feedback, with the prediction that participants will use feedback to more accurately monitor their performance on the different pair types.

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APPLICATION OF NETWORK SCIENCE TO HUMAN LEARNING**12:00-1:30 PM (2122)**

Metamemory and Memory for a Wide Range of Font Sizes. MONIKA UNDORF and MALTE F. ZIMDAHL, *University of Mannheim* — Words printed in a larger font are judged to be more memorable than words printed in a smaller font, although font size does not affect actual memory. To clarify the basis of this font size effect, four experiments investigated how presenting words in 48 (Experiment 1) or 4 (Experiments 2 to 4) different font sizes between 6 point and 500 point affected judgments of learning (JOLs) and recall performance. In all experiments, perceptual fluency (measured as response times in a lexical decision task) was lower for words presented in very small and very large font sizes than for words presented in intermediate font sizes. In contrast, JOLs increased monotonically with font size across the whole range of font sizes. This was not due to metacognitive beliefs masking perceptual fluency effects on JOLs (Experiment 3) and was also found when perceptual fluency was made salient at study (Experiment 4). Recall performance increased with increasing font size. These findings demonstrate that ecologically valid metacognitive beliefs underlie the font size effect even when font sizes differ in perceptual fluency.

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12:00-1:30 PM (2123)

The Development of Perspective-Taking During Adolescence. VICTORIA EA. BRUNSDON, ELISABETH EF. BRADFORD and HEATHER J. FERGUSON, *University of Kent* — During adolescence, there is continued development of brain regions involved in both social cognition and executive function. In addition, adolescents are considered to be egocentric, with an increased focus on the self during this period. We therefore investigated the development of perspective-taking ability across adolescence and examined whether individual differences in executive function were related to perspective-taking ability. Adolescents and young adults completed a perspective-taking task (with eye-tracking) and executive function tasks. Reaction times in the perspective-taking task decreased across adolescence to adulthood. In addition,



adolescents were impaired when judging another's perspective if their own perspective differed, indicating a higher degree of egocentric bias in adolescents. This egocentric bias decreased during adolescence, and this was related to inhibitory control skills. This study therefore discusses the development of perspective-taking across adolescence and into early adulthood, and investigates how this may be related to the continued development of executive functioning.

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12:00-1:30 PM (2124)

Linking Mindsets With Toolsets: Interpretations of Experienced Difficulty Matter for Knowing how to Learn.

VERONICA X. YAN, *University of Texas, Austin*, DAPHNA OYSERMAN, *University of Southern California* — Effective strategies for learning are those that introduce difficulties to the learning process (e.g., interleaving, self-testing) because they prompt learners to engage more deeply. These strategies, however, are counterintuitive, potentially because we tend to misinterpret the experience of difficulty as a signal of not learning, rather than of central importance. In three studies, we examine the relationship between the mindset (interpretation of difficulty) and the toolset (learning beliefs and study behaviors), in both instructors (study 1) and in students (studies 2 and 3). Studies 1 and 2 revealed a link between mindset and toolset: The more people believed that difficulty signals impossibility, the less accurate they were in identifying effective learning strategies. Study 3 further revealed a relationship between students' beliefs and their study behaviors: The more a student endorsed that difficulty was a signal of importance, they more they used active study strategies to prepare for a midterm exam. Email: Veronica Yan, veronicayan@austin.utexas.edu

12:00-1:30 PM (2125)

A Model-Based Vocabulary Intervention for Typically-Developing and Late Talkers. ELIANA COLUNGA, *University of Colorado Boulder* — Learning language is a self-propelling system, in which initial advantages can further leverage access to learn more complex language. Late talkers, children below the 20th percentile on productive vocabulary, are not a homogenous group in terms of their developmental outcomes. In this 4-month longitudinal study, we use network-based models to select target words for children and their parents to learn at home. Forty 20-22-month-old (half late talkers), were assigned to high probability and low probability conditions; their individual books contained either words that the models predicted were highly likely to be learned next or not very likely to be learned next, based on the individual child's vocabulary at the beginning of the study. Results suggest that late talkers and typically developing children may benefit from learning different types of words, and specifically that typically developing children may benefit more from learning high probability words than low probability words.

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12:00-1:30 PM (2126)

Estimating an Individual's Network Efficiently From Human Fluency Data.

JOSEPH LARRY AUSTERWEIL and JEFFREY C. ZEMLA, *University of Wisconsin - Madison* — An outstanding problem in using network-based representations to study memory retrieval is determining what network to use. Most researchers use networks derived from large-scale corpora, such as word association norms or Wikipedia. This is expensive and precludes individual-level analyses. We discuss a novel technique for efficiently estimating networks from fluency data. Given a set of fluency lists from individuals, it estimates individual networks using hierarchical Bayesian inference. It assumes human memory retrieval produces a fluency list by performing a random walk on an unobservable network and outputting only the first visit to each node. We validate the technique through simulations and behavioral experiments, demonstrating that individual semantic networks can be accurately estimated with only three lists per participant. The estimated networks explain human similarity data better than other state-of-the-art techniques. We conclude by showing how to use our technique via an easy-to-use web interface hosted at <http://alab.psych.wisc.edu/snafu/>.

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SKILL ACQUISITION AND PERFORMANCE

12:00-1:30 PM (2127)

Reactive, Proactive, and Selective Stopping: What can 500,000 Trials Tell us About Inhibitory Control?

PATRICK G. BISSETT, IAN W. EISENBERG and RUSSELL A. POLDRACK, *Stanford University* — Recent efforts have aimed to develop a richer model for controlling and stopping responses by going beyond traditional reactive inhibition to understand selective and proactive inhibitory control (Aron, 2011; Bissett & Logan, 2011; 2014). Progress towards this goal has focused on small, siloed studies that interrogate single subtypes of inhibition. Here, we scale up this endeavor by investigating reactive, proactive (preparing to stop), stimulus selective (stop responses to certain stimuli), and motor selective (stop certain responses) inhibition in a sample of 522 subjects. With higher stop probability, which encourages proactive control, go responses slowed and reactive inhibition sped. When stimulus or motor selectivity was introduced to the stop task, reactive inhibition slowed and the independence assumption between going and stopping, which is fundamental to stopping models, was often violated. This suggests (1) proactive control improves reactive inhibition and (2) both stimulus selective and motor selective stopping frequently invalidate extant models of stopping.

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12:00-1:30 PM (2128)

Countermanding an Executed Action: An Analysis of Partial Movements Obtained From a Stop-Signal Task.

MIN-SUK KANG, *Sungkyunkwan University* — We studied partial movements obtained from a novel stop-signal task. Participants moved the computer mouse to locate the cursor within a target area but were asked to inhibit the action upon an infrequent stop-signal. Upon the stop-signal, action can be completed,



initiated but countermanded before its completion or inhibited, and partial movements here refer to those incomplete actions. Similar to traditional stop-signal tasks, the probability of responding to the target in the stop-signal trials increased with the stop-signal delay (SSD). More importantly, we found that the partial movements show the following characteristics. First, the frequency of partial movements shows a skewed distribution as a function of SSD with its peak mirroring go-RT distributions. Second, the amplitudes and RTs of partial movements increased with SSD on average. Third, within each SSD, the amplitudes and RTs of partial movements were negatively correlated. The result suggests that the race model can still provide a parsimonious account for a wide range of behavioral patterns of the stop-signal tasks.

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12:00-1:30 PM (2129)

Do Social Intention-Based Changes in Action Vary as a Function of Social Aptitude? KAITLIN LAIDLAW, JENNIFER COOPER, MELVYN A. GOODALE and JODY C. CULHAM, *University of Western Ontario* — The way in which you pick up and move a coffee cup can change depending on whether you intend to offer the cup to a friend or to simply move it out of the way. It has been proposed that these kinematic changes may be a way of communicating one's underlying intentions to others. If this were true, then the difference between social and nonsocial actions should correlate with measures of social aptitude. To test this, participants picked up and moved a metal block to be collected by another person (social condition) or not (nonsocial condition). They then completed the Autism Quotient questionnaire. We replicate previous work showing kinematic differences in social/nonsocial actions, but more importantly, demonstrate a relationship between the magnitude of these differences and the scores on the Autism Quotient subscales. Results will be discussed in relation to how action execution can aid social interactions more generally.

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12:00-1:30 PM (2130)

Movement Trajectory Evolution and Changes in the Structure of Movement Amplitude Time Series. ANDREW B. SLIFKIN and JEFFREY R. EDER, *Cleveland State University* — We recently demonstrated that the time-series structure of movement amplitude (MA) values shifted from pink to white noise with increases in the index of difficulty [$ID = \log_2(2A/W)$] (Slifkin & Eder, 2014). That result was attributed to increased reliance on closed-loop visual feedback processes as ID increased. Here, instead of examining the time-series structure of MA values measured at movement termination, we examined the time-series structure of MA values measured at different percentages of time into the movement trajectory. We hypothesized that at all ID levels a pink-noise time-series structure would be seen during the early portions of the movement trajectory, but during later portions of the trajectory an increased whitening of time-series structure would emerge only under high ID conditions: That is, it is only under high ID conditions, during the approach of movement termination, that

increased engagement of closed-loop visual feedback processes would be needed. The results of our analyses will be presented and discussed.

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12:00-1:30 PM (2131)

Influence of Response Eccentricity on Orthogonal Compatibility Effects: Physical-Location Stimuli vs. Location Words. ROBERT W. PROCTOR and AIPING XIONG, *Purdue University* — When people respond to upper/lower stimulus locations with left/right keypresses using the index fingers, response-device location has a reliable effect: Placing the device in the left hemispace increases an advantage for the up-to-left/down-to-right mapping compared to centered placement, whereas placing it in the right hemispace increases an advantage for the up-to-right/down-to-left mapping. A polarity-correspondence account attributes this response-eccentricity effect to asymmetries of response coding induced by response-device placement. We report two experiments using centered location-words “above” and “below” as stimuli that did not show the response-eccentricity effect even when their letters were arrayed vertically to make the vertical dimension salient. Another experiment replicated the response-eccentricity effect for physical-location stimuli and showed that it was independent of asymmetry of the response device. The results imply that the response-eccentricity effect has its basis in processing of physical spatial locations rather than conceptual spatial codes, contrary to what the polarity correspondence account implies.

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12:00-1:30 PM (2132)

Who's Speaking at Psychonomics? A Gender Analysis of Spoken Presentations From 2007 to 2016. YANA WEINSTEIN and NICHOLAS TILTON, *University of Massachusetts - Lowell*, MEGAN A. SMITH, *Rhode Island College* — We created a database of presenters from Psychonomic Society abstract books of the past 10 yearly meetings. We identified 1,308 psychological scientists who gave spoken presentations at 1-10 meetings ($M = 2.4$, $SD = 1.9$). We searched the web to determine the gender of each presenter and the year of their PhD. Across the sample the percentage of females speaking varied between 26% (2011) and 34% (2016), with no consistent trend over time. While there may be more early-career females in our field, one important question is whether we will see more even gender distribution as the early career cohort moves up the ranks. It is possible that we simply need to wait for the larger numbers of females in these fields to “catch up,” but it is also possible that there is a bottleneck, where females are dropping out of the field as cohorts move up the ranks.

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12:00-1:30 PM (2133)

Two Retrievals From a Single Cue: A Bottleneck Persists Across Episodic and Semantic Memory Retrieval. TILO STROBACH and FRANZISKA ORSCHESCHEK, *Medical School Hamburg*, TORSTEN SCHUBERT, *University Halle*, TIMOTHY C. RICKARD, *University of California, San Diego*



— This study investigated whether dual-memory retrieval occurs in parallel or if it is subject to a retrieval stage processing bottleneck. Prior work explored this question for the case of two retrievals from episodic memory, demonstrating a retrieval bottleneck even after dual retrieval practice. It is plausible that the retrieval bottleneck only applies for the case of two retrievals from the episodic memory system. In contrast, the retrieval bottleneck could also be a global property of memory retrieval and applies to retrievals from different memory components. To test these hypotheses, in the present study, episodic memory retrieval was combined with retrieval from semantic memory. We used antonym pairs as a measure for semantic memories since antonyms are acquired in childhood and frequently retrieved from memory. Our results are consistent with the assumption that the retrieval bottleneck is superordinate to specific long-term memories and holds across different memory components.

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12:00-1:30 PM (2134)

Clinical Students' Use of Palpation of a Simulated Abdomen in Diagnosis of Abdominal Pain: Pre-Training Observations.

ROBERT M. HAMM and JOSE MEDINA, *University of Oklahoma Health Sciences Center*, CODY A. COX, *University of Oklahoma College of Medicine*, DAVID KELLEY, *University of Oklahoma Health Sciences Center*, FRANK J. PAPA, *University North Texas Health Sciences Center* — Exploring the potential of a simulated abdomen in instruction about diagnosis of abdominal diseases, we developed a procedure to assess students' ability to utilize a physical examination of the abdomen in diagnosing patients complaining of abdominal pain. Physician assistant students (50 first year, 42 second year) diagnosed four written cases, selecting best guess and top three of 8 possible diseases. After initial diagnosis, they palpated the simulated abdomen which had an appropriate abnormality within, and repeated diagnosis. 60.7% of Y1 students included the right diagnosis in their differential diagnosis list (three guesses) when reading the written cases; 69.6% included it when they palpated the abdomen. Of Y2 students, 70.9% listed the correct diagnosis when reading the text, and 74.6% when palpating. The impression that these students are unusually inaccurate, or rely unusually little on the abdominal palpation, may be an effect of the cases chosen for diagnosis; further work may clarify. This will be the baseline measure for assessing Y1 training with simulator, and Y2 clinical experience. The study represents a presentation-focused and disease-specific approach to cognitive differential diagnosis training.

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12:00-1:30 PM (2135)

How Task Characteristics and Cognitive Resources Interact to Predict Learning and Performance: Sequential and Simultaneous Task Environments. DAVID J. FRANK, *Texas A&M University-Commerce*, BROOKE N. MACNAMARA, *Case Western Reserve University* — Multitasking has been shown to impair performance on one or both tasks. People with greater cognitive resources (e.g., greater working memory

capacity) demonstrate fewer decrements in multi-task conditions, arguing that multitasking increases reliance on basic cognitive resources. However, most studies on multitasking involve dynamic (as opposed to static) task environments. Dynamic tasks themselves, have recently been shown to rely heavily on basic cognitive resources (Macnamara and Frank; under review). Thus, it is unknown to what degree multitasking necessitates basic cognitive resources when unconfounded with a dynamic task environment. Participants played a game similar to *Plants vs. Zombies*, in which they had two missions: collect energy and fight zombies. These missions were either carried out simultaneously (multitasking version) or in sequence. Additionally, half of the participants in each version performed the task under cognitive load. We examine the effects of cognitive load and simultaneity on learning and performance. Email: Brooke N. Macnamara, bnm24@case.edu

12:00-1:30 PM (2136)

Implicit and Explicit Knowledge Acquisition in Perceptual Matching Task.

REIKO YAKUSHIJIN, *Aoyama Gakuin University* — We examined how people learned implicitly and explicitly the latent causal structure in their environment using perceptual matching task. Participants were asked to manipulate comparison objects until they matched target objects using the fewest manipulations possible. Because they weren't given any knowledge beforehand about causal structures that governs the relationship between actions and perceptual outcomes in the task environment, they had to learn the causal structures through trial-and-error behaviors. Yakushijin & Jacobs (2011) used the task in simple environments and showed that human performances were broadly consistent with those of model-based reinforcement-learning agents. Interestingly, some participants showed performance improvement although they could never explain the causal structure explicitly. In this study, we used complex environment and inferred participants' implicit knowledge about the causal structure at each learning stage using model-based reinforcement-learning simulation, and compared it with their explicit explanation in detail. Result showed delay and simplification in explicit knowledge.

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12:00-1:30 PM (2137)

The Effect of Expertise on Motor Sequence and Visual Memory for Indoor Rock Climbing Routes.

KRISTINA M. RAND, MARGARET R. TARAMPI, MIRINDA WHITAKER and GRANT POINTON, *University of Utah* — Rock climbers are highly skilled motor experts who rely on both cognitive and physical competence (Bourdin, Teasdale, & Nougier, 1998). We evaluated climbers' abilities to predict and remember routes (motor sequence, visual memory) before and after climbing. Intermediate to expert level rock climbers identified which holds belonged to specified routes on a grayscale image both after a short visual preview and after climbing/attempting to climb the route. Climbers also predicted their hand sequence before, and recalled the actual sequence used after climbing the route. Expert climbers demonstrated higher performance on both predicting and remembering completed sequences compared to intermediate and advanced climbers. Expert



climbers also outperformed less skilled climbers on visual memory recall after the preview. However, no effect of skill was found for visual memory after climbing the route, suggesting that climbing the route benefits less skilled climbers' visual memories more than their sequence memories.

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12:00-1:30 PM (2138)

Factors That Influence Spatial Perspective Taking Performance. PERI GUNALP and MARY HEGARTY, *University of California, Santa Barbara* (Sponsored by Mary Hegarty) — Previous research has demonstrated a sex difference favoring males in perspective taking (PT) performance on the paper Spatial Orientation Test (SOT). However when an avatar, (a cue that is social and directional), is included in the SOT array, women and men perform equally well. Experiment 1 examined how performance in an immersive VR SOT was affected by an avatar versus an arrow (non-social directional cue). Participants performed better in the avatar condition than either the arrow or control conditions, indicating that the social nature of the avatar was critical in enhancing performance. Experiment 2 compared the avatar condition to a different non-social directional cue (a chair). Participants in both the chair and social conditions outperformed the control condition. Sex differences were evident in all conditions. These experiments suggest that performance on this task may be enhanced by ease of embodiment or interactivity of the cue rather than its social nature.

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12:00-1:30 PM (2139)

Switching Between Imagination and Execution: The Role of Inhibitory Mechanisms in Motor Imagery. VICTORIA K.E. BART, *UMIT*, IRING KOCH, *RWTH Aachen University*, MARTINA RIEGER, *UMIT* (Sponsored by Martina Rieger) — Motor imagery (MI) requires the mental simulation of movements. During MI actual movements need to be inhibited. We investigated which inhibitory mechanisms occur in MI. Participants performed hand movements from two start buttons to two target buttons in imagination (I) and execution (E) trials, which were randomly presented. In imagination, the start and end of the imagined movements were indicated using the hands (hand group) or the feet (foot group). Trial sequences differed depending on current action mode (I, E), previous action mode (I, E), hand (same, other), and target (same, other). Reaction times were longer in the foot group than in the hand group, but data patterns were similar in both groups. Evidence for global inhibition (faster reactions in E-I sequences compared to I-I sequences), effector specific inhibition (hand repetition costs after imagination trials), and inhibition integrated in MI (target repetition benefits in I-I sequences) was obtained. MI is not just a weaker form of execution. Different inhibitory mechanisms work jointly during MI.

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12:00-1:30 PM (2140)

Influence of Expectations on Changes in Motor Performance in Response to Anodal tDCS. SHEIDA RABIPOUR and PETAR SEFIK VIDJEN, *University of Ottawa*, ANTHONY REMAUD, *Bruyere Research Institute*, PATRICK S.R. DAVIDSON, *University of Ottawa*, FRANCOIS TREMBLAY, *Bruyere Research Institute* (Sponsored by Jesse Rissman) — Transcranial direct current stimulation (tDCS), increasingly promoted for motor and cognitive enhancement, remains shrouded in controversy. Despite a growing literature and market, tDCS effectiveness and mechanism(s) remain questionable. Notably, studies rarely examine factors such as expectations of outcomes, which may influence tDCS response through placebo-like effects. Here we assessed whether expectations could influence responses to tDCS. We randomized 52 naïve participants (18-34 years of age; 38 women), to receive information either praising tDCS as a performance enhancer (High) or questioning its effectiveness (Low). We further randomized participants to receive sham or active anodal (20 min, 2 mA) stimulation over the left motor cortex. Although participants were uncertain of tDCS effectiveness at baseline, ratings significantly increased or decreased in response to the High or Low condition, respectively, and decreased following the intervention. Motor reaction times and fine motor dexterity were unaffected by expectation or stimulation conditions. Our findings support recent criticisms of tDCS as a performance enhancer and highlight the need for further investigation of expectations and other factors in tDCS studies.

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12:00-1:30 PM (2141)

Non-Action Effect Binding: A Critical Re-assessment. LISA WELLER, WILFRIED KUNDE and ROLAND PFISTER, *University of Wuerzburg* (Sponsored by Roland Pfister) — The decision not to act in a given situation can lead to distinct subsequent effects. Recent studies report evidence that non-actions – voluntary omissions of actions – can become bound to their effects, just like actions and their effects. We provide a critical re-assessment of non-action effect binding: In an acquisition phase, participants learned to associate actions and non-actions with specific effects. In a subsequent test phase, participants were allowed to choose an action or non-action freely in response to the former effects. Binding should lead to more effect-consistent choices than predicted by chance. However, previous studies did not control for potential confounds, such as deliberate response strategies that might artificially inflate evidence for binding. We show that these confounds have a strong impact in common experimental designs and introduce ways to mitigate their effects. This improved assessment still corroborated evidence of binding between non-actions and their effects.

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12:00-1:30 PM (2142)

The Influence of Feedback on Task Switching Training: A Drift Diffusion Modeling Account. RUSSELL A. COHEN HOFFING, *University of California, Riverside*, FRANK KARVELIS, SAM RUPPRECHTER and PEGGY SERIES,



University of Edinburgh, AARON SEITZ, University of California, Riverside (Sponsored by Steven Clark) — Research suggests that task switching performance can improve with practice, but what is being learned over the course of training is still poorly understood. Here we investigate the influence of feedback on task switching training and use drift diffusion modeling (DDM) to gain insight into how decisional processes change during training. Our results suggest that feedback that informs participants of task switching performance leads to the biggest reductions in tasks-switching cost. However, tradeoffs between reaction time and accuracy led to difficulties in conventional analysis. To overcome this we implemented the DDM, which showed that participants learn to integrate information more slowly on switch trials and that feedback primarily influences decision boundaries, but had little effect on drift rate. Our results suggest that some types of feedback are more effective than others, and that DDM is a useful approach to understand factors that influence task switching performance. Email: Russell Cohen Hoffing, rcohe003@ucr.edu

SPEECH PERCEPTION I

12:00-1:30 PM (2143)

Second Language English Learners' Perception of Foreign-Directed Speech. SUSAN C. BOBB, KRISTIN MELLO, EMILY TURCO, LARISSA LEMES and ERIKA FERNANDEZ, *Gordon College*, KATHRIN ROTHERMICH, *University of Connecticut* — Previous research has shown that people adapt the way they speak depending on the perceived comprehension level of the listener (Uther et al., 2007) including when they speak to foreigners. While the acoustic properties of accommodations such as foreign speech are well documented, few studies have investigated how second language learners in particular interpret them. The present study investigated English language learners' (ELLs) perception of different speech types. Participants heard four types of auditory stimuli (casual, clear, infant-directed, and foreign-directed) spoken by four different speakers (two males, two females) and evaluated the extent to which the speaker was easy to understand, competent, condescending, friendly, and respectful. Perceptual ratings showed an interaction between speech type and question type ($p < .001$). Casual speech was least intelligible, least competent, least friendly, and least respectful compared to all other speech types. No effects were found for condescension. The implications of these results suggest that ELLs perceive speech accommodation of any type as positive. Email: Susan C. Bobb, susan.bobb@gordon.edu

12:00-1:30 PM (2144)

Dynamic Pitch Training to Improve Lexical Tone Learning in Older Adults. LYDIA F. HAYES, JESSICA B. WEINER and ERIN M. INGVALSON, *Florida State University* — Years of research have provided many insights into the mechanisms of non-native speech learning for younger adults, but little is known regarding older adults' learning mechanisms. Though little is known regarding the non-native speech learning mechanisms of older adults, there are reasons to suspect they may differ from those of younger adults, including age-related declines in peripheral hearing, working memory capacity, and

dynamic pitch perception. The present study tested whether providing older adults with practice identifying dynamic pitch would lead to improvements in lexical tone learning. Six older adults completed eight days of lexical tone training. An additional six older adults received three days of training in dynamic pitch perception identification prior to engaging in lexical tone training. Receiving dynamic pitch perception training did not provide an additional benefit for lexical tone learning in the older adults, suggesting that training paradigms that build on the strengths of the older adults may have more success than those that aim to improve their weaknesses. Email: Erin Ingvalson, erin.ingvalson@cci.fsu.edu

12:00-1:30 PM (2145)

Flanking Bigrams Affect Lexical Decision Performance. ALBERT F. SMITH, NICOLE M. RUSSO and LEA G. ARAYA, *Cleveland State University* — In a lexical decision task in which target strings were flanked by pairs of bigrams, Grainger, Mathot, and Vitu (*Acta Psychologica*, 2014) found, for words, better performance when flanking bigrams contained target-string letters (e.g., BI BIRD RD; RD BIRD BI; IB BIRD DR; DR BIRD IB) than when they did not (e.g., CE BIRD NT); better performance when flanking bigrams contained letters ordered as in the target (e.g., BI BIRD RD; RD BIRD BI) than switched (e.g., IB BIRD DR; DR BIRD IB); and that only letter order within bigrams—not bigram order relative to the respective target—affected performance. Palinski and Smith (*Abstracts of the Psychonomic Society*, 2016) replicated these findings. In each of those experiments, on 80% of trials, flanking bigrams were composed of letters from the target. We conducted a new experiment in which only 50% of trials involved flanking bigrams whose letters were in the target. We again found, for words, more efficient responding when flanking bigrams contained target letters than when they did not and when flanking-bigram letters were ordered as in the target than switched. These effects appear to not depend on the proportion of trials on which flanking bigrams are composed of target letters.

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12:00-1:30 PM (2146)

The Flexibility of Novel Word Representations: The Role of Frequency and Variability. MARIEKE VAN HEUGTEN, *University at Buffalo, State University of New York* — One of the fundamental prerequisites for efficient communication is the ability to understand spoken language. This involves not only the comprehension of familiar words, but also the acquisition of novel words without a pre-existing entry in the mental lexicon. The current study examines the flexibility of such newly-learned word representations. In two experiments, participants were exposed to novel label-object pairings, half of which were presented frequently and half of which were presented infrequently. At test, participants' comprehension of these items was assessed both in the native and in a foreign accent. In Experiment 1, where the same word token was used across presentations, participants were faster to recognize foreign-accented than native-accented words. In Experiment 2, by contrast, where each presentation was unique, high-



frequency words were recognized faster than low-frequency words, independent of the test accent. This suggests that both frequency and variability contribute to the flexibility of novel word representations.

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12:00-1:30 PM (2147)

Does Long-Term Exposure to Foreign-Accented Speech Improve Perception of Foreign-Accented Speech? HAYK ABRAHAMYAN AND PAUL LUCE, *University at Buffalo*

— We recognize spoken words in our native language with relative ease. Yet, difficulties arise when we encounter a talker with an accent. Short-term lab exposure leads to observable improvements in comprehension of foreign-accented speech. Life-long exposure markedly improves perception of within language variability (i.e. dialects) and refines listeners' representations. Less is known about the benefits of long-term exposure to foreign-accented speech. We used cross-modal identity priming to investigate if long-term exposure to Chinese-accented English by native speakers of American English would modulate their processing of Chinese-accented speech. We predicted that listeners with long-term exposure to the foreign accent, assumed based on long-term residence in the New York City area, should be faster and more accurate at recognizing Chinese-accented words than listeners without long-term exposure, assumed based on long-term residence in less linguistically diverse areas. Our results suggest that long-term exposure does affect listeners' abilities to recognize and represent foreign-accented spoken words.

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12:00-1:30 PM (2148)

A Multidimensional IRT Model of Working Memory Span. KRISTOF KOVACS, *Eszterhazy Karoly University*,

ANDREW CONWAY, *Claremont Graduate University* — There is substantial cross-domain variance in complex span tasks (CST) that can be explained by a general factor. This factor correlates strongly with the general factor of intelligence (g). Process Overlap Theory (POT) explains the cross-domain variance in intelligence tests (g) with a non-linear overlap of cognitive processes, and is also specified as a multidimensional item response model (M-IRT) (Kovacs & Conway, 2016). POT purportedly explains the domain-general WMC factor, too. Yet in terms of modelling, CST is different from intelligence tests since test items are dichotomous but scores on CST are continuous. Kan et al. (2016) performed a simulation to test POT, based on the corresponding M-IRT for test items. Here we replicate and extend that study to include a M-IRT model for WMC that corresponds to POT. The results demonstrate that POT can explain the general factor of WMC, as well as the relationship between WMC and intelligence.

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12:00-1:30 PM (2149)

Dynamics of Lexical Competition During Foreign-Accented Word Recognition. KIT YING CHAN, *City University of Hong Kong*,

CYNTHIA S.Q. SIEW, *University of Warwick* — This study examined the dynamics of lexical competition during

accented word recognition. Native (American-accented) and Spanish-accented English words were presented to native listeners for identification. The MouseTracker program was used to track participants' hand/mouse movements toward the target word or the distractor. The distractor was either a similar sounding word as control or a strong competitor (i.e., a similar sounding word that best matches the accented pronunciation based on a pilot study). Regardless of accent, participants responded more slowly and less accurately when the distractor was the strong competitor. Strong competitors resulted in lower accuracies than control words in the accented condition than the native condition. During accented word recognition, participants' hand movements were more attracted toward the strong competitor than the control, whereas no such difference was observed during native word recognition. Spatial attraction toward strong competitors was also greater for accented words than native words. Results aligned with Chan and Vitevitch (2015)'s finding that accented speech tends to strongly activate one particular similar sounding neighbor of the target word during lexical competition.

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12:00-1:30 PM (2150)

My Voice or Your Voice: Talker Age and Familiarity Effects on Spoken Word Recognition in Toddlers and Adults. ANGELA COOPER, NATALIE FECHER and ELIZABETH JOHNSON, *University of Toronto*

— The present work examined the impact of talker age and familiarity on 2.5-year-olds' and adults' spoken word recognition. Fifty-four mother-child dyads recorded select words commonly known by toddlers. In a subsequent lab visit, the dyads completed a word recognition task involving productions of their own voice, their own mother/child's voice, an unfamiliar child's voice and an unfamiliar mother's voice. For all participants, word recognition was superior with adult than child voices. For children, no own-voice advantage was found; recognition accuracy was in fact higher with the voice of an unfamiliar adult talker and comparable with the voice of an unfamiliar child. For adults, voice familiarity facilitated word recognition, with overall superior performance on familiar voices (own voice and their child's voice) relative to unfamiliar voices. These findings suggest that speech perception does not appear to be based on own-speech representations but involves the encoding of talker or talker group-specific information.

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12:00-1:30 PM (2151)

Language Experience Shapes Talker Recognition in Early Infancy. NATALIE FECHER and ELIZABETH K. JOHNSON, *University of Toronto*

— Adults recognize talkers speaking a familiar language better than talkers speaking an unfamiliar language (e.g. Thompson, 1987; Bregman & Creel, 2014). Previous research suggests that this Language Familiarity Effect (LFE) on talker recognition may already be present in 7-month-old infants (Johnson, Westrek, Nazzi, & Cutler, 2011). In Experiment 1, we replicate Johnson et al. (2011) with an improved design, a different population, and a different language pair (English/Polish; $N=48$). In Experiment 2, we extend Johnson et al.'s findings using a more challenging test



paradigm and another language pair (English/Spanish; N=48). Finally, in Experiment 3, we examine whether hearing Polish for 15 minutes a day for two weeks improves English-learning infants' ability to tell apart novel Polish speakers (N=36). Our results thus far clearly demonstrate that the LFE is robust by 7 months of age, implying an early interdependence of indexical (talker-specific) and linguistic (speech content) information during talker recognition.

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12:00-1:30 PM (2152)

How Task Engagement Influences Speech Production: A Look at Phonetic Convergence. TIFANI BIRO and NAVIN VISWANATHAN, *University of Kansas*, JOSEPH TOSCANO, *Villanova University* (Sponsored by Navin Viswanathan) — Interlocutors show increased similarity in phonetic properties for voicing distinctions during conversation (phonetic convergence), but the extent to which talkers converge varies across studies. One aspect of laboratory tasks that differs from real-world settings is how engaging they are. Highly contrived tasks may fail to elicit natural speech, which may influence whether participants converge. We addressed this by comparing the extent of interlocutor convergence in a traditional laboratory task versus a game-based task that provides a naturally engaging environment. Thirty word-initial voicing minimal pairs were used as stimuli, and we measured the degree to which phonetic indicators of voicing changed over the course of the experiment. We found that participants in the game-based task showed greater convergence of vowel length and F1 onset compared to participants in the traditional task. These results suggest that naturalistic tasks may yield results that more accurately reflect real-world phonetic variation than traditional laboratory experiments.

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12:00-1:30 PM (2153)

Social Information and Speech Behavior: Effect of Individual Talker Traits on Vocal Alignment. EVA M. LEWANDOWSKI and LYNNE C. NYGAARD, *Emory University* (Sponsored by Lynne Nygaard) — Vocal alignment is the tendency for individuals to match the speech characteristics of others. Although both social and cognitive factors affect patterns of alignment, interactions among these factors are poorly understood. To address this gap, the present experiment examined (1) whether individual-level social information about a talker influences alignment behavior and (2) whether alignment based on social information requires cognitive resources. Native English speaking adults participated in a laboratory shadowing task where the target speakers were paired with a photograph and a positive or negative biography. Shadowers aligned based on social characteristics with differential alignment to "good" and "bad" model talkers. Furthermore, shadower response times were examined to determine whether degree of alignment depends on effortful processing of social information. These findings suggest that attitudes regarding individual speakers influence alignment behavior and will elucidate the extent to which social evaluations are resource-demanding.

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12:00-1:30 PM (2154)

Long-Lasting Gradient Activation of Referents During Spoken Sentence Processing. JAMES BENJAMIN FALANDAYS, *Villanova University*, SARAH BROWN-SCHMIDT, *Vanderbilt University*, JOSEPH C. TOSCANO, *Villanova University* (Sponsored by Michael Spivey) — During spoken language comprehension, listeners must map continuous acoustic cues onto discrete categories. An outstanding question concerns how long gradient activation can be maintained when interpreting discourse information. The current study used the visual-world paradigm to address this issue. Listeners heard sentences with a pronoun referring to a male or female referent, with the correct referent not disambiguated until later in the sentence. The pronoun was manipulated along an acoustic continuum from *he* to *she*, and the length of the ambiguous period in the sentence varied from 3 to 35 syllables. Eye-movements to the visual referents were recorded, providing a measure of whether continuous acoustic differences guided interpretation later in the sentence. After revising their interpretation of the referent, time to fixate the target varied as a function of pronoun continuum step, revealing that gradient activation was maintained over periods of as long as 35 syllables (approx. 8 sec).

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12:00-1:30 PM (2155)

Through the Ear, to the Brain: How Cognitive Abilities Impact Speech Perception in Older and Younger Adults. ERIC J. FAILLES and MITCHELL S. SOMMERS, *Washington University in St. Louis* (Sponsored by Mitchell Sommers) — Although auditory sensitivity declines throughout the adult lifespan, listening comprehension remains relatively stable until approximately age 70. One reason for preserved comprehension in the face of hearing loss is increased reliance on contextual cues by older adults; however, this increased reliance on context makes older adults prone to falsely hearing a contextually predicted word when a similar sounding word is presented. Past research has largely overlooked how declines in cognitive abilities involved in speech perception relate to context use. The present study examined the individual contributions of hearing acuity, verbal ability, processing speed, working memory, and executive control to context use by older and younger adults. Consistent with previous findings, older adults were more likely to hear words predicted by context when a similar sounding word was actually presented. The individual differences analysis indicated that working memory protected against context-based misperceptions in older, but not younger, adults.

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12:00-1:30 PM (2156)

Effects of Pause Location and Duration on Perception of Native and Non-Native Speech. MISAKI KATO, MELISSA BAESE-BERK, CHARLOTTE VAUGHN and TYLER KENDALL, *University of Oregon* (Sponsored by Melissa Baese-Berk) — Previous studies have shown that suprasegmental aspects of non-native (NN) speech affect listener judgments. Specifically, NN speech has been described as having more frequent and longer pauses, and pauses at within-clause



boundaries. However, it is not clear how various characteristics of pause interact with one another for listener judgment, and whether they affect perception of native (N) and NN speech in a similar manner. In the present study, we examine how the location and duration of silent pauses affect listeners' judgments of N and NN speech. Segments of spontaneous dialogues from the Wildcat corpus (Van Engen et al., 2010) that differ in location (grammatical or ungrammatical) and duration of silent pauses were judged by native English listeners on their fluency and intelligibility. Examining how different aspects of silent pauses affect perception of spontaneous speech will add insight into the characterization of fluency in N and NN speech. Email: Misaki Kato, misaki@uoregon.edu

DISCOURSE PROCESSES

12:00-1:30 PM (2157)

The Role of Popularity Cues in Students' Selections of Scholarly Literature Online. NICOLAS VIBERT, OLE SKOV, GUILLAUME DE PEREYRA, LUDOVIC LE BIGOT and JEAN-FRANÇOIS ROUET, CNRS - *Université de Poitiers* — This study examined the effect of popularity figures on undergraduate psychology students' selection of bibliographical references. The main assumption was that high citation figures could be taken as accessible relevance cues and be used for quick decisions that bypass deeper reasoning processes. Experiment 1 presented university students with a reference selection task while manipulating the number of citations attributed to documents. As expected, there was a strong impact of citation figures on reference selection. Experiment 2 used eyetracking methodology to show that this "big number" effect was contingent upon the participants fixating the citation figures. Experiment 3 confirmed the pervasiveness of the big number effect by demonstrating that less relevant references were three times more likely to be selected when they came with a high number of citations. Hence, the data show that popularity cues can actually "trump" the intrinsic relevance of reference even during the selection of scholarly literature. Email: Nicolas Vibert, nicolas.vibert@univ-poitiers.fr

12:00-1:30 PM (2158)

Function Words in Text Processing. LIANG TAO, *Ohio University*, ALICE F. HEALY, *University of Colorado Boulder* — Comprehension and grammar knowledge of Chinese and English were assessed in native Chinese speakers and in native English speakers from 2nd to 4th year Chinese language classes. Chinese passages and their English translations were used, each missing 8 common function words, THE in English and DE in Chinese, with no indication of missing words. Each subject processed 1 Chinese and 1 English passage for 3 tasks: reading and giving a comprehensibility rating, answering comprehension questions, then rereading and inserting THE/DE. Despite missing function words, all subjects gave high comprehensibility ratings and made few comprehension errors except for native English speakers on Chinese passages. When inserting function words, in Chinese native English speakers made many misses (with a developmental progression from the 2nd to the 4th year students), but native Chinese speakers made

few misses. In English all subjects made a small number of misses. So subjects had clear knowledge of where function words should be in their native language but not in the language they were learning. This study reflects the progressive development of grammar knowledge in foreign language learning. Email: Liang Tao, tao@ohio.edu

12:00-1:30 PM (2159)

Anchoring Reduces Mind Wandering Thereby Enhancing Memory Performance. ANN ROTEM and YAAKOV HOFFMAN, *Bar Ilan University* — Mind-wandering (MW) refers to the interruption in focusing by task unrelated thoughts (TUT) and occurs 30-50% of our daily lives. While MW has many benefits, such as in creative problem solving, its price is distraction. In the current study we show a combination of two methods that interact to reduce the effect of mind-wandering and in turn enhance memory performance: Factor I: Attention level namely when one's task difficulty level increases slightly (feather-weight divided attention), there should be less available attention needed for mind-wandering, in turn mind-wandering should decrease. Factor II: Prime-time; whereby one's orientation towards the here-now is primed by being shown a clock vs. numbers. Applying an orthogonal design (2 Attention [divided vs. full] X 2 [primed vs. no-primed]) revealed better memory (and less TUT) when a feather weight divided attention manipulation was coupled with the prime-time manipulation. In addition to theoretical implications, these results also may have practical implications for reducing the deleterious effects of MW. Email: Yaakov Hoffman, hoffmay@gmail.com

12:00-1:30 PM (2160)

Inferences From Negative Emotional Language: Weird. CONNIE SHEARS, LUCIE JEROME, KELSEY LEAVY, SAMIRA AMIRAZIZI and HYE-RYNN LEE, *Chapman University* — When you listen to a friend describing their loss of a loved one, do you form causal inferences – that connection of implied information which supports comprehension – in the same manner as when you listen to a friend describing their hiccups during a presentation? Sympathy and awkwardness are weird valences (Sauter, 2010) which may be categorized as negative, but not always (Shears, 2017). If emotional language supports causal inferences, then readers should be slower and less accurate to inference targets following inference supporting relative to control sentences. Readers made key press responses to target words that were in stories that conveyed sympathy, pride, regret, resentment, boredom, or awkwardness and to targets that were not in the stories, but related to inferred information. Valence significantly interacted with both sentence and target type, indicating readers are more likely to form causal inferences if the valence is not awkwardness. Individual perceptions of these emotions can affect the inference process. Email: Connie Shears, shears@chapman.edu

12:00-1:30 PM (2161)

Tracking and Representation of Goal-Relevant Location Information in Narrative Processing. WILLIAM H. LEVINE and JESSICA MCCULLY, *University of Arkansas* — Participants



read short narratives in which a character had an urgent goal to achieve in a specific location. The character either made it to the location or not. Later in the narrative, after a variable amount of unrelated-to-location backgrounding text appeared after the location manipulation, a sentence was presented that was consistent or inconsistent with the earlier location. This sentence either did or did not include a reminder about the location of the narrative action. Reading times were longer on the inconsistent sentences, regardless of the presence of the reminder, suggesting that location information was readily accessible in memory and played a role in the integration of new text information. The inconsistency effect was larger when a reminder was present, illustrating the additional role of memory cues in reinstating information from earlier in a text. These results will be discussed with respect to memory-based and scenario-based text-processing theories.

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12:00-1:30 PM (2162)

The More Sarcastic You Are, the More Sarcastic You Think Others Are. ALICIA A. HAMMOND, J. TREVOR D'ARCEY, ALINA S. LARSON and JEAN E. FOX TREE, *University of California Santa Cruz* — Identifying sarcasm is tricky. Producing sarcasm in labs is also challenging. We created a corpus of sarcastic dyadic communication using visual prompts of badly dressed celebrities (cf. Hancock, 2004). Pairs discussed the celebrities for ten minutes and then reviewed recordings of their conversations immediately afterwards (cf. Amati & Brennan, 2016). Participants identified their own and their partners' sarcasm uses. Participants were not provided a definition of sarcasm, in order to further our understanding of how sarcasm is conventionally produced and interpreted. Self-reported sarcasm can be corroborated with partner-perceived sarcasm. Almost all participants reported producing sarcasm at least once. The more participants identified sarcastic utterances in their own productions, the more they identified them in their partners' productions.

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12:00-1:30 PM (2163)

An Empirical Test of Conceptual Metaphor Theory. ALBERT N. KATZ and J. NICK REID, *University of Western Ontario* — Lakoff and Johnson's (1980) Conceptual Metaphor Theory posits that all metaphorical language is based on underlying cross-domain mappings. For example, the expressions "that setback cost me an hour" and "invest your minutes wisely" are supposedly based on an underlying conceptual mapping in which language about money is used to talk about time. Despite its influence in a variety of disciplines there is little experimental support for the theory, which we do here by using the DRM false memory paradigm. We constructed five lists of metaphorical expressions all based around different putative conceptual metaphors. Following each list was a recognition test with unrepresented sentences that were either consistent or inconsistent with these conceptual metaphors. The sentences consistent with the conceptual metaphors were falsely recognized at significantly higher rates than the inconsistent

sentences, even when associative factors were eliminated, indicating the expressions in the study lists did in fact activate underlying conceptual mappings.

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12:00-1:30 PM (2164)

The Role of Affect in Reducing Misinformation About Vaccinations. GREGORY TREVORS and PANAYIOTA KENDEOU, *University of Minnesota - Twin Cities* — Misinformation about vaccines is prevalent and motivates anti-vaccine rhetoric and vaccine-hesitancy among new parents. The challenge of reducing the impact of such misinformation is compounded by the fact that vaccine misconceptions, and their correction, often have an affective dimension. Across three experiments, we tested how positive and negative emotional content may differentially influence revision. In Experiment 1, refutations of misinformation that included positive emotional content were not more effective than traditional refutations in facilitating revision. In Experiment 2, refutations that included negative emotional content were more effective than both control and traditional refutations. In Experiment 3, positive and negative refutations were directly compared to each other and a control. The findings showed that refutations with negative emotional content were more effective than both control and refutations with positive content. Results are discussed in the context of the Knowledge Revision Components (KReC) framework and models of affect.

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12:00-1:30 PM (2165)

Reading Science Texts for a Purpose. DYLAN BLAUM, KATHRYN RUPP, MICHAEL BONILLA-WEIR, SHANNON GALLAGHER, AMANDA DURIK and M. ANNE BRITT, *Northern Illinois University* — Readers have difficulty comprehending science texts (e.g., Millis et al., 1993). One reason may be that they fail to adopt appropriate goals and actions (i.e., Task Model, Rouet & Britt, 2011) based on their representation of the task presented (i.e., Context Model, Britt, Rouet & Durik, in press). Experiment 1 examined whether the authority of a person presenting the task would impact readers' memory for available extended arguments. We found that high-authority, compared to low-authority, figures lead to better memory for the request and for the arguments on both sides of a controversy. Thus, the context affects memory for arguments. Experiment 2 examined the impact of introductory psychology students' Task Models on memory for a reading from their psychology textbook. This study found that readers who had goals to find evidence and explanations while reading (appropriate Task Model) remembered more information about theory and studies on a recall task.

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12:00-1:30 PM (2166)

Self-Explanation Enhances the Effect of Retrieval Practice. KATHRYN S. MCCARTHY, *Arizona State University*, SCOTT R. HINZE, *Virginia Wesleyan University*, DANIELLE S. MCNAMARA, *Arizona State University* — Engaging in free recall after reading (retrieval practice) facilitates retention



of text content. However, these benefits may be moderated by a number of factors, including the complexity of the texts and outcomes, the type of processing engaged during retrieval, and the prior knowledge of the learner. This study examines the extent that the effects of retrieval practice on text comprehension are enhanced by self-explanation, which encourages both inference generation and comprehension monitoring. After reading a complex text about the visual system, 57 undergraduate students either engaged in free recall twice (retrieval practice condition), or recalled once followed by a prompt to self-explain (self-explanation condition). A delayed multiple-choice test (2 days later) revealed that the self-explanation condition outperformed retrieval practice on detail questions (requiring specific information from the text). For questions requiring bridging or elaborative inferences, the benefit of self-explanation depended on prior knowledge such that self-explanation enhanced performance for low- but not high-knowledge participants. Recall and explanation protocol analyses further elucidate the source of the self-explanation advantage.

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12:00-1:30 PM (2167)

Oh, So Sarcastic. J. TREVOR D'ARCEY and JEAN E. FOX TREE, *University of California, Santa Cruz* (Sponsored by Jean Fox Tree) — We investigated how people convey sarcasm in writing. Participants read posts and non-sarcastic responses taken from the Internet Argument Corpus (Walker et al., 2012) and rewrote the responses to make them sarcastic. No definition was given for sarcasm, in order to elicit naturalistic responses. At the end of the experiment, participants reported the strategies that they used to make the posts sarcastic. We assessed the degree to which people's reported strategies mirrored their sarcastic productions. Participants found the task harder than they thought it would be. Nonetheless, sarcastic revisions showed systematic changes in comparison to the non-sarcastic original responses. These changes included adding discourse markers such as oh, well, really, and so, and capitalizing and elongating words. Participants were generally aware of their uses of some of these phenomena. People use phenomena not typically found in formal writing as cues to suggest to readers that their writing be interpreted nonliterally.

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12:00-1:30 PM (2168)

Consequences of Exposure to Hyperbolic Utterances. BRITTANY A. HARMAN and RICHARD J. GERRIG, *Stony Brook University* (Sponsored by Richard Gerrig) — People are exposed to exaggeration in some form every day. They must comprehend, interpret, and remember the hyperbole, or conversational overstatement, to which they are exposed. In a series of experiments, we presented participants with texts containing information described in a literal or hyperbolic manner (e.g., "My boss got roses from her husband." versus "My boss got a truckload of roses from her husband."). The experiments used three measures to document the impact of hyperbole. First, we asked participants to make explicit estimates of quantities (with and without hyperbole). Second,

we asked participants to read stories that presented outcomes that were consistent or inconsistent with those explicit estimates. Third, we tested participants' memory for the content of those stories. We found that the presence of hyperbole had a reliable impact on participants' quantity estimates. However, participants did not produce consistency or memory effects that entirely paralleled those explicit estimates.

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12:00-1:30 PM (2169)

Examining Trans-Symbolic Comprehension Processes and Their Relation With Aesthetic Responses. CHRISTIAN STECIUCH and KEITH MILLIS, *Northern Illinois University* (Sponsored by Keith Millis) — Recent theoretical research has proposed that understanding discourse and visual artwork share mental processes, such as bridging inferences and elaborations, and have been referred to as trans-symbolic comprehension processes (TSC). While the existence of TSCs is theoretically sound, much empirical work is needed in order to determine the similarities between comprehending the two media. The present study addresses this issue with four research questions. Each question was explored through the use of think-aloud protocols. The first question sought to provide evidence of TSCs by having participants view artworks and short written fables. The second question evaluated whether the patterns of TSC were similar. The third question addressed whether specific TSCs predicted one's aesthetic responses as indicated by ratings of enjoyment, interest, and understanding. The fourth research question investigated whether verbal protocols would affect participant's aesthetic responses. Due to the ephemeral nature of an aesthetic experience, it was predicted that verbalizing one's thoughts would affect one's aesthetic responses. The results suggest that these two media share TSCs, but not all correlate with aesthetic responses.

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12:00-1:30 PM (2170)

Six of one, Half a Dozen of the Other: Examining Repetition Effects in Idiom Processing. KRISTA A. MILLER and GARY E. RANEY, *University of Illinois at Chicago* (Sponsored by Gary Raney)

— Raney (2003) argues that repetition effects (faster second readings) can be supported by repeating elements of the surface form, textbase, or situation model. Repetition of all three levels (e.g., direct repetitions) leads to enhanced repetition effects relative to texts with alterations to the surface form or textbase (e.g., paraphrases/synonyms). We examined how idioms are represented in memory using a text repetition method. Participants read passages containing an idiom (*walk in the park*) twice in succession or after a delay using a self-paced reading paradigm. Idioms were repeated during the second readings or replaced with idioms with similar meanings (*piece of cake*). Idiom reading times were recorded. Repetition effects were found for repeated idioms and idiom synonyms in both delay conditions. These effects were slightly larger for repeated



idioms than for idiom synonyms. Our results support Raney's model. Repeating figurative phrases support repetition effects in the same way as repeating words.

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BILINGUALISM I

12:00-1:30 PM (2171)

Learning to Make Better Decisions: Training-Induced Improvements and Their Transfer Across Domains.

ANDREAS JARVSTAD, *University of Oxford* — Human decision-making appears flawed. We gave participants the opportunity to improve their decision-making through extensive training - exploring how training in one domain might transfer to another. Pre-training involved a pointing task and a 2AFC decision task with both standard verbal and sensori-motor decision problems. In separate training sessions, participants practised one of the latter tasks (control groups practised without feedback). A post-training session followed. Feedback improved performance both on the trained and the untrained tasks - showing transfer of performance across risk domains. Learning profiles showed rapid insight-like learning followed by more gradual improvements. Prospect theory parameters change vectors indicate increased linearity in probability and money. For untrained domains, vectors were of similar direction but half the magnitude. However, because vectors originated from different points in parameter space - transfer of probability preferences were not necessarily a blessing. The results, replicated and extended with a third task in Exp 2, constrain plausible mechanisms for integrating risk and reward, and refute both strong domain-specificity and the identical mechanism hypothesis.

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12:00-1:30 PM (2172)

From the Structure of Experience to Concepts of Structure.

ANNA LESHINSKAYA and SHARON THOMPSON-SCHILL, *University of Pennsylvania* — It has been well established that causal and other relational information is central to concepts; but how does it get there? In this series of studies, we ask how equipped are we to extract relations from basic aspects of sensory experience, in a form useful to concepts, and in situations that resemble naturalistic, bottom-up learning. We show that while minimally instructed predictive learning informs causal judgment, it does not lead spontaneously to causal representations. We also find that attribution of causal properties to objects relies on object-conditional event-event contingencies rather than co-occurrence frequency between objects and events. Furthermore, in some circumstances, adult learners will spontaneously group together objects with similar causal properties into a common category — controlling for event frequency and generalizing across manner of causation. However, they do not always privilege causal information over and above other properties. Finally, we show evidence that causal schemas are automatically deployed when viewing naturalistic streams of events.

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12:00-1:30 PM (2173)

Hidden in Plain Sight: How Bilinguals Use Parafoveal Preview to Anticipate Code-Switches.

MICHELLE BRUNI, *Pennsylvania State University*, MEGAN ZIRNSTEIN, *University of California, Riverside*, PAOLA E. DUSSIAS, *Pennsylvania State University* — Encountering an unexpected code-switch can incur processing costs. Recent research has suggested that phonological information can be used to anticipate when a switch is likely to occur, and subsequently reduce costs (Fricke et al., 2016). The current study aimed to assess whether bilinguals similarly use visual cues in the parafovea, such as orthographic form and language status, to anticipate and therefore reduce costs related to the processing of a code-switch. Spanish-English bilingual participants read sentences while their eye movements were recorded, half in Spanish and half with switches from Spanish into English. Half of these sentences were masked with x's at the critical noun, and reverted to text when the eye passed an invisible boundary. Results showed that bilinguals can benefit from parafoveal preview when code-switched words do not share orthographic form across languages, but fail to do so for cognates that share both form and meaning.

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12:00-1:30 PM (2174)

The Effect of Lexical Accessibility on Spanish-English Code Switching.

JUSTIN T. SARKIS, JESSICA L. MONTAG and JUDITH F. KROLL, *University of California, Riverside* — Proficient bilinguals often switch languages in the middle of a spoken utterance. Code switching is a natural phenomenon governed by a range of factors that include grammatical constraints and the social context in which speech is produced. In the present study, we investigated the role of lexical accessibility in code switched speech produced by Spanish-English bilinguals. Sentence production is a cognitively demanding task, and speakers often make implicit choices to reduce difficulty and maintain fluency. Code switching may be one such choice available to bilinguals. In Experiment 1, Spanish-English bilinguals freely named pictures in either language to develop a measure of relative lexical accessibility in the two languages. In Experiment 2, a different group of bilinguals described an array of pictures, designed to elicit code switches in the laboratory. We hypothesize that the relative accessibility of the English vs. Spanish names will predict speakers' tendency to code switch.

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12:00-1:30 PM (2175)

Switching but not Mixing Transfers From Language to Task Control.

DORIT SEGAL, ALENA STASENKO and TAMAR H. GOLLAN, *University of California, San Diego* — Bilingual language use might enhance switching ability, but the mechanism of transfer is poorly understood. We compared switching and mixing costs in 96 Spanish-English bilinguals in digit-naming and color-shape decisions. Unlike previous studies, responses in both tasks were spoken (not button-pressed) to enable direct comparison. Mixing-costs were significantly larger in the color-shape than the language task, whereas switching costs exhibited the opposite pattern. Additionally, both mixing and switching



costs were correlated across domains, but only switching costs were also correlated with production of language intrusion errors in a read-aloud task. Bilinguals develop mechanisms for managing selection (switching and mixing) of their two naturally competing languages. However, while real life language switching (intrusion errors) transfers to trial-by-trial switching abilities (in linguistic and nonlinguistic tasks), mixing abilities are much more task-dependent and as such, they are correlated across domains but not with intrusion errors in connected speech.

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12:00-1:30 PM (2176)

Multilingual Benefits in Memory—A Longitudinal Study. DANIEL ERIKSSON SORMAN and JESSICA KÖRNING LJUNGBERG, *Umeå University* — Recently, Ljungberg et al (2013) found beneficial memory effects in bilinguals compared to monolinguals in verbal episodic recall and verbal letter fluency applying a longitudinal design. In the present study, we aimed to longitudinally investigate if these advantages in memory were even larger in multilinguals. Participants between 35 and 70 years at baseline were drawn from the Betula Prospective Cohort Study of aging, memory, and health. Results revealed a positive cumulative effect of knowing several languages at first testing session and across time both in episodic memory recall and in letter fluency. As predicted, based on results from previous data from the same study sample, no advantages was found in the categorical fluency task. With respect to the cognitive reserve hypothesis, these findings indicate that language learning may be a factor that contribute to enhanced cognitive ability over the life course.

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12:00-1:30 PM (2177)

Executive Function, but not Bilingualism, Associated With Stronger Inhibition of Previously Attended Targets in Working Memory. JULIE A. HIGGINS, *Manhattanville College* — Bilingualism may be associated with enhanced executive function relative to monolingualism due, in part, to superior interference resolution in bilinguals (Bialystok & Craik, 2010). This study tests whether bilinguals differ in their ability to resolve interference from a previously attended target, compared to monolinguals. Bilinguals and monolinguals briefly thought of (i.e., *refreshed*) one of two just-seen words. After a 100ms delay, participants read aloud the refreshed, the non-refreshed, or a novel word. Replicating earlier findings (MR Johnson et al., 2013), participants were slower to read the refreshed vs. the non-refreshed word. This refresh-induced inhibition did not differ between monolinguals and bilinguals suggesting that a bilingual advantage in interference resolution may not extend to competition arising from previously attended targets in working memory. Interestingly, across both groups, refresh-induced inhibition was significantly positively correlated with self-report measures of executive control, suggesting that the ability to resolve interference from prior

targets is better predicted by individual differences in executive function than by group differences between monolinguals and bilinguals.

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12:00-1:30 PM (2178)

Transposition Effects in Hindi Support its Functionally Alphabetic Nature. ANURAG RIMZHIM, *Central Connecticut State University; Haskins Laboratories*, AVANTIKA JOHRI and DAMIAN KELTY-STEPHEN, *Grinnell College*, CAROL FOWLER, *University of Connecticut* — Orthographies of South Asia (e.g., of Hindi) are generally typologically described as alphasyllabaries (i.e., they have both alphabetic and syllabic features) with the CV as their orthographic unit. Rimzhim, Katz and Fowler (2014) proposed that Hindi has a functionally alphabetic nature and highlighted the significance of the letter as its relevant psycholinguistic unit. We report results from three visual word-recognition experiments in Hindi examining transposition effects (slower and less accurate lexical decision responses to nonwords such as PSATE [compare PASTE] than PLUTE). We transposed various orthographic units: combinations of consonants (C's) and vowels (V's): C-Cə, V-V, V-Cə, C-V, C-CV, Cə-CV, and CV-CV. Accuracy analysis showed more undetected transpositions of letters than akshars. Also, accurate rejection of transposed items as words correlated better with nonword reading than with word reading scores in the TOWRE and its Hindi version. These results implicate a relatively stronger alphabetic than syllabic nature to Hindi.

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12:00-1:30 PM (2179)

Conflict Regulation During Bilingual Lexical Production. EVE HIGBY and JUDITH F. KROLL, *University of California, Riverside*, DEBORAH BURKE, *Pomona College* — To plan speech, bilinguals must select appropriate words among competing alternatives both within the target and non-target language. These demands on lexical selection engage regulatory mechanisms, such as monitoring and inhibitory control, but the precise nature of this regulation is not well understood. The first goal of the present study was to investigate the types of regulation that are involved when bilinguals plan spoken words. Spanish-English bilinguals named colored pictures in a task-switching paradigm (naming either the object or the color of the object). Distractors (color and object words) were presented before the picture to enhance attentional conflict or to induce lexical conflict. A second goal was to ask how variation in bilingual language experience influences language regulation ability. We hypothesized that early age of second language acquisition, high proficiency in both languages, and language immersion experience may modulate the relative contribution of different mechanisms of language control.

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12:00-1:30 PM (2180)

The Consequences of Bilingualism for New Category Learning. EMILY N. MECH, JESSICA L. MONTAG and JUDITH F. KROLL, *University of California, Riverside* (Sponsored by Curt Burgess) — Language impacts categorization (e.g., Lupyan et



al., 2007). The present study asks whether bilingual experience might also impact category learning. Young adults ranging in L2 experience learned to categorize aliens in a no-label condition or in a condition where arbitrary labels were heard as feedback. At test, participants categorized previously trained aliens and generalized to new aliens. RT, accuracy, and EEGs were recorded to assess learning. Language experience was assessed with a questionnaire together with online measures of proficiency and cognitive control. Preliminary findings (N=32) indicated that labels led to faster learning trajectories and better categorization of new aliens. In ERP comparisons, an N400 to new vs. trained aliens was found at test, but an N200 was present only in the label condition. The N400 mean amplitude was correlated with L2 age of acquisition. Further analyses will compare the effect of language experience on category learning outcomes and strategies.

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12:00-1:30 PM (2181)

Using ERPs to Investigate the Stability of Individual Differences in Sentence Processing in Two Languages.

KINSEY BICE, *Pennsylvania State University*, JUDITH F. KROLL, *University of California-Riverside* (Sponsored by Christine Chiarello) — Recent event-related potential (ERP) studies have challenged the classic native-speaker model by demonstrating individual differences in ERP responses during grammatical processing. Some monolingual speakers elicit an N400 component where a P600 would be expected (Tanner & van Hell, 2014). These individual differences have been replicated within individuals, and have been shown in bilinguals' L2, but research has not yet addressed whether speakers reveal similar patterns across their languages. We tested 25 early (heritage) Spanish-English bilinguals and 28 English monolinguals on a grammatical judgment task in English and the bilinguals also in Spanish. Taking into account language fluency, and whether the bilingual speakers learned to read in their native language, our results reveal a significant correlation in the brain's response across languages. These data suggest that the observed differences are a stable, rather than transient, characteristic of the individual that may reflect underlying cognitive processes that support and influence language processing.

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12:00-1:30 PM (2182)

Using ERPs to Investigate the Consequences of Bilingualism for New Language Learning. ANDREA A. TAKAHESU TABORI and JUDITH KROLL, *University of California, Riverside* (Sponsored by Judith Kroll) — Bilinguals are better word learners than monolinguals (Kaushanskaya & Marian, 2009) but early bilinguals sometimes outperform late bilinguals (Kaushanskaya & Marian, 2007). The present study used behavioral and electrophysiological (EEG) methods to ask whether variation in language experience affects initial learning trajectories and delayed learning outcomes. Monolinguals, early bilinguals, and late bilinguals studied 64 novel words that consisted of an English stem and a novel suffix along with its definition (*bricknule*- someone who works at a brick factory). Participants performed a recognition memory test following

study. A week later, they completed a sentence congruency task while EEG was recorded. Sentence final words were unstudied novel words containing one of the studied suffixes, and semantically congruent or incongruent with the sentence. Data revealed group differences behaviorally at immediate testing and also in the ERPs at delayed testing, suggesting that language experience affects both encoding and subsequent consolidation.
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12:00-1:30 PM (2183)

How Do Individuals With Varying Previous Experience Approach Learning New Languages? JENNIFER M. MARTIN and JEANETTE ALTARRIBA, *University at Albany, State University of New York* (Sponsored by Jeanette Altarriba)

— The present study sought to gather normative data on the motivations, attitudes, and strategy use of undergraduate students learning new languages. A wide sample was collected that ranged from individuals with very little second language experience to proficient multilinguals. The data collected gives insight into what perspectives students bring to approaching new languages and what strategies and behaviors they engage in, with special emphasis on cognitive and metacognitive strategies. The results show different patterns of motivation for new learners and proficient multilinguals with new learners endorsing more practical views, but remarkably similar strategies across these groups. More proficient second language (L2) speakers report a greater frequency of L2 use outside the classroom. Qualitative data recording participants' open-ended responses regarding second language learning orientations and perceived effective behaviors are also presented. The present work will inform future experimental interventions for strategy instruction.

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12:00-1:30 PM (2184)

Examining the Effects of Word Frequency, Language Use, and Immersion Context on Bilingual Picture Naming.

ANNE L. BEATTY-MARTÍNEZ, *Pennsylvania State University*, CHRISTIAN A. NAVARRO-TORRES, *University of California, Riverside*, PAOLA E. DUSSIAS, *Pennsylvania State University* (Sponsored by Paola Dussias) — Although bilinguals are typically slower to speak the L2 relative to the L1, changes to the native language have been observed in response to active L2 use. These observations have been attributed to either reduced-lexical access (frequency-lag hypothesis) or to the presence of activation of the nontarget language (competition-based models).

Here we characterize these differences as a function of immersion context and language use (e.g., codeswitching). We compared picture naming performance with high- and low-frequency items across three Spanish-English bilingual groups and in their two languages. Overall, bilinguals were slower than monolingual controls. Non-codeswitching bilinguals immersed in their L1 were faster in the L1 than in the L2 and this difference was greater for low-frequency items. Codeswitching bilinguals, regardless of immersion context, were faster in the L2 than



in the L1, although this effect disappeared for low-frequency items. We discuss these results with respect to accounts of bilingual language production.

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12:00-1:30 PM (2185)

Effects of Visual and Auditory Comprehension Episodes on Later Spoken Word Production. NAOKO TSUBOI, MANUEL R. MELENDEZ LUJAN, ERIKA L. GUEDEA, JOSEPH A. NEGRON and WENDY S. FRANCIS, *University of Texas at El Paso* (Sponsored by Wendy Francis) — Word-comprehension episodes improve both the speed and the accuracy of later spoken production of the same words, but it is unknown how long these priming effects last or whether they depend on the comprehension modality. Experiment 1 examined the relative strength and durability of production priming based on prior comprehension episodes in the visual and auditory modalities. 72 English speakers read or listened to words at encoding and named pictures at test. Repetition-priming effects in naming speed and accuracy were substantial after several minutes but not after a week, and modality effects were not reliable. Experiment 2 compared the impacts of word-comprehension and word-production episodes using translation tasks previously shown to require conceptual access. 112 Spanish-English bilinguals translated words presented visually or auditorially in both directions at encoding and named pictures at test. The moderating effects of word frequency and language proficiency were examined using linear and logistic mixed-effects regression models. *Supported by NSF Grant BCS-1632283.*

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12:00-1:30 PM (2186)

Does Learning a New Language Lead to Unlearning of the Old Language? DANBI AHN, TAMAR GOLLAN and VICTOR FERREIRA, *University of California, San Diego* (Sponsored by Victor Ferreira)

— People represent the structures of sentences in the languages that they know. This knowledge must be stable for successful communication. But, when learning another language that uses different structures, speakers must adjust their syntactic knowledge to fit the newly learned language. Does this also influence L1 syntactic knowledge? Here, we examine whether the newly acquired L2 knowledge can influence L1 structure knowledge. To do this, we compared Korean monolingual speakers living in Korea (who had little English exposure) with Korean-English bilingual speakers who acquired English late and were living in the US (and so had more English exposure) using acceptability judgment and sentence production tasks. Results suggest that acceptability and structural usage in L1 change after exposure to L2, but not in a way that matches L2 structures. Instead, L2 exposure appears to cause overall “noisier” L1 production.

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12:00-1:30 PM (2187)

Mitigating the Translation-Ambiguity Disadvantage: The Effect of Presenting Multiple Translations Simultaneously. CAITLIN RICE, *University of Pittsburgh*, ZACHARY EKVES, *University of Connecticut*, NATASHA TOKOWICZ, *University of Pittsburgh* (Sponsored by Natasha Tokowicz) — Translation-ambiguous words (with more than one translation) are generally at a learning disadvantage relative to translation-unambiguous words (with only one translation). Degani et al. (2014) showed that training both translations on the same session led to a smaller translation-ambiguity disadvantage than training the two translations on sessions two days apart. Here, we test whether training two translations on the same trial (“simultaneous”) leads to better learning than training on consecutive trials (“consecutive”), and compare this to learning of translation-unambiguous words. Training stimuli were German-English translation pairs, and learners were native-English speakers with no prior exposure to German or Dutch. Preliminary results suggest an advantage for simultaneous training over consecutive training, and a reversal of the typical translation-ambiguity disadvantage for the simultaneous condition. The results will be discussed in relation to the Revised Hierarchical Model of Translation Ambiguity (Eddington & Tokowicz, 2013).

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12:00-1:30 PM (2188)

Evidence for Accommodation and Assimilation in L2 Learners: Preliminary Evidence From a Cross-Linguistic Longitudinal Study. HENRY BRICE, *The Hebrew University of Jerusalem*, W. EINAR MENCL and STEPHEN FROST, *Haskins Laboratories*, JAY RUECKL, *University of Connecticut*, KENNETH R. PUGH, *Haskins Laboratories*, RAM FROST, *The Hebrew University of Jerusalem* (Sponsored by Ram Frost) — We present preliminary data from of a longitudinal neuroimaging study of second language (L2) acquisition, tracking two cohorts of English-Hebrew and Hebrew-English bilinguals. English and Hebrew are contrasting languages having alphabetic writing systems that differ substantially in the phonological-orthographical mappings and in their morphological structure. The results shown here are from an fMRI paradigm which looked at visual word processing in L1 and L2. Perfetti and colleagues (2007) suggest that the neural signature of L2 reading can be described by a process of accommodation in which L1 circuits converge with L2, or an assimilation process of L1 and L2 differentiation. Preston et al. (2015) show that a convergence of print and speech processing predicts reading ability in early readers. We look at the overlap of L1 and L2 processing and the overlap of print and speech processing in L1 and L2, and its relation to L1 and L2 proficiency. Preliminary results point to L1-L2 assimilation, with higher L2 proficiency correlated with greater accommodation, and to print-speech convergence predicting proficiency in L2, but not L1.

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12:00-1:30 PM (2189)

Bilingual Language Identification of Written Words: The Role of Orthographic and Semantic Cues. JENNIFER M. BROWN, ASHLEY S. BANGERT and ANA I. SCHWARTZ, *University of Texas at El Paso* (Sponsored by Ana Schwartz) — We examined bilinguals' discrimination of the language membership of visually presented word pairs. Specifically, we focused on how the presence or absence of distinctive cues modulate the time course of language identification. We hypothesized that language membership identification would be more uncertain in the absence of distinctiveness. Bilingual participants saw sequentially presented word pairs and indicated whether they were presented in the same or a different language (English or Spanish) using a mouse-tracking paradigm. We manipulated whether the two words were semantically equivalent or unrelated, the cognate status of words, and the presentation time of target words (100, 200, or 300 ms). Preliminary results suggest that same language word pairs led to less uncertainty than different language word pairs. Semantically unrelated word pairs containing a cognate led to less uncertainty than those containing a non-cognate. Implications for the processes that contribute to early stage language identification in bilinguals are discussed.

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EMOTION AND COGNITION II

12:00-1:30 PM (2190)

Understanding Caregivers' Accuracy in Facial Expressions of Pain in Children: An Eye Tracking Study. MÉLANIE PERRON, VICTORIA FOGLIA, ANNIE ROY-CHARLAND and ANNALIE PELOT, *Laurentian University* — Facial expressions of pain serve an adaptive function in signifying to others that you are in need of care. However, caregivers show difficulty distinguishing genuine, suppressed, and fake pain in children. The current study examined parents' and nurses' ability to recognize pain in children while their eye-movements were tracked, to identify strategies to improve accuracy. No differences were observed between caregiver groups for accuracy. However, participants were more accurate for suppressed than genuine pain and more for genuine than fake expressions. For genuine and suppressed expressions, more time and faster fixation in the eye zone were associated to better accuracy, while for fake expressions, more time and faster fixation in the mouth zone were associated to better accuracy. The current study provides insight to improve pain expression recognition based on where to look for cues and that cues might not be the same for each type of expression.

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12:00-1:30 PM (2191)

Active Affective Priming at 5 Second Prime-Target Separations With Counting. DEAN G. PURCELL, *Oakland University*, ALAN L. STEWART, *Stevens Institute of Technology* — Observers judge the affect of two successive faces (Face 1 followed by Face 2). The observer's task was to judge if the affect of F1 and F2 represented the same emotion. An angry F1 produced interference, increasing decision time and reducing an

observer's accuracy, independent of the affect of F2. To prevent the observers from encoding the expression semantically we required them count out loud from 1 to 10 during the interval separating the faces in time, a procedure that should interfere with working memory. Nevertheless, interference occurred with an angry F1 even when the onset of F2 was delayed by as much as 5 seconds.

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12:00-1:30 PM (2192)

The Effects of Mere Exposure of the Mirror Image on Implicit Self-Esteem. KEN MATSUDA, *The University of Kitakyushu*, NANA MITSUISHI, *Yamaguchi University*, KAYO MIURA, *Kyusyu University*, TAKASHI KUSUMI, *Kyoto University* — We investigated the influence of repeated exposure to self-reflection on the fluctuation of explicit self-evaluation and implicit self-esteem. Thirty-two participants initially performed an explicit self-evaluation and self-esteem implicit association test (IAT), followed by a self-reflection exposure phase, self-esteem IAT, self-reflection exposure phase, self-esteem IAT, and explicit self-evaluation. In the self-reflection exposure phase, the orienting task and the mirror image contact were alternately repeated 15 times. The results showed that, in the without-mirror condition, implicit self-esteem decreased as IAT frequency increased, while the D-scores were maintained under the with-mirror condition. In the additional experiment using IAT unrelated to self, D-scores were fixed regardless of whether a mirror was present. Thus, the implicit self-esteem that was supposed to be decreased when the difficulty of the IAT task increased was in fact maintained by the positive emotions about the self that were elicited by the viewing of their own faces in a mirror.

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12:00-1:30 PM (2193)

Seeing American Indians: Cognitive Perspective-Taking Influences Eye Movements and Emotional Responses. LANI CUPO, NANCY MARIE MITHLO and ALEKSANDRA SHERMAN, *Occidental College* — Previous research indicates that non-Indians "have a foggy, distorted set of perceptions [about American Indians] ... usually based on little direct contact and ... Hollywood stereotypes and generalizations" (Doble & Yarrow 2007). We sought to expand individual's often-skewed interpretations by investigating how mindsets shape viewers' perceptual, cognitive, and emotional responses to photographs of American Indians. Occidental undergraduates and Autry Museum visitors (N=120) were tested either in the lab or museum and randomly assigned to one of three conditions: perspective-taking, stereotype-suppression, or control. We showed that perspective-taking increased viewers' empathy while decreasing stereotyping, reflected in gaze patterns, physiology, and verbal descriptions. Specifically, participants in the perspective-taking condition attended to individual's eyes significantly more often and had heightened emotional responses. In contrast, stereotype-suppression led participants to emotionally disengage and to focus more on objects and



decorative qualities of the photograph. We discuss applying perspective-taking interventions in museums and beyond for combating stereotypes.

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12:00-1:30 PM (2194)

Bilinguals' False Recognition of Emotional Words. LI-HAO YEH and ANGELA YI-CHUN LU, *Chung Yuan Christian University* — The aim of this study was to replicate and extend the previous monolingual research to examine the effect of emotionality on false memory in bilinguals' L1 and L2 independently. Additionally, we investigated whether the emotionality effect of false memory can be observed across language boundaries. 71 Chinese-English unbalanced bilinguals participated in a DRM false memory task in which negative, positive and neutral list items were presented in either Chinese and English. The results showed that participants had higher false recognition of negative critical lures in comparison with positive and negatively ones. Moreover, the effect of positive valence on false recognition was found when the study language was Chinese and on the contrary, the effect of negative valence of false recognition was found when the study language was English. Fuzzy-trace theory and conjoint-recognition model were used to explain possible mechanisms of the cross-language discrepancy.

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12:00-1:30 PM (2195)

Can We Make Memory for Highly Negative Pictures Inaccessible by Creating Retroactive Interference? CODY J. HENSLEY, HAJIME OTANI and ABBY R. KNOLL, *Central Michigan University* — Can we make memory for highly negative pictures inaccessible by creating retroactive interference (RI)? Our previous experiment showed that RI can be created by presenting highly negative pictures for List 1, followed by moderately or highly negative pictures for List 2, and then testing memory for List 1. However, it was unclear whether items from List 1 were actually inaccessible or whether participants simply did not report these items due to source confusion. We replicated the previous study, except that this time we asked participants to recall items from both List 1 and List 2. The results showed that memory for highly negative pictures (List 1) can be made inaccessible by creating RI. However, unlike the previous experiment, RI was greater when List 2 consisted of highly negative pictures relative to when List 2 consisted of moderately negative or neutral pictures.

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12:00-1:30 PM (2196)

Nostalgia, a Bittersweet Emotion: A Study of the Content and Meaning of Nostalgic Experiences. CATALINA IRICINSCHI, *The University of the Arts*, KACIE ARMSTRONG, *Cornell University* — Is nostalgia an emotion? Despite unanimously perceived as such, empirical research on nostalgia is virtually absent in the psychology of emotion and cognition. This study attempts to define nostalgia through survey responses regarding five constructs: emotionality (emotional make-up of nostalgia), valence (positive, negative, mixed), temporality (nostalgia for

past experiences), spatiality (nostalgia for remote places), and veridicality (nostalgia for actual or imagined experiences). Respondents rated the happiness/sadness morphed face as the most nostalgic and the neutral face as the least nostalgic thus placing nostalgia in the realm of emotion with the positive-negative tension as a prerequisite. With 45% of raters perceiving nostalgia as mildly unpleasant and only 57% viewing it as moderately pleasant, nostalgia is again an ambiguous emotion. The variability across respondents' narratives of nostalgic episodes and nostalgia triggers calls for a multimodal approach. Visual and auditory stimuli will further investigate nostalgia as a complex emotion and a cultural construct.

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12:00-1:30 PM (2197)

Featural or Holistic Processing in the Recognition of the Basic Emotional Facial Expression in Children. ANNIE ROY-CHARLAND, JESSICA DÉNOMMÉE, MÉLANIE PERRON and ANICK LABONTÉ, *Laurentian University* — The study investigated the sufficiency and necessity of the mouth and eye/brow areas in 5 and 10-year old's recognition of the six basic emotions (happiness, sadness, anger, disgust, fear, surprise). Participants viewed prototypes with only the eyes/brows or mouth, without the previous zones and full-faces. Results revealed that, for 5-year-old children, the eye/brow area is sufficient to recognize anger, fear, surprise and sadness. The mouth is sufficient for anger, disgust, happiness and surprise. The eye/brow area is necessary for sadness and fear, and the mouth for happiness. For 10-year-old children, the mouth is sufficient to recognize disgust, happiness, fear and surprise. However, the eyes/brows area is not sufficient for any emotions. Both zones are necessary to recognize anger, whereas the eye/brow zone is necessary for sadness and the mouth for disgust. These results highlight the variations observed in recognition as a function of the emotion and the importance of development.

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12:00-1:30 PM (2198)

Interactions Between Anxiety and Emotional Attention. GIA M. MACIAS, KATHLEEN O'DONNELL, HYEJI KIM and HIDEYA KOSHINO, *California State University, San Bernardino* (Sponsored by Hideya Koshino) — Recent studies have reported complex interactions between anxiety and emotional attention. Emotional stimuli have been shown to bias attention in various tasks including emotional Stroop tasks. Also, a negative mood may narrow and a positive mood may expand the attentional scope. We compared between emotional and neutral words in an emotional disruption Stroop task. Results showed that attentional capture by emotional words was greater for the high anxiety than for the low anxiety group. In an emotional flanker task, a target (happy or sad face) appeared with two flankers at near or far locations. Compatibility effects were found for both near and far conditions for the happy target but only for the near condition for the sad target, suggesting that the attentional scope was narrowed with the sad target. Implications for relations among the attentional bias, attentional scope, and attentional control models will be discussed.

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12:00-1:30 PM (2199)

Response Inhibition Immediately Elicits Negative Affect and Devalues Associated Stimuli: Evidence From Facial Electromyography (fEMG) During a Go/No-Go Task.

ELIZABETH M. CLANCY and MARK J. FENSKE, *University of Guelph* (Sponsored by Mark Fenske) — Stimuli from which responses are withheld in Go/No-go tasks subsequently receive more negative affective ratings than response targets. This could be due to an immediate impact of response inhibition on the coding of stimulus value. Or perhaps the change in stimulus-linked affect only emerges later when the item is encountered in an affective-evaluation task; the retrieval of its prior inhibitory state negatively impacting explicit ratings. Here we show that facial electromyography can be useful for testing such competing accounts by providing indirect measures of affective response—activation of facial muscles involved in positive (*Zygomaticus*) and negative (*Corrugator*) emotional expressions—that can be obtained at the time of inhibition. Significant differences in muscle activity during No-go response-inhibition periods compared to that during Go-trial periods converged with subsequent ratings (How cheerful?) of the Go and No-go items (art-like patterns) to support the possibility that inhibition elicits negative affect, immediately devaluing associated stimuli. Email: Mark Fenske, mfenske@uoguelph.ca

12:00-1:30 PM (2200)

Do Arousal and/or Unusualness Induce an Attentional Narrowing on a Weapon Focus Effect? MASAE TAKENO, SHINJI KITAGAMI and ATSUNOBU SUZUKI, *Nagoya University* (Sponsored by Atsunobu Suzuki) — A presence of a weapon impairs memory for its peripheral information such as a perpetrator's face. This phenomenon is known as a weapon focus effect, which has been hypothesized to be caused by arousal and/or unusualness. Negative emotional arousal may narrow attentional focus, which impairs memory performance. Otherwise, weapon's unusualness in a surrounding context may narrow attention. We investigated the combined effects of these two in a Navon task, which has been used to assess the breadth of attention. Unlike the majority of previous studies that focused on memory performance, the present study constitutes a first step to understanding the weapon's effect on attentional breadth. Email: Masae Takeno, takeno.masae@k.mbox.nagoya-u.ac.jp

12:00-1:30 PM (2201)

On the Specificity of Evaluative Priming of Actions. LIEN DE SAEDELEER, MAARTEN DE SCHRYVER and GILLES POURTOIS, *Ghent University* (Sponsored by Senne Braem) — Performance monitoring is an important process that enables learning and facilitates goal achievement through cognitive, affective and motivational variables. One of these affective variables entails how we can rapidly discriminate correct from incorrect actions. Previous research using an affective priming procedure showed that errors on a Go/noGo task were processed as negative whereas correct ones as positive. The current study aimed to replicate and extend this priming effect by (1) generalizing it to actions performed on a choice (Simon) task, (2) eliminating stimulus-specific effects and (3) showing that it

does not depend on the presence of conflict, which has been found to be aversive/negative in other studies. We addressed these questions using an altered version of the affective priming procedure and assessed the aversive nature of conflict. A mixed-model analysis revealed the presence of a reliable action-based priming effect, in the absence of a conflict-based priming effect. In addition, conflict (elicited by incongruency) was perceived as more negative according to subjective ratings. Implications, limitations and suggestions for future research on affective influences of performance monitoring are discussed.

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12:00-1:30 PM (2203)

Virtual Reality as a Tool for Inducing and Understanding Transformative Experiences.

EKATERINA RUSLANOVNA STEPANOVA, DENISE QUESNEL, ALEXANDRA KITSON, MIRJANA PRPA and BERNHARD E. RIECKE, *Simon Fraser University* (Sponsored by Brian Fisher) — Profound, positive emotional experiences in life, such as witnessing natural wonders and phenomena, can lead to cognitive shifts and changes to moral attitudes. These experiences are, however, rare and thus understudied. The immersive potential of virtual reality (VR) present an opportunity to both induce and study such experiences. Our work explores the use of custom VR content, with the aim of facilitating a deeper connection between the participant and the Earth (the perspective shift). We propose that in this context, a transformative experience consists of 1. Perceptual change created via immersive VR; 2. Cognitive change realized in the feel of connectedness with the natural world; 3. Behavioural change realized through pro-social and pro-environmental behaviours. To measure the participant's perspective shift, we utilize this new evaluation framework combining physiological, implicit attitude, and observational behavioural measures in a mixed-methods study. The framework was informed by two pilot studies exploring the use of goose bumps (physiological) and an implicit association test as a measure of profound emotion, and consequently the feeling of interconnectedness.

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12:00-1:30 PM (2204)

How Do You Feel Words in Your Second Language?

CONSTANCE IMBAULT and AMY BETH WARRINER, *McMaster University*, DEBRA TITONE, *McGill University*, VICTOR KUPERMAN, *McMaster University* (Sponsored by Victor Kuperman) — Several studies have investigated how native speakers rate word emotionality (e.g., Moors et al., 2012; Stadthagen-Gonzalez et al., 2016), however, this work sheds minimal light on the well-documented tendency that words in one's native (L1) and non-native (L2) language carry different emotional loads (Sheikh & Titone, 2015). Here, we report valence and arousal norms for 2399 words collected from 278 L2 English speakers. In comparison with L1 norms (Warriner et al., 2013), L2 speakers rated most words as more neutral. Interestingly, this effect was especially salient for sex-related and taboo words likely to have infrequent L2 social usage, but eliminated for words related to job and occupation likely to have frequent L2 social usage. These data provide novel empirical



support for a behavioural ecology account of bilingualism, according to which emotional grounding of words within the L1 and L2 depends on their social usage (Sheikh & Titone, 2015).

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12:00-1:30 PM (2205)

A Face by any Other Name: Examining Positive Affect in Name Recall and Recognition. JESSICA TEALE CAMPBELL and LISE ABRAMS, *University of Florida* (Sponsored by Lise Abrams) — Proper names are difficult for both younger and older adults to recall, and individuals struggle to recall and recognize novel face-name pairings across the lifespan. This experiment explores the relationship between positive affect and face-name recall and recognition. Participants were repeatedly exposed to canine and human faces paired with first names until their names were retrieved. Faces were either positively affective (smiling) or neutral. After a delay, participants were shown the faces and asked to recall and recognize the associated names. Predicted results are that positively affective faces will improve both recall and recognition of names that have been associated with them, relative to neutral faces. Further, names of canine faces will be remembered better than names of human faces, as there are fewer canine-name pairings stored in memory, creating less competition for retrieval. Results will be interpreted in terms of the underlying mechanisms and social implications of face-name associations.

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REASONING AND PROBLEM SOLVING II

12:00-1:30 PM (2206)

Perception in Arithmetic: A Pilot Study. JINGQI YU, ROBERT L. GOLDSTONE and DAVID LANDY, *Indiana University Bloomington* (Sponsored by David Landy) — There has been evidence on the effect of low-level perceptual information on high level symbolic reasoning. The application of the Gestalt grouping principles has gained its momentum in Mathematics. The present study aims to explore human perception in Mathematics with an emphasis on grouping strategies, and how the available groupings facilitate or bias perceivers' choice of problem solving strategies. Eight binary coding rules, such as LeftRight (solve a question from left to right) and GroupCalculation (each intermediate step has either the same sum or add up to multiples of 5 or 10), were applied to create an eight-dimensional vector for each participant. A principal component analysis and k-mean cluster revealed that there were roughly four types of people showing distinctive grouping strategies: a) group operands by easy calculation (e.g., make multiples of 10), b) break a longer problem into shorter chunks, c) calculate straight across from left to right, and d) group numbers by identities whenever possible. In addition, an accuracy analysis revealed that participants in the four clusters showed different overall accuracy and that different strategies to the same problem led to different accuracy.

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12:00-1:30 PM (2207)

Avoidance-Based Scenarios Inflate Theory-of-Mind Errors in the Sandbox. DANIEL G. DERKSEN, *Kwantlen Polytechnic University*, ANDRE ASSEFALG, *University of Freiburg*, PATRICIA I. COBURN, *Simon Fraser University*, DANIEL M. BERNSTEIN, *Kwantlen Polytechnic University* (Sponsored by Daniel Bernstein) — In two experiments, we tested adult participants' understanding of mental states (theory of mind). Participants heard vignettes in which a character chose a location to dig for a food item. In each vignette a character watched the placement of a food item that he/she either hated (avoidance) or loved (desire). When the character left, the hated/loved food item was moved. When the character returned, participants indicated where the character would dig (false belief), and where the food item was before the character left. Reasoning about a character's false belief resulted in greater error than reasoning about where the character left the food item—a theory-of-mind error. The present study measured theory-of-mind errors continuously with an adult sample. Errors were larger in avoidance trials than desire trials, suggesting that task complexity may be responsible for some problems in adult theory-of-mind reasoning.

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12:00-1:30 PM (2208)

Spatial Orientation of Anagrams and Solution Performance. KATHERINE P. HEBERT and STEPHEN D. GOLDINGER, *Arizona State University* (Sponsored by Stephen Goldinger) — Cognitive science research has utilized anagrams to examine problem solving since the 1950's, but no research has examined the impact of the physical organization of the letters. If scrambled letters are presented such that they cannot be read from left to right, does the puzzle become easier to solve? In two experiments, participants solved word jumble puzzles in which the letters were presented either in the shape of a circle or a line (Experiment 1 also included random spatial arrangements). We hypothesized that letters presented in circle or scrambled orientations, as opposed to in a line, would allow the brain to more quickly assess different random letter combinations until the puzzle is solved. Free-response results showed that participants solved more puzzles on average in the circle condition than in the line condition—in addition to solving each puzzle two seconds faster—while forced-choice task results were mixed.

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12:00-1:30 PM (2209)

Hitting a Wall or Trying at all: An investigation of the Role of Reaching Impasse in Incubation Effects. ANNIE S. DITTA and *BENJAMIN C. STORM, *University of California, Santa Cruz* (Sponsored by Benjamin Storm) — An incubation effect is observed when a person attempting to solve a problem is more likely to solve it when they have two attempts separated by a break than the same total amount of time working continuously. According to the opportunistic assimilation hypothesis (Seifert, Meyer, Davidson, Patalano, & Yaniv, 1994), an incubation period can serve as a time to encounter information helpful for solving a problem once someone has reached impasse on their



first solving attempt. In three experiments, we examined the effect of reaching impasse on incubation effects. Participants were given either a short or long amount of time to work on a problem before being given their second attempt either immediately or after an incubation period. Results so far have failed to provide any evidence that reaching impasse before a break differentially affects the size of an incubation effect when exposed to helpful information during the break.

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12:00-1:30 PM (2210)

Breaking Through the Surface: Competition, Inhibition, and Forgetting in Analogical Transfer. TIM GEORGE and JENNIFER WILEY, *University of Illinois at Chicago* (Sponsored by Jennifer Wiley) — Spontaneous analogical transfer between source and target problems is fairly uncommon. One explanation for this is that retrieval of relevant information during solution attempts is guided more by surface-level similarity than structural similarity, and it has been suggested that surface-similar cases compete for access during problem-solving attempts. The present studies adapted retrieval-induced-forgetting to test for inhibition of surface information during analogical transfer. Participants attempted Duncker's *Ray* problem after studying a surface-dissimilar analogous story, a surface-similar-only story, and an unrelated story. Order of stories was manipulated during encoding such that the analogous story either preceded or followed the surface-similar story. In subsequent recall, surface-similar story recall was lower than unrelated story recall, particularly when the surface-similar story preceded the analogous story during encoding, and *Ray* solution rates were lower when the surface-similar story preceded the analogous story. This forgetting effect suggests inhibition plays some role in overcoming competition during analogical transfer.

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12:00-1:30 PM (2211)

The Impact of the Insight Experience on Memory. KRISTIN GRUNEWALD, ARIELLE SAPORTA and MARK BEEMAN, *Northwestern University* (Sponsored by Mark Beeman) — The generation effect is a well-known finding that generating information at encoding leads to better memory than simple exposure to the information. Problem solving can be thought of as a specific encoding experience where the learner generates a connection between relevant information. Recent research suggests that when a participant solves a problem with a holistic insight experience, as opposed to a part-by-part analytic process, they remember the solution to the problem better a week later. A small number of studies suggest that this insight effect can be translated to simple exposure to the solution. Our study improves upon this work by demonstrating an insight advantage in both solution generation and solution exposure for recall of the solution a week later within the same participants. In addition, we will discuss whether this memory advantage resides within recall of the solution or represents faster re-solving.

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12:00-1:30 PM (2212)

Contributions of Eye Tracking to the Study of Implicit and Explicit Knowledge: An Artificial Grammar Learning Experiment. ALINE GODFROID and JIEUN AHN, *Michigan State University*, PATRICK REBUSCHAT, *Lancaster University*, ZOLTAN DIENES, *University of Sussex* — We investigate the psychology of adult language acquisition by focusing on the link between real-time cognitive processes and the nature of the resultant linguistic knowledge. We introduce eye-tracking, as an innovative measure of controlled versus automatic processing (Godfroid et al., 2015), and triangulate it with two awareness measures. Eighty-six English speakers were exposed to an artificial language with English words and German syntax (Rebuschat & Williams, 2012). Participants completed a training phase and a surprise grammaticality judgment test. They indicated the basis of their judgment after each test sentence (Dienes & Scott, 2005) and verbally reported any rule knowledge. All participants learned over time. Verbal reports and source attributions showed learners' knowledge was conscious; it could be traced to elevated regression rates (more rereading) during training. We hypothesize that eye-movement data at test will primarily reflect participants' confidence—more rereading signaling lower confidence. Therefore, regressions may prove most informative to disentangle explicit and implicit linguistic knowledge when the task resembles natural reading.

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12:00-1:30 PM (2213)

Do Beliefs in Paranormal and Pseudoscience Bolster Belief Bias in Syllogistic Reasoning? YOSHIMASA MAJIMA, *Hokusei Gakuen University* — Studies on empirically suspect beliefs (ESB) have shown that the believers were less likely to reason analytically compared to the skeptics. Particularly, they tended to confuse logical validity of the conclusion with its believability during syllogistic reasoning. However, it remains unclear whether believers were also susceptible to belief bias when the conclusions of syllogisms were congruent with ESBs. The present study explored this possibility and investigated the associations between beliefs, reasoning errors and cognitive styles. The results indicated, as shown in previous studies, that the paranormal believers failed to reason correctly in syllogisms where the conclusion conflicted with common knowledge; however, they didn't show biases in syllogisms concerning paranormal claims. In addition, believers in pseudoscience tended to err in syllogistic reasoning if the conclusion was congruent with their pseudoscientific beliefs. Multiple regression analyses also showed that the analytic style was associated with general and paranormal belief bias, but not with pseudoscientific belief bias.

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12:00-1:30 PM (2214)

The Association Between Authoritarianism and Conspiracy Beliefs is Modulated by Handedness. ERIC C. PRICHARD, *University of Arkansas - Monticello*, STEPHEN D. CHRISTMAN, *University of Toledo* — Some studies find that higher levels of Right Wing Authoritarianism are associated with increased beliefs in conspiracy theories (e.g., Abalakina-Paap et al, 1999),



while others report that *lower* levels of authoritarianism are associated with increased conspiracy beliefs (e.g., Swami et al, 2010). Part of this discrepancy may reflect a modulatory effect of handedness. Consistent right-handedness is associated with both higher levels of authoritarianism (e.g., Lyle & Grillo, 2014) and lower levels of gullibility (e.g., Christman et al, 2008): the higher authoritarianism could predispose consistent-handers to endorse conspiracy theories, while their lower levels of gullibility could protect them against conspiracy beliefs. To explore this issue, we administered consistent- and inconsistent-handers measures of conspiracy beliefs and authoritarianism. Regression analyses indicated a significant interaction between authoritarianism and handedness on the tendency to endorse conspiracy theories. For consistent-handers, *higher* levels of authoritarianism were associated with higher levels of conspiracy beliefs, while, for inconsistent-handers, *lower* levels of authoritarianism were associated with higher levels of conspiracy beliefs.

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12:00-1:30 PM (2215)

Base-Rate Consideration: Visual Attention, Conflict Detection, and Strategy Selection. IAN R. NEWMAN, *University of Saskatchewan*, SIMON HANDLEY, *University of Macquarie*, VALERIE THOMPSON, *University of Saskatchewan* (Sponsored by Valerie Thompson) — Base-rate neglect is studied with reasoning problems that contain personality descriptions and base-rate ratios which can suggest either consistent or competing responses. The hallmark indicators of detection of conflict between competing responses are longer response times and lower confidence. We tested the claim that successful detection of conflict is an implicit process through implicit measures (response time, confidence, and eye-gaze) and explicit measures (self-reported strategy choice and relative awareness) of conflict. Visual attention measures indicated more attention is given to the base-rate ratios for conflict problems than non-conflict problems. Our self-reported strategies demonstrated that attention to base-rate ratios for conflict problems does not differ across self-reported strategy, but typical indices of conflict detection (response time, confidence) did differ across strategy. These data suggest that the supposed implicit detection of conflict is influenced by the explicit strategy one adopts to approach the problem at hand and that base-rate neglect is not related to the duration one spends visually attending to base-rate ratios.

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12:00-1:30 PM (2216)

Relations and Similarity in the Encoding of Associations in Event Memory. GREGORY EDWARD COX and AMY H. CRISS, *Syracuse University* — We investigate how associations between events depend on the similarity and relations between those events. In Experiment 1, associations are stronger (better recognized and less confused with other associations) when the associated events are causally related, i.e., depict the same object in two different states, but such events are also perceptually similar. In Experiment 2a, we used distorted versions of the objects from Experiment 1, thereby preserving perceptual

similarity while removing any meaningful causal relations; associations remained strong between perceptually similar events. Experiment 2b extends these results to word pairs, where pairs of orthographic neighbors (high perceptual similarity) are better recognized and less easily confused than either random pairs or synonyms and have comparable performance to pairs that form a compound word. These results suggest that events are associated more strongly when their perceptual— -but not necessarily semantic— -similarity allows them to be aligned into a joint holistic representation.

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12:00-1:30 PM (2217)

Pre-Crastination and the Role of Cognitive Load. EMILY CODER, LISA FOURNIER and MCKENNA KENG, *Washington State University*, DAVID ROSENBAUM, *University of California, Riverside*, BRYAN HAFLICH, TIFFANY GRAY, KIRSTEN WESTMORELAND and ARIA PETRUCCI, *Washington State University* (Sponsored by David Rosenbaum) — Research shows that people will start a sub-goal as soon as possible, even at the expense of extra physical effort (pre-crastination). We asked whether pre-crastination generalizes to ordering of subgoals, and whether increasing attention to the means of the task eliminates pre-crastination. Cognitive demands of subgoal selection order were also evaluated. Participants retrieved two buckets (containing different numbers of balls; low attention to means) or cups (containing different volumes of water; high attention to means) positioned at different distances from their start location, and returned them to their start location. Half of the participants concurrently performed a digit span task. Results showed a preference to retrieve the closer bucket first (pre-crastination), but not the closer cup. Digit span did not affect bucket preference, but eliminated any preference to retrieve the farther cup first. Thus, pre-crastination generalizes to subgoal selection and is likely the default behavior (automatic) in low-load tasks. Strategic preferences in higher-load tasks can be compromised during dual-task performance.

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12:00-1:30 PM (2218)

Studying for Recall vs. Studying to Facilitate Transfer: In Search of a Mechanism. ANDREW B. LOGIUDICE, GEOFFREY R. NORMAN and SCOTT WATTER, *McMaster University* (Sponsored by Scott Watter) — Previous work has demonstrated so-called “pretesting effects”, whereby an unsuccessful attempt at generating unstudied target information enhances subsequent encoding of said information. Similarly, in the domain of analogical transfer, Needham and Begg (1991) showed that attempting to generate an explanation for a base analogue (problem-oriented training) enhanced subsequent encoding of its solution more than if the base analogue was encoded in anticipation of a final free recall test (memory-oriented training). Specifically, a counterintuitive interaction was observed such that problem-oriented training produced better subsequent transfer to new problems, whereas memory-oriented training produced better subsequent recall of the base analogue. In Exp. 1 we sought to replicate this interaction.



Then, in Exp. 2, we evaluated a hypothesis stemming from the pretesting literature which posits the initial generation attempt activates prior knowledge, providing a richer conceptual scaffolding with which to later encode the solution. Although the interaction was replicated, we did not find evidence in support of the latter hypothesis. Results are discussed with respect to other potential mechanisms underlying the interaction.

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Our results support the idea that modulating accessibility of information (through retrieval practice) may unwittingly impair insight creative problems as well as analogical thinking problems without intending to.

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12:00-1:30 PM (2219)

Storage and Processing Tasks May Limit the Working Memory-General Fluid Intelligence Relationship. COREY I. MCGILL, MATT CALAMIA and EMILY M. ELLIOTT, *Louisiana State University*, BENJAMIN D. HILL, *University of South Alabama* (Sponsored by Janet McDonald) — The relationship between working memory (WM) and general fluid intelligence (Gf) is well established, but the cause of the relationship remains debated. Three theories about the cause of the relationship were simultaneously examined, the storage and processing hypothesis, executive attention hypothesis, and the relational integration hypothesis. Importantly, prior research on the relationship between WM and Gf has almost exclusively used WM measures from the cognitive tradition, but a significant number of clinical WM measures are used to facilitate diagnoses of neurocognitive disorders. Exploratory factor analysis and structural equation modeling indicated that WM measures could load onto unique factors that share significant variance, and that these unique factors could demonstrate differential relationships with Gf. WM tasks requiring the storage and processing of distinct stimulus sets showed no unique relationship with Gf, while WM tasks requiring the storage and processing of the same stimulus set demonstrated a strong unique relationship with Gf. While the relational integration and executive attention accounts of the WM-Gf relationship could explain the results well, the storage and processing hypothesis could not.

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12:00-1:30 PM (2220)

Examining Memory Accessibility to Relevant Information During Creative and Analogical Problem Solving. TANIA M. VALLE, *University of Granada*, CARLOS J. GÓMEZ-ARIZA, *University of Jaen*, TERESA BAJO, *University of Granada* (Sponsored by M. Teresa Bajo) — Knowledge accessibility plays a fundamental role in creative problem solving: Only the ideas which are available will be selected as potential solutions. Previous research has shown that unconscious activation of relevant information enhances transfer and reasoning to creative problem solving. However, we recently showed that reduced access to relevant information may also impair performance on creativity tasks unconsciously. In the present work, we further explore this issue in two experiments by manipulating the accessibility of words that were subsequent solutions for a set of problems through inhibition. In Experiment 1 participants solved Remote Associates Task (RAT) problems, wherein implicit remote associations can be generated by insight. In Experiment 2, participants solved verbal analogies in which conscious, deliberative retrieval is thought to be involved.



POSTER SESSION III

Friday Evening

West Ballroom BCD

Viewing 4:00-7:30, Author Present 6:00-7:30 PM

AUTOMATIC PROCESSING

6:00-7:30 PM (3001)

Does Implicit Learning of Ordered Stimuli Influence Perceptual Recognition Speeds in Temporal Order Judgment? JOSHUA E. ZOSKY, MATTHEW R. JOHNSON and MICHAEL D. DODD, *University of Nebraska - Lincoln* — Visual statistical learning studies have repeatedly demonstrated that individuals can acquire joint and conditional probabilities of items co-occurring during passive viewing. In the present study, we examine whether these learned probabilities impact low-level perception in a temporal order judgment (TOJ) task. Participants took part in two identical TOJ tasks in which ambiguous fractal stimuli were presented to the left and right visual field in rapid succession. In between the TOJ blocks was a statistical learning block in which the stimuli used in the TOJ task appeared in triplets of equivalent probability. The statistical learning session altered performance on the post-learning TOJ task, changing the point of subjective simultaneity for the learned items. These results extend our understanding of visual statistical learning by providing evidence of transfer to other tasks and domains.

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6:00-7:30 PM (3002)

Automatic and Controlled Visual Perspective Taking. GEOFF G. COLE, *University of Essex*, IEVA VACAITYTE, *Goldsmiths, University of London*, ANTONIA D.C. D'SOUZA, *University of Essex*, GUSTAV KUHN, *Goldsmiths, University of London* — A number of authors have suggested that the computation of another person's visual perspective occurs automatically. In two experiments we examined this claim and the alternative notion that experimental results are due to mechanisms associated with conscious control. Participants viewed everyday scenes in which a single human model was seen looking towards a target object. Importantly, the model's view of the object was either unobstructed or occluded by a physical barrier (e.g., briefcase). Results showed that when observers were given five seconds to freely view the scenes (Experiment 1), eye movements were faster to fixate the object when the model could see it compared to when it was occluded. By contrast, when observers were required to rapidly discriminate a target superimposed upon the same object (Experiment 2) no such visibility effect occurred. These findings suggest that although humans do take into account the perspective of other people when given time to consciously compute this viewpoint, it does not occur automatically.

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6:00-7:30 PM (3003)

Are Ideomotor-Compatible Tasks Processed Automatically, Even in Old Age? FRANÇOIS MAQUESTIAUX, *Université Bourgogne Franche-Comté*, ERIC RUTHRUFF, *University of*

New Mexico, GUILLAUME CHAUVEL, *Université Bourgogne Franche-Comté* — Ideomotor (IM) compatibility refers to tasks in which the stimulus resembles sensory feedback from the response, such as when pressing a left or right key to an arrow pointing left or right. Here we reexamined the controversy of whether responses for an IM-compatible task can be automatically activated, without requiring central attention. Our procedure consisted of varying the SOA between a *long* Task 1 with a *short* Task 2. This means that, at short SOAs, Task 2 automaticity would result in very fast response times and response order reversals (R2 before R1), but non-automaticity would result in very long response times (due to the central bottleneck). In two experiments, we manipulated whether Task 2 was IM-compatible or non-IM-compatible (e.g., identifying one of two shapes). We also tested 64 older adults, along with 64 younger adults, to examine whether automatic activation is still within reach in old age. Even though the evidence was consistent with *some* automatic processing of the IM-compatible task in both age groups, it was restricted to less than half of the trials. Automaticity is difficult to achieve, even with the easiest of tasks.

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6:00-7:30 PM (3004)

Searching for Brad Pitt: An Electrophysiological Study of Automatic Face Recognition. ANNABELL K. SCHULZ and MEI-CHING LIEN, *Oregon State University*, ERIC RUTHRUFF, *University of New Mexico* — Jung, Ruthruff, and Gaspelin (2013) argued that face recognition automaticity depends on familiarity. We sought converging evidence for this claim using electrophysiological measures. Participants first rated their familiarity with 6 male actors. They then performed a Psychological Refractory Period experiment with a variable stimulus onset asynchrony (SOA) between the two tasks. For Task 2, two faces were presented side-by-side. Participants were to find the target actor, whose identity was specified prior to each block, and indicate his location (left vs. right). The N2pc was used as an index of when participants shifted attention to the target face. For familiar faces, the N2pc was similar across all SOAs, indicating that participants successfully identified the target face and shifted attention to it automatically (regardless of concurrent Task 1 processing). For unfamiliar faces, however, the N2pc was attenuated at short SOAs. We concluded that face recognition occurs automatically but only for familiar faces.

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6:00-7:30 PM (3005)

Auditory Entrainment Effects on Visual Attention. ANTHONY S. BARNHART and AMANDA EHLERT, *Carthage College*, STEPHEN D. GOLDINGER, *Arizona State University*, ALISON MACKEY, *Carthage College* — Attentional entrainment occurs when neural oscillations phase lock with



rhythmic events in the environment to optimize perception processing at moments of high information content (e.g., on the beat). Entrainment effects have been well-documented within sensory modalities, but little research has explored whether they occur across modalities. The current experiments provide the first compelling evidence of cross-modal attentional entrainment, showing that visual attention is influenced by the presence of irrelevant, auditory rhythms. Participants heard a series of rhythmic tones presented at a consistent rate (Experiment 1) or at a consistently-changing rate (Experiment 2) while they monitored a screen of colored noise for the onset of a dot probe. Probes appeared in- or out-of-phase with the tones. Entrainment effects were apparent in response times, but were moderated by the dynamics of the auditory rhythms. The results necessitate revision of the dominant models of temporal attention.

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6:00-7:30 PM (3006)

Gaze Cueing Effects and Preference Bias in Older Adults.

ANNA PECCHINENDA, BIANCA MONACHESI and SABRINA SCHIEVANO, *Sapienza University* — To what extent old individuals are able to automatically shift their attention based on observed direction eye-gaze, and whether the emotional expression and age of the central face-cue modulate gaze cueing effects and preference acquisition was investigated. Thirty-nine 70-80 year old individuals completed a non-predictive gaze cueing task with happy, angry and neutral faces of old and young individuals gazing left or right. Targets were kitchen and garage objects and, at the end of the experiment, participants rated their preferences toward each target-object. Findings showed typical gaze cueing effects, $F(1, 38) = 71.24$, $p < .001$, $\eta^2 = .65$ with faster RTs on trials with valid cues ($M = 707$; $SE = 34$) than invalid cues ($M = 742$; $SE = 33$). There was no evidence of larger cueing effects for emotional faces, [expression \times cue: $F(2, 76) = 1.69$, *ns*] or for own-age faces, [face-age \times cue: $F(1, 38) = .96$, *ns*]. However, participants liked more objects looked at by old faces than by young faces, $F(1, 38) = 10.09$, $p = .003$, $\eta^2 = .21$, suggesting an own-age preference bias for objects looked at by older faces.

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6:00-7:30 PM (3007)

The Influence of Attention and Stimulus Duration on the Scope of Processing—Implications for Both Conscious and Unconscious Perception Research. GARY D. FISK, *Georgia Southwestern State University* — An important goal of attention research has been to determine whether unattended stimuli might receive significant perceptual processing. We endeavored to replicate a report of no perception without attention (Lachter, Forster, and Ruthruff, 2004). In 3 of 4 experiments for 56 ms masked primes, we obtained attentional leakage at the unattended location, with lexical decisions being 11 ms faster on congruent trials (pooled effect size $d = -0.20$ [small]; Bayes Factor $> 1,000$). In comparison, the effect for attended trials was strong (42 ms, $d = -0.80$ [large]). We also investigated priming effects for briefer (28 ms) primes. There was a significant (18 ms) effect only at the attended location ($t(28) = -3.53$, $p = .001$, d

$= -0.28$). These results show weak processing outside the focus of attention with word and nonword stimuli that may have implications for the scope of possible unconscious perception effects.

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6:00-7:30 PM (3008)

The Influence of a Partner on Stroop Interference. SCOTT SINNETT and ANIKA GEARHART, *University of Hawaii at Manoa*, BASIL WAHN, *University of Osnabrück* — Heed et al. (2010) required participants to respond to the elevation of tactile vibrations on a foam cube that were also accompanied by lights that occurred either at the same or opposite elevations. When performing this task alone, a congruency effect was observed, which was reduced when the participant performed the task jointly with a co-actor that indicated the elevation of the lights. To date, it is unknown if these effects are specific to only crossmodal displays. Therefore, the present experiments used a Stroop task in both unimodal and crossmodal presentations which was either performed alone or jointly. The primary Stroop task was to verbally identify the color that was presented, while the co-actor's task was to decide whether the two items were congruent or not. Our findings (i.e., a reduced congruency effect for jointly performing the Stroop task) will be discussed in relation to current theories on joint attention.

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6:00-7:30 PM (3009)

Examining the Strength and Boundary Conditions of Various Symbolic Cues. MENGZHU FU and MICHAEL D. DODD, *University of Nebraska - Lincoln* (Sponsored by Jeffrey Stevens) — Previous studies have demonstrated that symbolic cues that have a well-established spatial meaning (e.g. arrows) influence the allocation of attention in a target detection task, even when the cue is not predictive of the subsequent target location. In the present study, we examine the relative strength and boundary conditions of various symbolic cues (arrows, numbers, directions words, gaze cues) by presenting them subliminally (brief presentation followed by a white noise mask) as well as in either separate or mixed experimental blocks (a manipulation known to influence the relative strength of gaze and arrow cues). Participants simply respond to a peripheral target following the presentation of the irrelevant cue. The results of the study speak to both the automatic nature of symbolic cueing effects in addition to providing insight into the relevant strength of various symbolic cues and the boundary conditions for symbolic attention.

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6:00-7:30 PM (3010)

Visual and Auditory-Accessory Simon Effect Distributions. AIPING XIONG and ROBERT W. PROCTOR, *Purdue University* (Sponsored by Robert Proctor) — We measured Simon effects for tasks in which left-right responses were made to red-green stimuli. For the visual-Simon task, the stimuli occurred in left-right locations; for the accessory-Simon task, the stimuli occurred in a centered location but accompanied by a left-right accessory tone. Mean Simon effects were similar



for both tasks, but the reaction-time (RT) distributions showed distinct patterns. The visual-Simon effect decreased across the RT distribution regardless of stimulus duration, whereas the auditory-accessory Simon effect increased. Inverse efficiency scores that incorporated percentage-error [$IES = RT/(1-PE)$] showed decreasing functions for both tasks, but the visual-Simon effect was larger initially and decreased more than the accessory-Simon effect. These results imply that automatic activation of spatially corresponding responses follows a different time course for auditory-accessory stimuli than for the locations of visual stimuli that carry the relevant stimulus feature. Combined with results from other studies, the accessory/carrier distinction is implicated as crucial.

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6:00-7:30 PM (3011)

Selective Attention in a Bimodal Switching Paradigm: Does Feedback Modality Matter? LINDA TOMKO and ROBERT W. PROCTOR, *Purdue University* (Sponsored by Kim-Phuong Vu) — Unimodal equivalence between stimuli of different sensory modalities must be established before meaningful conclusions can be drawn regarding crossmodal effects of simultaneously presented stimuli. We conducted three experiments assessing unimodal equivalence between auditory and visual stimuli. In the absence of response feedback, single modality response times and errors did not differ, suggesting unimodal equivalence. The same was true when auditory (earcon) feedback was provided. However, when visual (verbal) feedback was displayed, responses were slower to auditory relative to visual stimuli. Given these differences, we assessed the potential influence of feedback modality in two additional experiments using a bimodal switching paradigm in which we previously found robust visual dominance effects. Overall, responses were faster with auditory feedback. However, both when feedback was auditory and when feedback was visual (color), responses were slower and less accurate when the relevant modality was auditory. Results suggest feedback modality influences performance, despite presentation *following* responses.

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CONTROLLED PROCESSING I

6:00-7:30 PM (3012)

Re-evaluating the Role of Location-Based Processes in the Distractor Devaluation Effect. BILJANA STEVANOVSKI and PAMELA STEVENSON, *University of New Brunswick* — Distractor devaluation is the finding that ignored distractors are affectively rated lower (e.g., less cheery) than attended targets. Of interest was whether to-be-rated items presented at previously ignored locations would be rated lower affectively than to-be-rated items presented at previously attended locations. Previously we had failed to find location-based effects when a target was presented alongside one distractor item. We re-examined the role of location-based processes in the distractor devaluation effect by using multiple locations in an attempt to make location a more salient feature of the task. To investigate this possibility, stimuli were presented at four possible positions (above or below, to the left or right). Participants responded to

a target presented with either one distractor item or presented with three distractor items. Next, participants rated either the target item or a distractor item; these to-be-rated items were presented at either a previously attended or a previously ignored location. Results are discussed in relation to theories regarding location- and feature-based involvement in the distractor devaluation effect.

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6:00-7:30 PM (3013)

How Complex is Negative Priming? LIN LI, *Sichuan Normal University* — Over years the dominant view on negative priming has assumed that an interplay between selective attention and episodic memory retrieval occurred occurs in the same perceptual dimension. It is in such a mental representational space that the forward and backward acting processes are to be integrated as a goal oriented executive control. However, current research has challenged the view by emphasizing that higher dimensional, neuronal computing structures might be involved in selective attention tasks. In a cross-language negative priming study, letters, digits, English number words, and logographic Chinese number words were temporally separated in two rapid serial visual presentation (RSVP) streams instead of concurrently presented. The findings suggest that active suppression of irrelevant distracting information is a more ubiquitous form of cognitive control than previously thought, leading to a (hyper)complex-number based interpretation.

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6:00-7:30 PM (3014)

Irrelevant Information Can Bias Judgments by Inducing the Retrieval of Exemplars. AGNES SCHOLZ and BETTINA VON HELVERSEN, *University of Zurich* — When making judgments, for instance about the quality of a job applicant, the decision maker should ignore irrelevant attributes such as the persons' name. However, past research has shown that irrelevant attributes influence judgments, possibly because automatically activated past instances (i.e. former applicants) are integrated into the judgment process. We tested the link between the retrieval of specific exemplars and their influence on judgments. In accordance with research showing that when people retrieve information from memory, they look back to the location where they encoded it, we studied eye movements to measure whether participants retrieved previously encountered exemplars during judgments. Indeed, participants were more likely to retrieve an exemplar when it matched the test item on an irrelevant attribute and irrelevant attributes influenced judgments in the direction of the retrieved exemplar. The results provide insights into how memories about exemplars are integrated into the judgment process when assessing memory retrieval online.

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6:00-7:30 PM (3015)

Disentangling Response and Location Inhibition in Auditory Distractor Processing. MALTE MÖLLER and SUSANNE MAYR, *University of Passau*, AXEL BUCHNER, *Heinrich-Heine-University* — Responding to a location that was



previously occupied by a distractor (ignored repetition trial) is impaired as compared with responding to a new location (control trial). In vision, this spatial negative priming effect is attributed to the inhibition of distractor-occupied locations or their task-assigned responses. In the present study, a to-be-ignored distractor sound was followed by a to-be-located target sound after 300 or 900 ms. Sounds were presented from one of four speakers and the two speakers on the left (right) of the participant were assigned to a common response key. Performance was compared among ignored repetition, control, and so-called response control trials in which the target was presented from a formerly unoccupied speaker but required the execution of the previously withheld response. Presenting the target at the location of the former distractor generally delayed responding. Interestingly, performance in response control trials was only impaired with an interval of 900 ms. The results suggest that (1) location and response inhibition contribute to action control in audition and (2) response inhibition takes more time to develop.

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6:00-7:30 PM (3016)

Category Level Control in the Item-Specific Proportion Congruence Paradigm. ABHISHEK DEY, MIRANDA KALISH and JULIE M. BUGG, *Washington University in St. Louis* — The item-specific proportion congruence (ISPC) effect is the reduction in the Stroop effect for mostly incongruent items compared to mostly congruent items. Using a picture-word Stroop task, Bugg, Jacoby, and Chanani (2011) demonstrated transfer of the ISPC effect to novel, 50% congruent pictures from the same categories as training items. In Experiment 1, this finding was replicated despite the reduced number of items and the inclusion of training and transfer items in all blocks. In Experiment 2, we further extended this research by demonstrating transfer for items for which proportion congruence conflicted with the training items. The ISPC effect for transfer items corresponded to the training items and not to the proportion congruence of the transfer items. Together, the results indicate that the dominant trigger for reactive control in the item-specific picture-word Stroop paradigm appears to be the category represented by the item, and not the item (individual exemplar) itself.

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6:00-7:30 PM (3017)

Dynamic Cognitive Control Engagement Modulates Conflict Resolution During Real-Time Language Processing: An ERP Study. JARED NOVICK and NINA S. HSU, *University of Maryland*, SARA MILLIGAN and DONALD BELL-SOUDER, *University of Colorado, Boulder* — Incremental language processing often engenders conflict between incompatible representations of sentence meaning. One hypothesis is that cognitive-control processes engage to resolve conflict during real-time comprehension. We tested this by recording event-related potentials while participants read anomalous and well-formed sentences (e.g., “The bathroom floor was mopping/mopped yesterday”) following Stroop-Incongruent (SI) or -Congruent (SC) trials. In standard cognitive-control

tasks, incongruent trials are easier to process following other incongruent trials, reflecting dynamic control adjustments after conflict detection. We predicted that SI trials would engage control and subsequently influence real-time sentence processing. Following SC trials, anomalous sentences elicited a P600, suggesting that readers perceived items as syntactically ill-formed and attempted to repair them according to a favored analysis (e.g., “mopping” → “mopped”). Following SI trials, anomalous sentences elicited an N400, suggesting pursuit of the implausible interpretation dictated by the syntax. Thus, dynamic cognitive-control engagement may facilitate readers’ resolution of syntactically-licensed interpretations when semantic support is absent.

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6:00-7:30 PM (3018)

Dichotic Listening: Reducing Task Load in the Attended Channel Helps Older Adults Detect Their Name in the Unattended Channel. SANCHITA GARGYA, *University of Missouri*, MATTHEW S. BRUBAKER, *Springfield College*, GEOFFREY M. MADDOX, *Rhodes College*, MOSHE NAVEH-BENJAMIN, *University of Missouri* — In a series of experiments, Naveh-Benjamin et al. (2014; *Journal of Experimental Psychology: LM&C*) found that similar to high Working Memory (WM) capacity younger adults, older adults fail to notice their names in the unattended channel. This suggests either that they have as good inhibitory abilities as those of high WM capacity younger adults, or have reduced attentional resources to invest in the unattended channel. The current study further investigates the reduced attentional resources hypothesis by decreasing the load of the standard dichotic listening task; participants of both age groups were not required to shadow the attended words, but instead, were instructed to attend to words presented in a female voice, as they would be tested on the words later on, while blocking simultaneously presented words in a male voice that included their name. The results suggest that with increased available attentional resources, older adults were more likely to detect and recall hearing their name in the unattended channel.

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6:00-7:30 PM (3019)

Monitoring of Prediction Errors Facilitates Cognition in Action. JOHN C. PLASS, SIMON CHOI, SATORU SUZUKI and MARCIA GRABOWECKY, *Northwestern University* — Cognition in action requires allocation of attention between internal processes and the sensory environment. This allocation might be facilitated by prediction of sensory results of self-generated actions. Ignoring sensory signals confirming predictions might facilitate focus on internally generated content, whereas disconfirmed predictions would draw attention. In two visual working-memory experiments we varied the relationship between voluntary keypresses and auditory distractors so that distractors were either temporally correlated or uncorrelated with keypresses. Temporally uncorrelated distractors were more likely to intrude into working memory. Interference was maximal when sounds preceded keypresses,



suggesting that distractor attenuation depended on inferred causality between keypresses and sounds. These results suggest that cognition during action is facilitated by monitoring prediction errors of sensory signals relative to expected action-perception contingencies. Because sensory signals unrelated to motor actions also provide crossmodal predictions about sensory input, crossmodal monitoring of prediction errors may play a critical role in directing exogenous attention.
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6:00-7:30 PM (3020)

Working Memory and External Stroop Tasks: Comparison of Interference and Conflict Adaptation Response Time and ERP (N450) Effects. MARK E. FAUST, ERICA GOWAN, MONICA NESON and CHRIS ANDERSON, *University of North Carolina at Charlotte*, KRISTI S. MULTHAUP, *Davidson College* — Comparison of response-time based distractor interference (DI) effects for a traditional (external, perceptually driven distractor interference) Stroop color identification task and for a working memory (internal, distractor word in immediate memory) Stroop analog (e.g., Kiyonaga & Egner, 2014), yields similar patterns of results, suggesting working memory employs general, internally directed, attention and control processes. We have modified the internal (WM) Stroop task to allow assessment of conflict adaptation (CA, changes in DI contingent on the prior trial thought to reflect cognitive control). We have also created a modified external Stroop task that matches the stimulus contingencies of the internal Stroop task to facilitate direct comparison of CA across both versions of the color identification task. The present study will add ERP (e.g., N450) and time-frequency analysis of EEG to standard response time measures of DI and CA to further verify the correspondence of internal and external Stroop tasks.
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6:00-7:30 PM (3021)

Visual Modulations of Resting State Alpha Oscillations. KELLY WEBSTER and TONY RO, *Graduate Center, City University of New York* — Once thought to reflect cortical idling, recent work has demonstrated that the alpha rhythm plays a causal role in cognition and perception. However, whether cognitive or sensory processes modulate various components of the alpha rhythm is poorly understood. Sensory input and resting states were manipulated in three conditions: eyes-open fixating on a visual stimulus, eyes-open without visual input, and eyes-closed. We show increases in alpha power—and for the first time, peak frequency—across posterior electrodes without visual input. These results suggest that increases in alpha power reflect a shift of attentional direction from external to internal states and that shifts in peak frequency may be a result of the visual system sampling the external environment more frequently in order to detect stimuli under restricted visual input. They further demonstrate how sensory information modulates alpha and the importance of selecting an appropriate resting condition in studies of alpha.
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6:00-7:30 PM (3022)

Cognitive Control Over Prospective Task-Set Interference. PETER S. WHITEHEAD and TOBIAS EGNER, *Duke University* (Sponsored by Tobias Egner) — Maintaining task-sets in working memory (WM) for prospective implementation can interfere with performance on an intervening task when stimulus-response mappings overlap between the two tasks. This prospective task-set interference has previously been conceptualized as reflexive or obligatory. However, the extent to which strategic control can be exerted over this interference in ongoing behavior has not yet been directly tested. To probe for possible strategic control over this effect, we conducted three experiments that manipulated the likelihood of prospective task-set interference in the ongoing task. We hypothesized that if this interference were malleable by control, then under conditions where interference is highly probable, participants would suppress the influence of the prospective set on ongoing processing. In line with this prediction, our results show that prospective task-set interference is modulated by strategic control such that the magnitude of interference is reduced, eliminated, or reversed in the presence of frequent incompatible trials.

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6:00-7:30 PM (3023)

The Impact of Self-Absorption and Preoccupying Thoughts on Dieting Pathology and Working Memory. KELLY CUCCOLO and RIC FERRARO, *University of North Dakota* (Sponsored by Ric Ferraro) — Successful dieting requires self-monitoring, and this may lead to preoccupying thoughts surrounding weight loss. This preoccupation may account for cognitive deficits observed in dieters. This study examined the impact of self-focused attention, and preoccupation on disordered eating symptomology, and executive function. Participants (n=33) completed self-focused attention, disordered eating symptomology, and working memory measures. Statistically significant correlations were observed between disordered eating symptomology and preoccupation, $r=.73$, $p<.001$, and self-absorption, $r=.69$, $p<.01$. The correlation between disordered eating symptomology and a visual working memory measure was significant, $r=-.40$, $p=.043$. A correlation between self-absorption and verbal working memory, $r=-.47$, $p=.013$, was significant. Preoccupation mediated the relationship between self-absorption and a verbal working memory measure. The indirect coefficient was significant, 95% CI = .0207, .0903. Results indicate self-focused attention may detract from attentional resources necessary for cognitive tasks performance through increasing cognitive load via preoccupation.

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6:00-7:30 PM (3024)

Effector System Prioritization Across Different Dual-Task Paradigms: A Comparison of Simultaneous and Sequential Stimulus Presentation. MAREIKE AMELIE HOFFMANN, ALEKS PIECZYKOLAN and LYNN HUESTEGGE, *University of Würzburg* (Sponsored by Andreas Eder) — Whenever two tasks are executed at once performance suffers from dual-task



costs, which are often distributed asymmetrically across both tasks. Recent studies employing a single common stimulus demonstrated that such cost asymmetries can result from an ordinal prioritization structure among effector systems (i.e., oculomotor responses are prioritized over vocal, and vocal over manual responses). However, the role of effector system prioritization was not yet considered in paradigms with sequential stimuli. In the current study, we explored effector system prioritization in two dual-task paradigms by presenting two stimuli a) simultaneously and b) sequentially. Generally, we observed typical effector system prioritization effects (e.g., smallest dual-task costs for oculomotor responses suggesting oculomotor dominance). Importantly, these effects cannot be fully explained by a simple first-come, first-served mechanism within basic serial processing frameworks. Instead, the results call for additional response modality weighting mechanisms in dual-task control theories.

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6:00-7:30 PM (3025)

Assessing the Relationship Between Media Multitasking and Task Switching Ability. JACKSON S. COLVETT, KATHERINE V. SAMS, SARAH A. BLUMENTHAL, KAITLYN N. GALLITANO and JANINE M. JENNINGS, *Wake Forest University* (Sponsored by Janine Jennings) — Previous studies examining the relationship between media multitasking and task switching ability have led to differing conclusions about whether high media multitaskers show better (Alzahabi & Becker, 2013) or worse (Ophir et al., 2009) task switching performance than low media multitaskers. To elucidate this discrepancy, we adapted the Media Multitasking Index (MMI; Ophir et al., 2009), used in prior work, to create a measure with up-to-date forms of media which was also designed to be more user-friendly. Second, we included a voluntary task switching paradigm (Arrington & Logan, 2004), along with the previously used cued paradigm, as the former seemed more akin to real world multitasking. Results showed that our media multitasking measure had convergent and discriminant validity with the MMI. In addition, high media multitaskers displayed *smaller* switch costs during cued task switching relative to low media multitaskers, although, surprisingly, there was *no* group difference in voluntary switch costs.

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6:00-7:30 PM (3026)

Social Media and Cognition. ANA CECILIA RUIZ PARDO, *University of Western Ontario* (Sponsored by John Paul Minda) — Social media (SM) has become an inescapable platform for sharing media and connecting with others. Since these online platforms have become a daily ritual in modern society, the present studies investigated how SM impacts cognition; specifically, attention. Study 1 investigated people's typical SM usage patterns and was used to gauge which SM platform was most popular. Study 1 revealed that there are three main platforms people used most often: Facebook, Instagram, and Snapchat. Facebook was reported as the most popular SM platform. Therefore, study 2 investigated how a SM post could

impact people's cognition. The Sustained Attention to Response Task (SART) was used to measure reaction time and accuracy. It was hypothesized that participants who posted, with the intention of provoking a reaction from their followers, on their SM prior to doing the SART would be distracted and have lower performance than a control group. Preliminary results demonstrated that people who posted on SM prior to the SART were distracted when compared to those who only completed the task. Future research is still needed to determine how SM impacts people's cognition.

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6:00-7:30 PM (3027)

Contributions of Executive Function to Individual Differences in Response Variability and Attention Problems. LOUISA L. SMITH, MARIE T. BANICH and NAOMI P. FRIEDMAN, *University of Colorado Boulder* (Sponsored by Marie Banich) — Variability and slowing of responding have been linked to reduced executive function (EF), e.g., in individuals with attention difficulties and aged individuals with compromised prefrontal functions, respectively. The goal of the present study was to examine the relationship between these aspects of responding and EFs with an individual differences approach in a large, unselected sample of young adults. Confirmatory factor analysis indicated that response time and variability were moderately related to each other and to a Common EF factor, thought to reflect goal maintenance and top-down biasing. Both also predicted teacher-reported attention problems from ages 7 to 14. However, after controlling for response time, the relations between variability and both attention problems and Common EF became nonsignificant, although variability remained related to an EF factor specific to mental set shifting. These results suggest that the relationships between response components and attention difficulties arise via shared Common EF processes.

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CONCEPTS AND CATEGORIES I

6:00-7:30 PM (3028)

Breaking the Perceptual-Conceptual Barrier: Does Relational Matching Depend on Explicit Cognition. BARBARA A. CHURCH, BROOKE JACKSON and J. DAVID SMITH, *Georgia State University* — Cognitive, comparative, and developmental psychologists have long been interested in the ability to respond to abstract relations because it may underlie important capacities like analogical reasoning. Cross-species research has used relational matching-to-sample (RMTS) tasks, where participants try to complete abstract analogies of Sameness and Difference, to study this ability. In the present RMTS paradigm, the relational cue was made redundant at first with a perceptual cue. Then the perceptual cue faded, requiring participants to transition from a perceptual to conceptual approach. We studied participants' ability to make this transition with and without a working-memory load. The concurrent load was devastating, causing many participants to fail dramatically to break the perceptual-conceptual barrier, suggesting that conceptual solutions may depend on reconstructing the task



using an explicit cognitive process reliant on working memory. Our data provide a look at this cognitive reorganization, raising important theoretical issues for cross-species comparisons of relational cognition.

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6:00-7:30 PM (3029)

Self-Paced Reading Shows Visual Prediction is Fine-Grained When Reading is More Natural. NYSSA BULKES, *University of Arizona*, KIEL CHRISTIANSON and DARREN TANNER, *University of Illinois at Urbana-Champaign* — Prior work using event-related brain potentials (ERPs) shows neural sensitivity to unexpected orthography in informative contexts (Kim & Lai, 2012). This work demonstrates how the constraint of a sentence can be used to formulate predictions about upcoming visual information (i.e. spelling, orthography). In two experiments, we investigated how control over how a stimulus is read affects the specificity and time course of visual predictions. In Experiment 1, when sentences were presented in rapid serial visual presentation (RSVP), only flagrant visual anomalies elicited an N170. In Experiment 2, when participants read the same sentences at their own pace, targets containing letter transpositions and pseudohomophones also elicited this effect, indexing increased sensitivity of the visual system to unexpected orthography when presentation more closely resembled natural reading. Results demonstrate that predictions for visual information are facilitated when readers have greater control over when and how they read a stimulus.

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6:00-7:30 PM (3030)

Performing a Task Jointly Modulates Audiovisual Integration. BASIL WAHN and ASHIMA KESHAHA, *University of Osnabrück*, SCOTT SINNETT, *University of Hawai'i at Mānoa*, ALAN KINGSTONE, *University of British Columbia*, PETER KÖNIG, *University of Osnabrück* — Humans constantly receive sensory input from several sensory modalities. Via the process of multisensory integration, this input is often integrated into a unitary percept. Researchers have investigated several factors that could affect the process of multisensory integration. However, in this field of research, social factors (i.e., whether a task is performed alone or jointly) have been widely neglected. Using an audiovisual crossmodal congruency task we investigated whether social factors affect audiovisual integration. Pairs of participants received congruent or incongruent audiovisual stimuli and were required to indicate the elevation of these stimuli. We found that the reaction time cost of responding to incongruent stimuli (relative to congruent stimuli) was reduced significantly when participants performed the task jointly compared to when they performed the task alone. These results extend earlier findings on visuotactile integration by showing that audiovisual integration is also affected by social factors.

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6:00-7:30 PM (3031)

Goal Directed Conceptual Acquisition: Examining the Goal Framework Hypothesis. SETH CHIN-PARKER, *Denison University* — Participants used experimental items to complete tasks in a novel domain. Critically, although all participants used the same items, the tasks varied between participants. During the initial task phase of the study, participants were simply asked to use the items to complete the tasks, and we made no mention of different types of items. Participants were only told whether they had successfully completed the task or not. Following those interactions, we assessed their knowledge of the items they had used. The participants organized their knowledge of the items in a manner that clearly reflected their task goals. The task relevant features of the items were used to differentiate the types, or categories, of the items. Also, although other features of the items were not directly involved in completing the tasks, they were interpreted in terms of how they either facilitated or obstructed the tasks completed. The results of the study provide support for the goal framework hypothesis (Chin-Parker & Birdwhistell, 2017), i.e. the idea that goals structure information and provide coherence to acquired concepts.

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6:00-7:30 PM (3032)

Asymmetric Underlying Mechanisms of Relation-Based and Property-Based Conceptual Combination. MINGYEONG CHOI, *Pusan National University*, SANGSUK YOON, *Temple University* — In this study, we performed an experiment to examine the difference of cognitive processes underlying property-based and relation-based interpretations of noun-noun conceptual combination. Participants made sensicality judgments on newly combined noun-noun compounds that were constructed to facilitate either property-based or relation-based interpretation followed by lexical decisions for modifier associates or head associates. The result showed that property-based interpretation facilitated the lexical decisions on modifier associates, whereas it inhibited those on head associates. On the other hand, relation-based interpretation facilitated lexical decisions on both of modifier and head associates. The results imply that the property-based and relation-based interpretations have asymmetric underlying mechanisms in which semantic features of constituent concepts are modified to accomplish conceptual combination. In property-based interpretation, the properties of modifier replace the properties of the corresponding dimensions of head, while in relation-based interpretation, such replacement doesn't take place.

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6:00-7:30 PM (3033)

Meta-Memory in Noise: Auditory Distraction Interferes With Allocation and Perception of Study Time. PHILIP BEAMAN, *University of Reading*, MACIEJ HANCZAKOWSKI and DYLAN M. JONES, *Cardiff University* — Even simple memory tasks involve a degree of judgment and strategic decision-making, based upon the perceived benefits of particular mnemonic strategies. The consequences of these metacognitive judgments for memory have been amply documented under



experimental conditions that require participants to focus upon a task in the absence of distractors. Here, we consider the impact of less benign environmental conditions —specifically, the presence of distracting speech —upon the metacognitive aspects of memory. In multiple studies, distracting speech reliably disrupted free recall and, as indicated by Judgments of Learning, participants were aware of this effect. However, because participants did not adjust study time to counter these effects, the distraction effect was exaggerated relative to experimenter-imposed presentation rates. A further experiment suggests that this result was the consequence of distraction-induced disruption of time perception at encoding, rather than any deliberate strategy by the participants. The results are interpreted in terms of a limited self-regulation hypothesis and highlight the need to consider the impact of more challenging environments on metacognition generally.

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6:00-7:30 PM (3034)

Recognizing Abstract and Concrete Causal Relations. JANE E. NEAL and KATJA WIEMER, *Northern Illinois University* (Sponsored by Katja Wiemer) — Previous work (e.g. Crutch et al., 2009) has suggested that abstract concepts are organized in memory based on associative relations and concrete concepts by semantic similarity (i.e. taxonomic relations). While these results established that recognizing associative relations between abstract concepts is faster than for concrete concepts, it is unclear whether this would be the case for causal relations. Using a semantic odd-one-out task (Crutch et al. 2009), the current study investigated reaction time for selecting an unrelated item within different semantic contexts. Each triad included an unrelated target and a pair of either abstract or concrete concepts related associatively, causally, or categorically. A significant interaction between abstractness and relation type demonstrated that recognition times of associative relations for abstract concepts were significantly lower than causal or categorical, while reaction time for concrete did not vary across relation type. Implications for the representation and construction of causal relations will be discussed.

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6:00-7:30 PM (3035)

Modeling Individual Concepts as Graph Theoretical Networks. SARAH H. SOLOMON, JOHN MEDAGLIA and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* — Here we test a novel conceptual framework in which concepts are described as graph-theoretical networks. We represent concepts not as nodes or states of a network, but as their own individual networks, with conceptual properties (i.e. yellow, sweet) as nodes and pairwise associations between these properties as edges. We collected data on the different contributions of conceptual properties to object concepts (e.g., banana, bottle) across a range of sub-kinds (e.g., unripe banana, wine bottle), and used these data to create concept-specific network models. Then, we created a set of images of these concepts, and participants reported which properties applied to the object shown in the image. Our goal was to classify these property vectors using graph alignment on our network

models. We show that classification is successful, suggesting that the coherent covariation of properties within a concept may play a role in the structure of conceptual knowledge.

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6:00-7:30 PM (3036)

Learning Categories via Relative Evaluation Tasks. DANIEL SILLIMAN and KENNETH KURTZ, *Binghamton University* (Sponsored by Kenneth Kurtz) — Researchers have moved beyond the traditional classification learning paradigm to investigate how different task requirements mediate category learning and representation. We explore two novel modes of category learning that are based on evaluative comparison of three co-presented examples with task feedback provided: in the within-category condition, the learner chooses which item is least typical of the category; in the between-category case, the learner chooses which item belongs to a different category than the others. Successful responding across the two learning modes requires focusing on different information – resulting in learning the same category structure in either a more discriminative or more generative manner. We report differences at test between learning groups (including a single-item classification baseline) on measures of full and partial-item classification.

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6:00-7:30 PM (3037)

Presentation Type, Strategy Usage, and Working Memory all Contribute to Successful Category Learning. ERIN N. GRAHAM and CHRISTOPHER A. WAS, *Kent State University* (Sponsored by Christopher Was) — Previous work suggests that the strategies individuals employ when learning inductive categories may be dependent on context and cognitive ability. However, research examining the extent to which individual differences, strategy usage, and changes in category task demands are interconnected is inconclusive. The goal of the present study was to examine the relationships between working memory, strategy usage, and stimulus presentation variation (i.e. presenting a novel category name and asking participants to choose an exemplar word or presenting an exemplar word and asking participants to choose a novel category name) in a semantic category learning task. Results indicate that successful category learning depends on interactions between these variables. Individuals utilizing a memorization-based strategy were adversely impacted by category name presentation variation and were not reliant on working memory. In contrast, individuals using a rule-based strategy saw marginal benefits from the category name presentation variation and were heavily reliant on working memory.

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6:00-7:30 PM (3038)

Using Deep Learning to Automatically Extract Psychological Representations of Complex Natural Stimuli. CRAIG A. SANDERS and ROBERT M. NOSOFKY, *Indiana University Bloomington* (Sponsored by Robert Nosofsky) — Deep-learning networks have been successful at solving machine-learning problems because they can learn useful representations of



high-dimensional data. While previous research has looked for correspondences between these representations and those used by humans, the present work directly teaches deep networks psychological representations of complex natural stimuli. Similarity ratings were collected between pairs of 360 images of rocks belonging to 30 categories, and multidimensional scaling was used to derive values for each rock along 8 psychological dimensions such as lightness of color and average grain size. Deep convolutional networks were then trained to output these dimensions from a subset of the images. This training was followed by generalization testing, in which the networks produced dimension values associated with the remaining untrained images. The network predictions for the remaining images correlated highly with the empirical data. These results indicate that deep networks can be used to derive psychological representations for complex natural objects. Such representations may be useful for exploring the structure of natural categories and for testing formal models of categorization and similarity judgment.

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6:00-7:30 PM (3039)

Silence! An Auditory Task Disrupts Processing of Auditorily Experienced Concepts. CHARLES P. DAVIS, GITTE H. JOERGENSEN and EILING YEE, *University of Connecticut* (Sponsored by Eiling Yee) — Grounded cognition suggests that processing concrete concepts entails reexperiencing what it is like to perceive or interact with those things. This predicts that when performing a demanding task in a specific modality, access to conceptual knowledge in that modality should be disrupted. Accordingly, we asked whether performing an auditory task disrupts processing of auditorily-experienced concepts. In the interference condition, participants heard a four-tone sequence, while simultaneously a word (e.g., *applause*) was presented visually. Participants made an animal judgment on the word, and then judged whether a subsequent four-tone sequence matched the initial one. In the no-interference condition, participants simply made the animal judgment. The interference effect (interference RT – no-interference RT) was greater for auditorily-experienced words than for non-auditorily-experienced words (e.g., *rainbow*). It appears harder to access conceptual knowledge for concepts like *applause* when performing an auditory task, suggesting that this conceptual knowledge shares neural resources with auditory processing areas.

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6:00-7:30 PM (3040)

Cross-Cultural Comparison of the Representation of Abstract Concepts About Interpersonal Warmth in Hong Kong. PRISCILLA LOK-CHEE SHUM and CHI-SHING TSE, *The Chinese University of Hong Kong* (Sponsored by Chi-Shing Tse) — According to Barsalou's Perceptual Symbol System (1999), abstract concepts can be represented by situational and introspective information available when experiencing that concept. Previous studies that corroborate this theory were mostly conducted in the West, but few investigated whether there were cultural differences. People from collectivist societies

pay more attention to relationships and contextual information (Masuda & Nisbett, 2001) and place greater emphasis on behaviors (vs. traits). Thus, we predicted that Chinese participants rely primarily on these types of information when grounding abstract concepts about interpersonal warmth. Twenty-five Chinese undergraduates and 25 Caucasian international students reported their thoughts on abstract concepts (friendly, trustworthy, affection, kind, and love) in Cantonese and English, respectively. Chinese participants mentioned more observable actions than unobservable actions while Caucasian participants showed the opposite. However, Chinese participants did not produce more *Situation* properties than Caucasian participants, although they did produce fewer *Entity* properties and marginally fewer traits. The implications of these findings on embodiment will be discussed.

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DECISION MAKING II

6:00-7:30 PM (3041)

Team Coordination in Visual Search With and Without Shared Eye Movements. CARY STOTHART, ROBERT BIXLER, JAMES R. BROCKMOLE and SIDNEY D'MELLO, *University of Notre Dame* — Many real-world visual searches often involve teams of observers (e.g., military scouts searching for enemy combatants, police officers looking for suspects in a crowd), or are amenable to team coordination (e.g., security screening, imagery intelligence). In a collaborative search task, how do observers coordinate their behavior? Does coordination change when observers can see where each other is looking? To answer these questions, we had teams of 3 to 4 observers search displays while we recorded their eye movements. Each team member used their own computer, but they searched the same displays at the same time as their teammates. Some teams saw their teammates' eye movements superimposed on the search display while others did not. Overall, team coordination depended on search difficulty and was not always optimal. Our work informs models of joint attention and have implications for real-world applications of visual search.

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6:00-7:30 PM (3042)

Physiologic Reactivity, Police Tactics, and Resisting Confession: The Unique Experiences of Innocent and Guilty Individuals During the Interrogation Process. KYLE C. SCHERR and CHRISTOPHER J. NORMILE, *Central Michigan University* — The role of individuals' physiologic reactivity on the confession decision-making process is in its infancy. This research extended physiological investigations on confession decision-making by examining whether certain tactics used during police interrogations uniquely influence suspect's physiological state and how these changes may relate to confession resistance. Procedures mirrored the cheating paradigm (Russano et al., 2005) and measured participants' ($N = 154$) physiology at critical times during the study. Innocent participants resisted confessing longer than guilty participants, but innocents confronted with false evidence resisted confessing longer than innocents confronted with minimization.



Moreover, a moderated-mediation analysis indicated that although innocents resisted confessing longer when confronted with false evidence compared to minimization, these innocents sustained a significantly higher level of physiologic reactivity. The results of the conditional-indirect relationship suggest that innocents confronted with false evidence may resist longer, but at a cost—their continued resistance may exhaust them and undermine subsequent decision-making.
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6:00-7:30 PM (3043)

Exploring or Exploiting Novelty: Solving Trade-offs in Contextual Bandit Tasks. SEAN TAUBER, DANIEL J. NAVARRO and BEN R. NEWELL, *University of New South Wales* — How do people learn to choose between options that they have never encountered? With no direct experience of the options, people must rely on the similarities between the novel items and other, more familiar items. Because no options are ever “completely novel”, people can learn how the features of familiar options relate to rewards, and then generalize this knowledge to novel options based on shared features. This raises several important questions: How do people approach the exploration-exploitation tradeoff inherent in attempting to learn the underlying reward function (mapping features to rewards) while maximizing expected reward? Do people approach this as a reinforcement learning problem, a categorization problem, or a combination of both? We explored these questions through a series of experiments using novel contextual bandit tasks. People’s ability to learn a reward function was affected by a priori biases in favor of certain functions, which is consistent with previous research on function learning. Novelty of options — induced by non-uniform sampling of the feature space — also played a role in exploration behavior, interacting with structured inductive knowledge of features and rewards.
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6:00-7:30 PM (3044)

The Role of Context and Numeracy in Probability Distortion. CHENMU XING, ALEXANDRA ZAX, JOANNA PAUL, HILARY BARTH and ANDREA PATALANO, *Wesleyan University* (Sponsored by Andrea Patalano) — People overestimate small proportions and underestimate large ones across diverse domains (Hollands & Dyre, 2000), a pattern much like probability distortion in decision making under risk. Context often matters in these judgments, in that S-shaped distortion patterns are scaled to the range of relevant magnitudes. Here, we tested the hypothesis that probability distortion in decision making might be similarly influenced by context. Adult participants ($N = 52$) were assigned to either a full-range (probabilities from 0-100%) or a half-range (probabilities from 50-100%) condition. Participants indicated certainty equivalents for 176 hypothetical monetary gambles (e.g., “a 75% chance of \$100, otherwise \$0”), and completed a numeracy measure. Using a cumulative prospect theory framework, we found that patterns of probability distortion in the two conditions were similar, and that numeracy was

associated with less distortion. We conclude that probability distortion patterns, unlike other judgments that yield similar distortions, might not scale to context.

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6:00-7:30 PM (3045)

Did I Control the Situation all Along? The Interplay Between Hindsight Bias and Perceived Controllability. KIMIHIKO YAMAGISHI and AKANE NISHIDA, *Tokyo Institute of Technology* — We question whether perceived control over the negative affects the hindsight bias. Blank and Peters (2010) used a scenario approach to investigate that the effect of the controllability affected the level of hindsight bias. Our studies incorporated a real gamble situation with cash rewards. We manipulated participants’ perception of controllability after Langer’s (1975) *locus of control* experiments. We allowed half of the participants to roll a die by themselves (high control) or the experimenter rolled the die (low control). The die roll decided each participant’s cash reward amount, and each participant provided probability estimates of winning before the die roll, and recalled her/his probability after the die roll. A 2(controllability: high vs. low) x 2(condition: judgments vs. recall) ANOVA did not reveal main effects of both controllability and condition, while detecting a significant interaction [$F(1,41) = 4.4825, p < .05$]. As expected, significant hindsight biases were found only among the low controllability group. Thus we remark that the lack of perceived controllability as an effective cause of hindsight bias.

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6:00-7:30 PM (3046)

Exploring the Role of Memory in Deception Using a Revised Misinformation Paradigm. SCOTT MEEK, *University of South Carolina - Upstate*, MICHELLE PHILLIPS-MEEK, *Limestone College*, TESSA MCCOY, *University of South Carolina - Upstate* — The current research consists of two experiments which seek to create a more salient version of the visual misinformation task, and then use this paradigm to examine the impact of memory in cognitive models of deception. The first experiment sought to improve accuracy rates on both critical and control item questions in the conventional visual misinformation paradigm. Five new vignettes were ultimately tested, each consisting of 25 critical and 25 control items. Recognition memory was tested using a two answer forced-choice paradigm. Recognition accuracy rates were higher for the new vignettes when compared against accuracy rates in previous studies. Reaction time results for critical versus control items were not consistent with previous findings. In the second experiment, participants were cued to either respond deceptively or truthfully, using the same two answer forced-choice paradigm, to questions concerning information viewed in the vignettes. Preliminary results indicate that recognition accuracy remained consistent, and that reaction times for deceptive responses were not impacted by memory conflict. These findings demonstrate that more research is needed examining the role of memory in cognitive models of deception.

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6:00-7:30 PM (3047)

Examining the Relationship Among Delay Discounting, Episodic Future Thinking, and Temporal Construal. ELI LEISTAD and STIAN REIMERS, *City, University of London* — Delay discounting (devaluing a reward more with increasing delay to its receipt) is reduced when people engage in episodic future thinking (EFT) about the delayed outcome, and may be affected by the way in which an outcome is construed. We examine whether the large unexplained heterogeneity in discounting rates may be related to individual differences in spontaneous EFT representation richness and temporal construal. Study 1 (n = 313) found that reported richness of EFT representations was unrelated to discount rate, as was construal preference. Study 2 (n = 117) replicated findings that discounting is reduced when participants are cued to think about future outcomes episodically, but again found no relationship between general EFT richness and discount rate. Study 3 compares these web-based findings to lab-based findings. It appears that cued engagement in EFT can reduce discounting, but that variability in discounting is not automatically related to variability in EFT richness.

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6:00-7:30 PM (3048)

Memory and Updating in Evaluation of Value Sequences. ALICE MASON, *University of Western Australia*, GORDON BROWN, *University of Warwick*, GEOFF WARD, *University of Essex*, MARK HURLSTONE and SIMON FARRELL, *University of Western Australia* — Retrieving samples from memory is a critical tool for decision-making. In a series of experiments we introduce incentive compatible methods to investigate the extent to which memory predicts evaluation. We present participants with a sequence of monetary values and ask them to complete both a free-recall task and a willingness-to-pay (WTP) task. We then predict WTP from both the items that were recalled and those that were presented. Our findings consistently show substantial evidence in favour of a memory-based model of evaluation, even when participants are aware of the upcoming evaluation task. In addition, in order to assess whether there is indeed a trade-off between memory-based and moment-by-moment strategies in evaluation, we varied which tasks were rewarded. We find that when each task is incentivized with a high probability (75%) the reliance on a memory-based strategy is maintained. We also discuss how the position of a value in a sequence determines evaluation.

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6:00-7:30 PM (3049)

Neural Correlates of Change Deafness Under Conditions of High and Low Similarity. KELLY DICKERSON, JESSICA CORTNEY BRADFORD, ASHLEY FOOTS and JEREMY GASTON, *Army Research Laboratory* — Change deafness, the failure to notice a change in an auditory scene is a relatively new phenomenon. The introduction of EEG has illuminated the possibility that changes are missed not because of a lack of sensory information, but due to later perceptual and cognitive processes (e.g., differences in P3a, P3b, and P2 as well as enhanced T400 for trials where the change is noticed vs. missed).

The present study uses an AX discrimination task with listeners who received feedback after each trial, and a control group that received no feedback on performance. Change-to-background similarity as well as the heterogeneity of the background sounds was also manipulated. We found that feedback did not influence change deafness when change-to-background similarity was low. In the more difficult discrimination task of high change-to-background similarity, there was a clear benefit of feedback. These benefits will be discussed in terms of behavioral performance and neural responses.

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6:00-7:30 PM (3050)

Uncertainty is in the Eyes of the Beholder: Oculomotor Metrics of Perceptual Decision Uncertainty. AARON L. GARDONY, *Tufts University & US Army* — Perceptual decision making involves gathering and interpreting sensory information to effectively categorize objects and inform behavior. For instance, a pathologist distinguishing the presence or absence of abnormal cell proliferation, or a luggage screener categorizing objects as threatening or non-threatening. In many cases, sensory information is not sufficient to reliably disambiguate the nature of a stimulus, and resulting decisions are done under conditions of uncertainty. The present study asked whether several oculomotor metrics might prove sensitive to transient states of uncertainty during perceptual decision making. Participants viewed images with varying visual clarity and were asked to categorize them as faces or houses, while eye tracking monitored fixations, saccades, blinks, and pupil diameter. Results demonstrated that decreased stimulus clarity influenced several oculomotor variables, including fixation frequency and duration, the frequency, peak velocity, and amplitude of saccades, and phasic pupil diameter. While most measures tended to change uniformly with clarity variation, pupil diameter revealed more nuanced information about the dynamics of perceptual decision making under conditions of uncertainty.

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6:00-7:30 PM (3051)

The Adolescent Mind: Factors Influencing Theory of Mind Abilities During Adolescence. ELISABETH E.F. BRADFORD, VICTORIA E.A. BRUNSDON and HEATHER FERGUSON, *University of Kent* — Throughout our daily lives, we are required to infer information about other people's mental states, an ability referred to as possession of a 'Theory of Mind' (ToM). Prior research has demonstrated ongoing cognitive development throughout adolescence. This study explored the extent to which ToM continues to develop during adolescence, and which factors may influence successful ToM expression during this period. Participants aged 10-21 years completed a number of tasks, including assessments of ToM (e.g., emotion recognition, intention reasoning), general cognitive traits (including autistic traits, empathy, positive/negative affect) and the influence of technology usage. Results revealed a significant effect of age on ToM engagement, with a decrease in egocentric processing across adolescence, related to a number of factors including association with autistic traits and time spent



engaging with technology. However, these relationships varied between younger and older adolescents, suggesting changes in factors influencing successful ToM expression across this period of development.

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6:00-7:30 PM (3052)

Dialect Influences Juror Perceptions of Witness, but not Decision Making. COURTNEY KURINEC and CHARLES WEAVER, *Baylor University* (Sponsored by Charles Weaver) — We investigated the effect of race and dialect on juror decision making. Mock jurors read a summary of an ambiguous criminal case, to include an audio recording of a defense witness. Witness race and dialect were crossed in a 2 (White v. Black) x 2 [General American English (GAE) v. Black Vernacular English (BVE)] factorial design. Jurors who listened to the BVE recording found the witness to be less professional and less educated than those who heard GAE, but neither witness race nor dialect significantly influenced juror verdict or ratings of witness credibility. When juror race (White v. Non-white) was entered into analyses, non-white jurors who heard the witness use GAE a) rated the witness as more likeable and b) were less confident in their judgments when the witness was white; however, this did not change jurors' overall judgment of the case. Future research will extend these findings to defendant race and dialect.

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6:00-7:30 PM (3053)

Assessing the Effectiveness of Expert Testimony by Jurors' (In)Sensitivity to Irrelevant Cues. GIANNI RIBEIRO, JASON M. TANGEN and BLAKE M. MCKIMMIE, *The University of Queensland* (Sponsored by Jason Tangen) — The way in which forensic experts testify about the results of forensic comparisons is a contentious issue. Current proposals involve presenting evidence in ways that are scientifically or mathematically complex for the average juror to understand. Edmond, Thompson, and Tangen (2014) propose that presenting information about examiners' performance is both easier to understand and is useful to appropriately weigh the evidence. To evaluate testimony effectiveness, prior research has compared novice participants' judgments against theoretically "normative" standards of decision-making. However, this is problematic when comparing judgments about a methodology and judgements about experts' performance. Instead, we examine people's (in)sensitivity to irrelevant cues such as an examiner's attractiveness, confidence, or likeability, as an ideal model of testimony would be one in which jurors do not rely on irrelevant cues to weigh the evidence.

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6:00-7:30 PM (3054)

To Prevent or Alleviate Negative Outcomes? The Role of Difficulty in Risk Mitigation Decisions. LISA VANGSNESS and MICHAEL YOUNG, *Kansas State University* (Sponsored by Michael Young) — Challenging tasks involve some level of risk (i.e., base-rate) that decision-makers can modify through their behaviors. One way decision-makers can reduce their risks is to

employ risk-mitigation strategies during a task, either before or after a negative event occurs. These risk-mitigation strategies, sometimes referred to as risk-diffusing operators (RDOs), require that decision-makers maintain an ongoing awareness of task demands, resource constraints, and RDO availability. This work explores how risk mitigation strategies unfold during difficult tasks by using a videogame task designed to require fast-paced decisions. The results suggest that decision-makers prefer preventative risk-mitigation strategies, but will only employ these strategies when pre-event RDOs are easy-to-use. Decision-makers' preferred risk-mitigation strategies change over time as they gain experience with available RDOs, the environment, and their abilities.

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6:00-7:30 PM (3055)

A Bayesian Analysis of Multi-Task Cognitive Load Effects on Individual Performance. HECTOR D. PALADA and ANDREW NEAL, *University of Queensland*, DAVID STRAYER, *University of Utah*, TIMOTHY BALLARD, *University of Queensland*, ANDREW HEATHCOTE, *University of Tasmania* (Sponsored by David Strayer) — The detection response task (DRT) is an international standard for assessing the effects of cognitive load on drivers' attention (ISO, 2015). As load increases on the primary task, lesser resources are thought to be allocated to the DRT, and therefore DRT performance suffers. Thus, the DRT is thought to reflect demands on limited resource allocation, or the rate of information processing. However, the processes by which DRT reflect cognitive load may vary across individuals, and task prioritization may also vary. We examined individual differences in the processes explaining the effects of load on a primary classification task and DRT. Greater cognitive load decreased the processing rate of the DRT, and increased the processing rate on the primary task. Response caution also declined in response to load on the primary task. However, these effects varied across individuals.

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6:00-7:30 PM (3056)

Exploring Data-Driven Decision Making and Cognition by Using Graphs as Experimental Stimuli. CAITLYN M. MCCOLEMAN and MARK BLAIR, *Simon Fraser University* (Sponsored by Mark Blair) — Graphs are the midway point between scientists and our data. Designing graphs that most effectively support accurate insight and honest communication is important to publishing and preparing analyses. Additionally, we propose that graphs are useful for understanding human cognition itself. As with other psychophysical stimuli, they can be manipulated and participants' reactions to those manipulations can be recorded. In the current study, we use a relatively unfamiliar type of graph to explore how naive participants a) learn how to read it, b) how they are impacted by different perceptual manipulations, and c) the extent to which grid lines help/hinder performance. We see different rates of learning depending on the physical characteristics of the graph,



and find that the presence of grid lines positively negatively the participants' ability to recall values from the graph, contrary to predictions of both the authors and data visualization experts. Email: Caitlyn McColeman, cmccolem@sfu.ca

6:00-7:30 PM (3057)

Differences in Risk Taking for Numerical and Symbolic Outcomes With and Without a Legend. ELIZABETH M. FULLER and SANDRA L. SCHNEIDER, *University of South Florida* (Sponsored by Ken Malmberg) — Research on risky choice behavior often utilizes outcomes presented as numbers. There is ample evidence of individual differences in the ability to comprehend numeric information, which may adversely influence risky choice. We examined how displaying monetary gambles as numbers, affective symbols, or analogue symbols impacts risk taking. We established that differences in risk preferences emerge as a function of presentation format, symbol type, and availability of a numerical reference scale or legend. Analogue symbols seem to help reduce marginal discounting of values, whereas affect-laden symbols tend to promote risk aversion.

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6:00-7:30 PM (3058)

But He Is My Brother: The Role of Family Obligation in Moral Reasoning. JUNHO LEE and KEITH J. HOLYOAK, *University of California, Los Angeles* (Sponsored by Keith Holyoak) — Studies in moral psychology have focused on how people make ethical judgments and decisions regarding strangers. However, in order to understand moral reasoning in a realistic setting, it is important to consider the role of personal relationships such as family ties. In this study, participants read scenarios in which they role-played witnessing a transgression. The offender was described as either the participant's brother or a stranger. The participants rated how unethical the offender's behavior was, and rated how willing they were to report the offender to the police. Results showed that when the offender was a brother, judged unethicality did not differ from when the offender was a stranger, but willingness to report was significantly lower. Controlling for the global seriousness of the transgression (misdemeanor versus felony), willingness to report increased with judged unethicality in the stranger condition but not in the family condition. These findings indicate that decisions to report transgressions depend in part on judged unethicality, but this relation can be overridden when a strong completing obligation to protect family members is evoked.

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6:00-7:30 PM (3059)

The Relationship Between Two Routes to Adaptive Learning in Changing Environments. NATHAN TARDIFF, KATHRYN N. GRAVES and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* (Sponsored by Sharon Thompson-Schill) — The ability to adapt to change is crucial for survival. Traditional models of reinforcement learning (RL), however, often fare poorly in dynamic environments. Within the learning and decision-making literature, two disparate mechanisms for adapting to change have recently been explored. In one case,

it is posited that explicit models of the environment can be used to dynamically plan actions and anticipate outcomes, thus allowing for rapid incorporation of environmental change (model-based RL; MB-RL). In the other case, markers of environmental change—such as the absolute magnitude of prediction errors—can be used to adaptively modulate learning rates such that they rise during periods of instability and fall during periods of stability. Interestingly, there is some evidence that learning rate modulation and MB-RL may be oppositely associated with prefrontal dopamine function, suggesting a potential tradeoff. In this study, we examine the relationship between learning rate modulation and MB-RL in the context of a two-step decision task. We assess how the relationship between these two mechanisms covaries across individuals, and we also ask how the use of an adaptive learning rate affects the overall utility of model-based control.

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6:00-7:30 PM (3060)

Preference for Challenge in Decision-Making. GRETA M. FASTRICH, *University of Reading*, SHINSUKE SUZUKI, *Tohoku University*, ANASTASIA CHRISTAKOU and KOU MURAYAMA, *University of Reading* (Sponsored by Kou Murayama) — In the previous literature of decision-making, neuroscience and economics, an important assumption is that people prefer positive outcomes and try to avoid effort where possible. However, the literature of motivation suggests that people have intrinsic inclination to overcome negative outcomes in favour of challenging tasks. This study aims to reveal people's preference for challenge when no rewards are involved and to see if people avoid challenge once rewards are introduced. Participants were asked to select the meaning of rare English words and given feedback about their performance. For each trial, participants first saw a (no-) reward cue and then choose the difficulty level of the word. Results show that when rewards are provided easier options were preferred in comparison to no reward condition, whereas more difficult options were chosen more frequently when no reward was provided. We propose a computational model to account for people's preference for challenge in decision-making.

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EVENT COGNITION

6:00-7:30 PM (3061)

Adult Age Differences in Change Detection and Memory for Everyday Events. CHRIS WAHLHEIM, *University of North Carolina at Greensboro*, JEFF ZACKS, *Washington University in St. Louis* — Two experiments examined the memorial consequences of detecting and remembering changes in naturalistic activities, in younger and older adults. Participants watched movies of an actor performing everyday activities on two fictive days. Some activities repeated exactly between days, some activities had a critical feature that changed between days (e.g., waking up to an alarm clock or a cell phone), and other activities appeared only on Day 2. Older adults were less likely than younger adults to detect changes, or to recollect them later. Both younger and older adults showed much better



memory for changed events when they recollected the changes. Putting these two results together, age differences in memory for Day 2 were to a significant degree accounted for by failure to detect and recollect changes. This pinpoints an age-related difference that may have major implications for explaining and remediating age differences in event cognition.

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6:00-7:30 PM (3062)

Testing the Attention Narrowing Effect of Suspense During Repeat Viewings. MATTHEW BEZDEK and ERIC SCHUMACHER, *Georgia Institute of Technology* — We have previously found evidence that suspense narrows attention: at moments when viewers perceive increased threats to characters, their performance on a secondary task is impaired. But what happens when viewers are already aware of how suspenseful narratives will end? According to Gerrig's (1993) concept of anomalous suspense, even when viewers have knowledge of an outcome, their moment-by-moment cognitive processing may still generate suspense. We compared participants' reaction times to audio probes presented at peaks and valleys of suspense in a set of film excerpts that participants viewed twice. Participants were significantly slower to respond to probes at suspense peaks compared to valleys. This effect was present in both viewings, though the delay in responding to probes at suspense peaks was attenuated in the second viewing. These results provide support for the attention-narrowing hypothesis of suspense and the theory of anomalous suspense.

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6:00-7:30 PM (3063)

A Negativity Bias in Detail Generation During Event Simulation. VANNIA A. PUIG, *University of Illinois at Chicago*, MÜGE ÖZBEK, *Aarhus University*, KARL K. SZPUNAR, *University of Illinois at Chicago* — We recently found that novel negative future events are simulated in greater detail than novel positive future events (Puig & Szpunar, in press). In the present studies, we set out to test whether this pattern of data is specific to simulations of personally relevant experiences. Across three experiments, we asked participants to simulate novel negative and positive events in relation to (1) their own future, (2) the future of an acquaintance, and (3) the future of a familiar person with whom they have had no personal interactions (Barack Obama). Descriptions of events were audio-recorded and scored for internal and external detail using an adapted version of the Autobiographical Interview. Preliminary analyses indicate that simulations of negative events are generally characterized by more internal detail than simulations of positive events, regardless of the self-relevance of the events in question. Implications for the role of emotion in event cognition are discussed.

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6:00-7:30 PM (3064)

An Unobtrusive Cueing Procedure That Improves Everyday Event Segmentation. LAUREN L. RICHMOND and JEFFREY M. ZACKS, *Washington University in St. Louis* — Viewers spontaneously parse continuous streams of activity

into meaningful events, and there is good agreement across observers as to the locations of event boundaries. However, individuals vary in how well their segmentation agrees with group norms, and poor agreement with the norm is associated with poorer subsequent memory. This suggests that improving segmentation could improve memory. Here, we tested whether unobtrusive cues at normative event boundaries would improve viewers' segmentation. One cue—darkening frames at event boundaries—had this effect, whereas several others did not; these were inserting blank frames, slowing, speeding, and brightening frames. Providing feedback in conjunction with cueing did not further improve normative event boundary identification. This result suggests that event segmentation can be improved without direct instruction, suggesting a potential technique to improve memory for everyday events.

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6:00-7:30 PM (3065)

Grammatical Aspect and Event Segmentation. DANIEL P. FELLER and JOSEPH P. MAGLIANO, *Northern Illinois University*, TODD FERRETTI, *Wilfrid Laurier University*, ANITA EERLAND, *University of Utrecht* — Time is central to human cognition, both in terms of how we understand the world and the events that unfold around us as well as how we communicate about those events. As such, language has morphological systems, such as temporal adverbs, tense, and aspect to convey the passage of time. This project explored the role of one such temporal maker, grammatical aspect, and its impact on how we understand the temporal boundaries between events. Participants ($N=79$) read ten stories that contained a critical event that was either conveyed with a perfective (e.g., watched a movie) or an imperfective aspect (e.g., was watching a movie), and engaged in an event segmentation task. Events described in perfective aspect were more often perceived as being bounded than events in imperfective aspect. This study demonstrates that grammatical aspect conveys event structure information that influences how people interpret the end and beginning of events.

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6:00-7:30 PM (3066)

The Roles of Anticipation and Modality During Event Comprehension. MARKUS HUFF, DINA LAUSCH and MARIA OBERBECK, *Eberhard Karls Universität Tübingen* — When comprehending picture stories the cognitive processes are similar to reading. Missing bridging-event information increases viewing times for subsequent end-state pictures, thus indicating inference generation processes. In this project, we focus on the questions if comprehenders anticipate the end-state of a narration, and if inference generation processes are independent of modality. In two experiments, bridging-event information was absent or present. The third condition was realised either by masking the bridging-event information ("anticipation experiment") or by replacing the visual pictures with textual descriptions thereof ("modality experiment"). We measured viewing times for the end-state pictures. Replicating earlier work, viewing times in the absent conditions were longer than in the present conditions, thus indicating inference



generation processes. In the “anticipation experiment”, longer viewing times in the mask condition as compared to the absent condition indicate that participants did not anticipate the end-state of the narration. In the “modality experiment”, viewing times in the text condition were longer than in the visual condition. We thus conclude that inference generation was modality specific.

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6:00-7:30 PM (3067)

Effects of Emotional Context on False Memory for Person/Action Conjunctions. ALAN W. KERSTEN, JULIE L. EARLES, LAURA L. VERNON, NICOLE MCROSTIE and ANNA RISO, *Florida Atlantic University* — Two experiments demonstrate that eyewitnesses often falsely recognize an actor performing an action that had actually been performed by somebody else, even if the action involves negative emotions and the actor in question had only appeared in emotionally neutral contexts. Participants viewed videos, each involving an actor performing a neutral (e.g., microwaving soup) or negatively valenced (e.g., tearing up a notebook) action, and were asked to remember the events (Experiment 1) or to rate them for valence and arousal (Experiment 2). In both experiments, participants subsequently recognized emotional actions better than neutral actions, but had difficulty remembering which person had performed each action, making them especially likely to falsely recognize emotional actions performed by actors who had been seen performing other actions, even if only neutral ones. These results suggest that even individuals seen only in benign contexts can be falsely remembered as having participated in emotionally-charged events (e.g., crimes).

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6:00-7:30 PM (3068)

How Do Humans Estimate Temporal Trend? HIROMI SATO, *Kogakuin University*, ISAMU MOTOYOSHI, *The University of Tokyo* — We can estimate the temporal trend of dynamic events. To understand computational mechanisms underlying this ability, we have been investigating human judgments on the temporal average of visual features (motion, orientation, face; Sato et al., 2013, 2016) and of numerosity (Sato et al., 2016, 2017) in serially presented stimuli of 2-8 sec. Our experiments showed that observers specifically utilize information at ~200-500 ms before making decision upon the temporal average of perceptual features (recency effect), whereas they utilize information over the whole presentation when they judge the numerical average. Here, we suggest that all of these data are well explained by a ‘derivative averaging’ model that humans optimally estimate the temporal average of information which is affected by temporal differentiation in case of perceptual representation (e.g., form and motion), but not in case of symbolic representation (e.g., number).

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6:00-7:30 PM (3069)

Event Memory Uniquely Predicts Memory for Large-Scale Space. JESSE Q. SARGENT, *Francis Marion University*, JEFFREY M. ZACKS, *Washington University in St. Louis*,

DAVID Z. HAMBRICK, *Michigan State University*, NAN LIN, *Washington University in St. Louis* — When a person explores a new environment, they begin to construct a spatial representation of it. Doing so is important for navigating and remaining oriented. How does one’s ability to learn a new environment relate to one’s ability to remember experiences in that environment? Here, 208 adults experienced a first-person videotaped route, and then completed a spatial map construction task. They also took tests of general cognitive abilities (working memory, laboratory episodic memory, processing speed, general knowledge) and of memory for familiar, everyday activities (event memory). Regression analyses and structural equation modeling revealed that event memory, word list memory and gender were unique predictors of spatial memory. These results implicate the processing of temporal structure and organization as an important cognitive ability in survey memory from route experience. Accounting for the temporal structure of people’s experience while learning the layout of novel spaces may improve interventions for addressing navigation problems.

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6:00-7:30 PM (3070)

Recall of Experiences in Virtual Reality: Event Representation Across Different Time Scales. ELAINE H. NIVEN and ELLEN PAULEY, *University of Dundee*, ROBERT H. LOGIE, *University of Edinburgh* — We employed a defined event in a virtual environment, with follow-up interviews, to assess episodic detail changes in event memory over time. Previous studies for personally experienced events have focused on consistency of reported detail across two time points (post-event review and recall interview). Here, we used a novel approach: we recorded participants individually spending 15 minutes actively navigating a detailed, virtual reality replica of a real-world museum exhibit. Participants returned for an interview to recall their experience after a delay of a day, a week or a month. Autobiographical Interview (Levine et al., 2002) scoring was used to assess the degree of episodic information present in recall; coders’ ratings of recall, and number and type of details provided, were compared across time delays. Results suggest virtual environments afford suitably episodic-rich recall to enable research to focus on effect of time delay on recall without the confound of post-event review.

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6:00-7:30 PM (3071)

Action Plan Interrupted: Coordinating Action Plans During Sleep Deprivation. ALEXANDRA M. STUBBLEFIELD, LISA R. FOURNIER, DEVON A. GRANT and HANS P.A. VAN DONGEN, *Washington State University* — Complex, goal-directed behavior often requires the suspension and retention of one action plan to give priority to another. When action plans partly overlap (vs. do not overlap), the prioritized response can be delayed (partial repetition cost, PRC). We examined whether sleep deprivation exacerbates PRCs. Participants viewed two visual stimuli in sequence. They retained an action plan to the first stimulus while executing a speeded response to the second (interruption); afterwards they responded to the first stimulus. The actions either partly overlapped or not.



All participants performed the task at baseline and again after one night of sleep deprivation or a full night of sleep (control). Responses were overall slower after sleep deprivation compared to baseline and control, but the size of PRCs did not differ. Thus, one night of sleep deprivation slowed overall responding, but executive control components involved in reducing proactive interference (due to shared features between action plans) were not significantly compromised.

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6:00-7:30 PM (3072)

Cognitive Control and Narrative Memory. JERRY S. FISHER, *University of Notre Dame*, VANESSA CARLOS and KYLE MOBLY, *California State University, San Bernardino*, GABRIEL A. RADVANSKY, *University of Notre Dame*, JASON F. REIMER, *California State University, San Bernardino* — Studies examining the mechanisms of complex memory processing have led to a greater understanding of the role that cognitive control plays in the formation of memories. The purpose of the present study was to examine the relationship between cognitive control and the ability to process and remember narratives. Participants were identified as either reactive or proactive based on the mode of control they used during the AX-CPT. They then read four short narratives and were given two forced-choice recognition tests, one immediately after reading and the other seven days later. The recognition data were used to identify surface form, textbase, and event model memory. For immediate testing, proactive mode of control people had better memory for the event model level than reactive mode people. However, this difference was not present one week later.

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6:00-7:30 PM (3073)

Visual Processing at Event Boundaries: Eye Movements Reveal Online Event Model Construction Processes in Visual Narratives. MAVERICK E. SMITH and JOHN P. HUTSON, *Kansas State University*, JOSEPH P. MAGLIANO, *Northern Illinois University*, LESTER C. LOSCHKY, *Kansas State University* (Sponsored by Lester Loschky) — Observers comprehend continuous activities in visual narratives by segmenting them into discrete events, each with a distinct beginning and ending. The Scene Perception & Event Comprehension Theory (SPECT) explains how information gathered during single eye fixations is used to create event models in working memory. According to SPECT, the coherence of incoming visual information determines whether to map it onto the current event model or to shift to create a new one. When low coherence triggers perception of an event boundary, the foundation for a new event model is laid. We tested the hypothesis that eye movements reflect online event model construction using picture stories. Participants sequentially viewed images of six picture stories at their own pace while their eyes were tracked. Using event boundaries identified by an independent group of participants, we found that viewing times increased and additional fixations were made on boundary images compared to non-boundaries, consistent with the need to gather more information at boundaries. Boundaries

also elicited longer saccades and shorter fixation durations, consistent with the idea that viewers are searching more broadly when laying the foundation for a new event model.

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6:00-7:30 PM (3074)

Adopting a Perspective Influences Event Segmentation and Recall. KIMBERLY NEWBERRY and HEATHER BAILEY, *Kansas State University* (Sponsored by Heather Bailey) — When individuals take a perspective, they invoke relevant schemata at encoding and remember information consistent with the schemata at retrieval. Perspective taking may improve memory for perspective-relevant information through event segmentation, one's ability to parse information into meaningful units as an activity unfolds. The current experiment investigated whether perspective influences the segmentation and memory of a text. Participants read the House narrative from Anderson and Pichert (1978) from the perspective of a burglar or homebuyer, freely recalled the information, and then segmented the text. Replicating previous work, perspective-relevant information was remembered best. More importantly, perspective influenced segmentation, such that an individual's perceived event boundaries were more likely to align with those identified by members of one's own perspective. Additionally, segmentation predicted memory. The current results demonstrate that semantic knowledge influences event comprehension at encoding and retrieval.

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6:00-7:30 PM (3075)

The Effect of Situational and Perceptual Continuity on the Segmentation of Narratives. RYAN D. KOPATICH and DANIEL FELLER, *Northern Illinois University*, CHRISTOPHER A. KURBY, *Grand Valley State University*, JOSEPH P. MAGLIANO, *Northern Illinois University* (Sponsored by Joseph Magliano) — The goal of the present study was to assess the relative contributions of perceptual and situational change on event segmentation in visual narratives. Participants viewed picture stories and engaged in an event segmentation task. The extent that critical pictures depicted situational continuity (continuity of character goals) or perceptual continuity (continuity in bodily position) was manipulated. The likelihood of perceiving an event boundary and the viewing latencies at the critical locations were measured. Results indicated that situational shifts (i.e., change in character goals) increased the likelihood of segmenting at the critical point, but perceptual shifts (e.g., change in body position) did not. Viewing time, however, was affected by both conceptual and perceptual shifts. Event boundaries in narratives may be associated with situational shifts, but there are costs in processing pictures that depict perceptual change in terms of processing effort. These results have implications for major theories of event cognition.

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6:00-7:30 PM (3076)

Viewers Adapt to Rate Changes in Event Perception. CHRISTOPHER C. HEFFNER, ROCHELLE S. NEWMAN and WILLIAM J. IDSARDI, *University of Maryland, College*



Park (Sponsored by Rochelle Newman) — The perception of events relies on a combination of top-down and bottom-up cues. Although previous studies have examined the role of bottom-up cues such as movement in determining how events are perceived (Zacks, Kumar, Abrams, & Mehta, 2009), few studies have examined the role of the rate of actions in determining event perception. The current experiments assessed the perception of a sequence of actions performed on a touchscreen (e.g., tapping, swiping, twisting). Mimicking methodologies from the speech perception literature (Dilley & Pitt, 2010), the rate of the first actions within the sequence was sped up or slowed down, and viewers were asked to report the final action in the sequence. The results indicate that the viewers' perception of the final actions was perceived relative to the rate of the precursor sequence. This suggests that viewers adapt to the rate of actions in order to perceive ambiguous ones. Email: Christopher C. Heffner, heffner@umd.edu

NUMERICAL COGNITION

6:00-7:30 PM (3077)

Order Effects on Numeracy Evaluation. DANA L. CHESNEY, *St. John's University*, NATALIE OBRECHT, *William Paterson University*, CARMEL BRUNSWICK, RYAN SALIM and LINYU GUO, *St. John's University*, MAITRY MAHIDA and MARWA SHOAIIB, *William Paterson University* — Individual differences in numeracy – numerical literacy – are increasingly of interest as a predictor variable in a variety of fields, such as cognition and judgment and decision making. It is important that measures of numeracy be valid and reliable. However, while objective numeracy is often treated as a somewhat stable trait, we have observed that scores on numeracy measures can be significantly influenced by seemingly innocuous procedural differences. In the current experiment, we found that task order significantly affected performance on the Objective Numeracy Scale (ONS; Weller et. al, 2013). In an online study, we randomly assigned 217 undergraduate participants to complete the ONS evaluation before or after a short (~5 min) judgement task where they integrated base rate and stereotype information. Participants who completed the ONS task first had significantly higher ONS scores than those who did the task second (First: Mean ONS = 4.172, SE = .178; Second: Mean ONS = 3.686, SE = .148; $t(215) = 2.115$, $p = .036$. Cohen's $d = .288$). We recommend that researchers carefully track the impact of design features when measuring individual differences in numeracy. Email: Dana Chesney, dlchesney@gmail.com

6:00-7:30 PM (3078)

Relation Between Math Performance, Stress Mindset, and Working Memory. DAVID AMPOFO and MICHAEL R. DOUGHERTY, *University of Maryland* — Stress can affect performance across a range of tasks, however recent research within social psychology suggests that different mindsets can moderate how stress affects individual performance: Individuals who view stress as enhancing respond differently to stressful events compared to individuals who view stress as debilitating. At the same time, considerable evidence within the cognitive literature suggests that people with greater WM

capacity often show greater drops in performance compared to lower-WM capacity individuals when placed under cognitive load. The present research examined the effect of stress mindset and WM in a stereotype threat paradigm that was intended to manipulate stress. After being exposed to the stereotype threat induction (versus a control manipulation), participants completed a modular arithmetic task consisting of both easy and difficult items. In addition, individual differences in WM, stress mindset, and math anxiety were measured. The data from over 300 participants indicate that math performance was best accounted for by problem difficulty alone. There was no support for the effect of stress mindset, stereotype threat, working memory or math anxiety after accounting for baseline differences.

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6:00-7:30 PM (3079)

The Effects of Math Anxiety and Math Achievement on Basic Arithmetic Facts: A Pupillometry Approach. KRISTAL KAMEKONA and MARK H. ASHCRAFT, *University of Nevada Las Vegas* — Task-evoked pupillary responses (TEPRs) reflect cognitive load during task performance. Using a verification task, we examined the effects of math anxiety and math achievement on TEPRs while college students solved basic addition and multiplication facts. False addition problems had incorrect answers that varied by split (wrong by 1, 7, or 23); false multiplication answers were either simply false, were a multiple of an operand (e.g., $6 \times 5 = 35$), or were the sum of the operands ($6 \times 5 = 11$). Reaction time, accuracy, and TEPRs showed clear achievement and problem size effects. Low achievement participants perform more slowly, are less accurate, and reach peak pupil dilation later across all problem types than their high achieving counterparts. Multiplication confusion answers were particularly difficult for low achieving students. Achievement effects on basic facts appear to persist into adulthood, which merits additional research.

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6:00-7:30 PM (3080)

Does the Ordinal Position Effect Require Central Attention: A Dual Task Investigation. NATALIE FORD and CASSIE MCCOY-BULLOCK, *Trent University* — Similarities between the Ordinal Position Effect and the Spatial-Numerical Association of Response Codes (SNARC) effect suggest that the SNARC effect may arise in working memory instead of long term memory. To test this possibility the ordinal position effect was examined in task 2 of the psychological refractory period (PRP) paradigm. Previous research with SNARC effect have shown that the SNARC effect decreases with SOA in task 2 of the PRP paradigm. Therefore, if the SNARC effect and the ordinal position effect both occur in working memory (or share a common locus), the ordinal position effect should also decrease with SOA. A single experiment ($N=42$) tested this prediction. Inconsistent with SNARC effect and ordinal position effect arising at the same locus, the ordinal position effect was additive with SOA. Implications are discussed. Email: Michael Reynolds, michaelchanreynolds@trentu.ca



6:00-7:30 PM (3081)

External Structure Helps Problem Solving by Facilitating ‘Mental Projection.’ TYLER MARGHETIS and MATT PENTICUFF, *Indiana University Bloomington*, DAVID KIRSH, *University of California, San Diego*, ROBERT L. GOLDSTONE and DAVID LANDY, *Indiana University Bloomington* — ‘Mental projection’ is a proposed process in which internal mental imagery is ‘projected’ onto external physical structure. For instance, architects may project imagined people onto miniature models of houses; mathematicians may project imagined curves onto graphs. In Study 1, participants were given times (eg, 4:50) and estimated the angle between the hands of a hypothetical analog clock displaying that time. Study 2 extended this to a task with real-world implications: multidigit addition (eg, 27 + 85). Within subjects, we manipulated the amount of visual support on each trial: blank screen; numerical info (addends in random locations); simple spatial structure (lines representing the standard vertical format for multidigit arithmetic); or both numerical info and structure (addends arranged vertically). The mere presence of spatial structure improved performance—even without numerical info—in ways that suggest the external structure facilitated mental projection. These studies establish experimentally that mental projection makes quantifiable contributions to everyday, real-world thinking, and is not limited to creative or idiosyncratic contexts. External artifacts act as stable anchors onto which we project our imagination. Email: Tyler Marghetis, tyler.marghetis@gmail.com

6:00-7:30 PM (3082)

An Unlikely Surprise: Children Use Probability to Infer Others’ Surprise and Happiness. TIFFANY DOAN, ORI FRIEDMAN and STEPHANIE DENISON, *University of Waterloo* (Sponsored by Britt Anderson) — Assessments of probability contribute to people’s emotional reactions. Improbable events are surprising, but probable ones are not. Similarly, positive outcomes are more pleasing if they are improbable rather than probable. In Experiment 1, 4 – 7-year-olds judged which of two characters is more surprised after receiving a red gumball. One character had a high chance of getting a red gumball, while the other had a low chance. We found a significant effect of age, $p=.003$; only 7-year-olds inferred that the character with a low chance of getting a red gumball would be surprised. In Experiment 2, children rated how a girl felt after receiving two red and two black gumballs from either a machine that contained mostly red and few black gumballs, or a machine with the opposite distribution. Children rated the girl as happier when the gumballs came from the mostly-black distribution than when they came from the mostly-red distribution, $p=.019$. Together, our findings show that children understand that others’ emotions about an outcome depend on the likelihood of its occurrence. Examining whether children use probability to infer emotions will expand our knowledge of probabilistic reasoning. Email: Tiffany Doan, t3doan@uwaterloo.ca

6:00-7:30 PM (3083)

The Dynamics of Spatial-Operational Momentum in Mental Arithmetic. KRISTEN A. BOWMAN and THOMAS J. FAULKENBERRY, *Tarleton State University* (Sponsored by Thomas Faulkenberry) — Many studies have demonstrated spatial-numerical associations; additionally, there is evidence that this association extends to arithmetic. Pinhas et al. (2014) demonstrated a spatial operational momentum (SOM); when participants manually pointed answers to arithmetic problems on a number line, horizontal coordinates for addition problems were significantly rightward of coordinates for subtraction problems. In the present study, we used computer mouse tracking to measure the dynamics of this SOM effect. Participants were presented trials with a flanked number line (0-10) and a single-digit addition/subtraction problem. Participants used the mouse pointer to indicate at the approximate location of the sum/difference. While we found no difference in horizontal landing coordinates by operation, we did find differences in the evolution of trajectories. Specifically, addition trajectories drifted rightward of subtraction trajectories throughout much of the decision process. These results indicate a need for investigation into the dynamics of spatial-arithmetical associations. Email: Thomas J. Faulkenberry, faulkenberry@tarleton.edu

6:00-7:30 PM (3084)

Larger vs. Smaller: Which Operand Counts When Solving Simple Addition? MATTHEW G. HUEBNER and JO-ANNE LEFEVRE, *Carleton University* (Sponsored by Jo-Anne LeFevre) — Adults report using a variety of procedural strategies such as transformation and counting when solving addition problems (e.g., $4 + 3$, $9 + 12$). We investigated (a) whether individual differences in strategy selection are reflected in different gaze patterns, and (b) whether operand order influences these patterns. Forty-one participants solved addition problems and described their solution approach after each trial. These descriptions were used to classify participants as *retrievers*, *transformers*, and *counters*. Average gaze duration patterns across problem components revealed that participants allocated more attention to the operands relative to the operator as a function of problem size, with counters looking more at the operands compared to retrievers and transformers. These patterns varied depending on operand order, such that more attention was given to the larger of the two operands. These findings highlight the problem components people use to mentally solve addition problems in relation to their solution strategies. Email: Matthew G. Huebner, matthewhuebner@cmail.carleton.ca

6:00-7:30 PM (3085)

Do People Estimate Abstract Number Magnitude When Asked to Estimate Long-Range Time Intervals? CAMILA SILVEIRA AGOSTINO and PETER M. CLAESSENS, *Federal University of ABC*, FUAT BALCI, *Koç University*, YOSSİ ZANA, *Federal University of ABC* — There is limited knowledge of how people perceive time intervals in the range of days to years. Time intervals are presented in the form of an abstract numeral



coupled with a time unit. We hypothesized that people estimate the magnitude of abstract numerals when asked to estimate long-range time intervals and predict similar responses when intervals are presented with and without time units. The crossmodal line paradigm was used with two experimental groups: Number only ($N=20$), in which participants estimated the magnitude of numerals from 3 to 36, and Number and Month ($N=18$) in which participants performed the same task, but the stimuli were presented as “nn months”. Results of the aggregated data showed that power function ($c+\alpha^{\beta}$) provided a better fit as compared to linear and logistic models. The β parameter value was estimated at 0.84 and 0.77 for the number only and number and time unit groups, respectively. Nonlinear mixed-effects model analysis showed no significant difference of the exponent between groups ($t=-1.09, df=413, p=.27$). Our data support the conclusion that, in paradigms in which time intervals are presented symbolically in a number + time unit format, participants do not invoke a domain-specific mechanism.

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6:00-7:30 PM (3086)

Shifts in Likelihood to Use Diagnostic Tests When Problem Presentation is Manipulated. ALAINA N. TALBOY and SANDRA L. SCHNEIDER, *University of South Florida* (Sponsored by Sandra Schneider) — How people assess the usefulness of a diagnostic test is likely to be related to their understanding of the accuracy of the test. But this understanding will differ depending on which reference class is being considered, e.g., accuracy for all those with the condition (sensitivity) or accuracy for all those who test positive (positive predictive value [PPV]). We manipulated Bayesian reasoning problems from various domains to evaluate how shifts in presentation of the diagnostic test information affects one's reported likelihood to use the test. Results indicate that the likelihood to undergo testing may be tied to judgments of the diagnostic value of the test, regardless of whether that value is the PPV or sensitivity, and regardless of whether the estimate is correct or incorrect. Our results suggest that variations in the presentation of diagnostic values may sway perceptions of the usefulness of tests.

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6:00-7:30 PM (3087)

Spatializing Time and Number: How Culture Shapes Cognitive Universals. BENJAMIN PITT (Graduate Travel Award Recipient) and DANIEL CASASANTO, *University of Chicago* (Sponsored by Daniel Casasanto) — People conceptualize both time and numbers as unfolding along a horizontal line, either from left to right or right to left. The directions of both the mental timeline (MTL) and mental number line (MNL) are widely assumed to depend on the direction of reading and writing within a culture. Here we argue that this assumption is false, and show that the MTL and the MNL are shaped by different aspects of cultural experience. In two training experiments, the MTL was shaped by experiences that provide a correlation between space and time, whereas the MNL was shaped by experiences that provide a correlation

between space and number. The distinct experiential bases of the MTL and MNL were predicted on the basis of a general principle, which we call the Correlations in Experience principle: People spatialize abstract domains in their minds according to the ways those domains are spatialized in the world.

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6:00-7:30 PM (3088)

Number Word Retrieval Paths in English-Dominant, Spanish-Dominant, and Balanced Bilinguals: Divergence or Convergence in Memory Representations? OMAR GARCIA and JYOTSNA VAID, *Texas A&M University* (Sponsored by Jyotsna Vaid) — This study examined bilingual memory representation in the domain of number code retrieval. Of interest is whether, in retrieving number symbols (e.g., 3, 12, 102), both languages are similarly activated, and whether differences in language dominance may affect numerical retrieval. Most studies of bilingual numerical cognition to date have revolved around number facts processing (e.g., $3 \times 4 = 12$), with few studies examining access to simple verbal numerical notation in bilinguals. The present study aims to extend existing research by identifying whether number words function similarly to other types of words in the bilingual mental lexicon. To assess lexical access pathways and measure the degree of retrieval transfer from a numeric symbol code into a verbal code, Spanish-English bilinguals varying in language dominance completed a recognition memory task. Results will be discussed in terms of current bilingual numerical cognition models.

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6:00-7:30 PM (3089)

Cognitive Abilities Associated With Changing Perceptions of Distracted-Driving Risk. BLAIR SHEVLIN, *Towson University* (Sponsored by Kerri Goodwin) — One way to discourage distracted-driving is to target young drivers' perceptions of the risks associated with this behavior. However, risk-related information is too-often presented using content in difficult-to-comprehend formats, which negatively impacts those with low levels of cognitive ability. This study examined the impact of utilizing visual-aids as a means of improving comprehension of statistical information related to texting while driving. This study also evaluated how different informational content and format could alter young drivers' perceptions, attitudes, and intentions. This study found that the visual-aids that were used were generally ineffective in improving comprehension of the material; though, some formats improved comprehension among those elevated cognitive ability. Providing risk-related information in any format was not an effective means of altering perceptions, attitudes, or intentions. However, a mediating relationship of past behavior on the influence of attitudes on intentions was discovered, in which more positive attitudes predicted intentions to abstain from distracted-driving – except where individuals had extensive prior exposure to the behavior.

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**BILINGUALISM II**

6:00-7:30 PM (3090)

Bimodal Language Switching in Language Production and Perception. ANDREA M. PHILIPP, IRING KOCH and SIMONE SCHAEFFNER, *RWTH Aachen University* — Switching between languages leads to performance costs and switching between modalities (either sensory or motor) also leads to costs. In our study, we were interested in the combination of these two types of switching. Is bimodal language switching (e.g. switching from spoken English to written German or gestures) different from unimodal language switching (e.g. switching from spoken English to spoken German)? For language production tasks, we observed lower switch costs for bimodal language switching than for unimodal language switching. However, this was only the case when signs or gestures were used as manual responses (i.e., switching between gestures and spoken German). When bimodal language switching included typed and spoken responses, no reduction in switch costs was observed. For language perception (i.e., categorizing an auditorily or visually presented number word as odd/even), we observed a reversed pattern with larger switch costs for bimodal language switching than for unimodal language switching. These results demonstrate, on the one hand, fundamental differences in bilingual language control between language production and perception and, on the other hand, the crucial role of phonology in language production.
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6:00-7:30 PM (3091)

The Relationship Between Language Proficiency and Attentional Control: Evidence From a Highly Proficient Multilingual Sub-Saharan African Population. CHI-SHING TSE, *The Chinese University of Hong Kong*, JEANETTE ALTARRIBA, *University at Albany, State University of New York* — The bilingual advantage effect refers to whether knowing and using two languages results in increased cognitive ability and greater executive control. Several studies have reported cognitive advantages for those who are bilingual (see Bialystok, Craik, & Luk, 2008; Craik, Bialystok, & Freedman, 2010), while other studies have failed to find consistencies within the effect (see Paap & Greenberg, 2013; Paap, Johnson, & Sawi, 2015). To date, few studies have explored this effect in multilingual populations, yet the study of those who use multiple languages on a daily basis is essential to gaining more insight into this effect. In the current study, 162 highly proficient multilinguals (i.e., all who had ages of acquisition of < 10 years old for their first 3 languages) participated in a Simon Task experiment. Analyses of ex-Gaussian parameters revealed that when a nonverbal attention task is used, and the attentional demand of the task was higher (i.e., with a larger proportion of congruent trials) and the number of languages that participants knew was more than in previous bilingual studies (3-5 languages in all cases), there was only a weak relationship between language proficiency and nonverbal attentional control measures.
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6:00-7:30 PM (3092)

Hands off: Gesturing Interferes With Associative Memory. ASHLEY S. BANGERT, ALAN BARRERA, HECTOR RODRIGUEZ, GLADYS TELLEZ and ANDREA BENCOMO, *University of Texas at El Paso* — We examined whether gesturing during encoding of name-occupation pairs leads to better associative memory than studying the pairs alone. Pairs included names that were meaningful (i.e. Mr. Pond) and easy to gesture to or meaningless (i.e. Mr. Jenkins). In a prior study we found that gesturing when learning word pairs led to poorer associative memory but better item memory than study alone; creating a gesture for each word may have led to strong representations of the individual words that interfered with the ability to encode their association. In the current study, pairs with meaningless names should not be subject to the same interference effects, while pairs with meaningful names should. Results showed that for all pair types, self-generated gestures led to poorer associative memory but better item memory than study alone, suggesting that these types of gestures boost individual concept representations but interfere with encoding of associations.
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6:00-7:30 PM (3093)

Cross Language Activation and Idiom Processing: Effects of Language Brokering. BELEM G. LÓPEZ, GERARDO MORALES MENDEZ, KATARINA ANTOLOVIC and MAYRA CHANTAL RAMIREZ, *The University of Texas at Austin* — Language brokering is a phenomenon wherein bilingual children of immigrants are asked to translate/interpret for their parents. Recent research suggests bilinguals with this experience (brokers) develop more integrated semantic representations across languages as well as facilitated semantic access across language boundaries compared to bilinguals without this experience (non-brokers). In two separate experiments (Exp. 1: English unidirectional, Exp. 2: Spanish unidirectional), Spanish-English bilingual brokers and non-brokers participated in a semantic verification task in which partial idioms were followed by the presentation of the idiom final word (prime). Participants then had to decide as quickly and as accurately as possible whether same or different language target words were related or unrelated to the overall meaning of the idiom. It was hypothesized that brokers would outperform non-brokers in correctly identifying cross-language targets. Findings are discussed in how brokering experience may affect cross language semantic access when processing figurative language.
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6:00-7:30 PM (3094)

Does Age of Second Language Acquisition Matter? Effects on a Flanker Task, Simon Task, and Remote Associates Test. BELEM G. LÓPEZ and SU YEONG KIM, *The University of Texas at Austin* — Extensive experience in two languages may lead to a bilingual advantage; however, recent replication failures have called into question this effect. The present investigation tested whether replication failures may be due to the lack of consideration of second language acquisition. We tested the



potential effects of the age of second language acquisition (L2) on executive function and creativity. Motivated by recent literature that highlights the effects of individual differences within bilinguals, this study observed the effects of varying L2 acquisition. Sixty Spanish-English bilinguals participated in a Flanker Task (Experiment 1), Simon Task (Experiment 2), or a Remote Associates Test (Experiment 3). It was hypothesized across all three experiments, that age of L2 acquisition would affect performance and that bilinguals who acquired a second language earlier in life would exhibit better executive function than later bilinguals. Findings are discussed in how individual differences among bilinguals may affect executive function ability.

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6:00-7:30 PM (3095)

Cross-Language Associative Priming is Influenced by Language Proficiency and Executive Control. DEANNA C. FRIESEN, *University of Western Ontario*, CORINNE A. HAIGH, *Bishop's University* — The present study investigated the impact of language proficiency and executive control (EC) ability on cross-language priming. Fifty-eight English-French bilinguals performed an English Semantic Priming task where cross-language homographs (words sharing spelling but not meaning, e.g., “pain” is *bread* in French) and their control words (e.g., *pale*) were 50 ms masked primes. Target words were translations (e.g., *pain* - *BREAD*) or cross-language associates (e.g., *pain* - *BUTTER*). LME models revealed that participants with slow English lexical access exhibited homograph facilitation on associative priming (e.g., *pain* relative to *pale* facilitated responses to *BUTTER*). Whereas, individuals with poor EC ability experienced interference on associative priming. The interaction of English Proficiency and EC ability further revealed that priming effects were exaggerated for poor EC ability. Specifically, poor EC individuals with fast English access exhibited interference, whereas poor EC individuals with slow English access exhibited facilitation. Results are discussed in relation to the BIA+ model.

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6:00-7:30 PM (3096)

Don't Put all Your ESLs in one Basket: Heterogeneity Amongst Bilinguals. SUSAN J. RICKARD LIOW and MARY LAY CHOO LEE, *National University of Singapore* — Differences between the cognitive-linguistic processing of bilinguals and monolinguals have been established but the heterogeneity amongst English Second Language (ESL) learners has often been overlooked both when participants' first languages (L1s) are phonologically dissimilar, and when they contrast with English. We conducted a one-year longitudinal study of literacy development in English in two groups of 5-6 year-old ESL bilinguals attending the same English-medium kindergartens: Malay L1/English L2 ($n=30$) and Mandarin L1/English L2 ($n=31$). Culturally appropriate measures of receptive and expressive vocabulary, phonological processing (nonword repetition, digit recall, syllable/phoneme awareness), reading and spelling, were collated separately for the two ESL groups and for the combined sample ($n=61$). The results of a series

of hierarchical regression analyses, controlling for age and nonverbal IQ, showed that combining data from different types of ESL bilinguals obscures group differences in the processing that predicts reading and spelling abilities.

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6:00-7:30 PM (3097)

Bilingual Language Switching Across the Life Span. ANGELA DE BRUIN, ARTHUR G. SAMUEL and JON ANDONI DUÑABEITIA, *Basque Center on Cognition, Brain and Language* — Bilingual language switching has been studied extensively in younger adults, but it remains unclear how it changes across the lifespan. Previous studies show mixed results, suggesting that age affects overall response times, but not always switching costs. Age effects may furthermore be smaller when bilinguals can switch freely as compared to in response to a cue. The predictability of the cued switching pattern may be another modulating factor. While some studies have compared younger to older adults, data from children or teenagers are scarce. We investigated language switching across the lifespan by comparing groups of children, teenagers, younger adults, and older adults. We included three different switching contexts: predictable cued, unpredictable cued, and free switching. The results demonstrate critical differences in switching performance across the lifespan, with children performing differently from the other age groups. We will discuss these changes in relation to the switching context and language background.

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6:00-7:30 PM (3098)

Encoding Lexical Tone in Memory: Resolving Acquisition and Perception Asymmetries in Cantonese Speakers. PHILIP J. MONAHAN and RACHEL SOO, *University of Toronto* — Although lexical tone contributes to lexical contrast, during language processing tasks in tone languages, consonants and vowels are prioritized (Wiener & Turnbull, 2016) and tone mispronunciations are often unnoticed (Cutler & Chen, 1997). As such, it is unclear to what extent speakers robustly use tone information during perception. Moreover, little is known about how tone-language heritage speakers (HSs), whose L2 does not utilize lexical tone (e.g., English), encode tonal contrasts in their L1 (Montrul et al., 2008; Polinsky, 2011; Valdés, 2000). We tested Cantonese HSs ($n=21$) against native speakers ($n=21$) using a medium-distance repetition priming paradigm (Pallier et al., 2001) and AX discrimination task. The results suggest that due to minimal exposure to the tonal L1 (Cantonese), as the tone-less L2 (English) becomes more dominant, HSs are unable to encode linguistic cues of the L1 in long-term memory while these cues remain available to the sensory-motor system irrespective of language dominance. More specifically, HSs experience phonological priming across medium distances, instead of identity priming, suggesting weak and confusable tone representations.

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6:00-7:30 PM (3099)

The Cognitive Processes Underlying the Bilingual Response Time Switch Cost in Lexical Decision. GABRIEL HANS ONG, *The University of Melbourne*, DAVID KEISUKE SEWELL, *The University of Queensland*, MEREDITH MCKAGUE, *The University of Melbourne*, BRENDAN WEEKES, *The University of Hong Kong* (Sponsored by Brendan Weekes) — In lexical decision, bilinguals exhibit a response time (RT) cost when having to switch between languages, despite the lack of a task-specific requirement to separate lexical entries by language. At present, the mechanisms underlying this switch cost are not very well defined. The current study analysed data from a generalized lexical decision task (Spanish and English), in a sample of Spanish-English bilinguals (N=19). The RT distributions were analysed using Ratcliff's diffusion model. The diffusion model conceptualises decision making as a stochastic evidence accumulation process and is governed by parameters with empirically validated psychological interpretations. It was found that switching across languages decreases the rate of evidence accumulation (drift rate), and slows the cognitive processes that occur prior to decision-making (non-decision time). The findings indicate that the language switch cost is composed of two separate costs: one functioning at the level of lexical activation, and another functioning outside of the lexicon.

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6:00-7:30 PM (3100)

Phonological Convergence in Spanish-English Bilinguals: VOT Differences in Habitual and Non-Habitual Code-Switchers. DELANEY WILSON, *Pennsylvania State University, University of Kansas*, MARIANNA NADEU and JANET G. VAN HELL, *Pennsylvania State University* (Sponsored by Janet van Hell) — Bilinguals have longer voice onset times (VOTs) when naming isolated pictures during switched trials than non-switched trials (Goldrick et al., 2014; Olson, 2013), indicating that switching impacts phonetic output. To understand how this manifests in naturalistic speech, we employed a sentence creation task focusing on word-initial /p/ and /t/ phonemes. Habitual and non-habitual code-switchers produced sentences that switched from Spanish to English, from English to Spanish, and unilingual Spanish and English sentences. Spanish VOTs were shorter than English VOTs in all contexts, for both habitual and non-habitual code-switchers. In habitual code-switchers, English VOTs were shorter in code-switched than in unilingual sentences, suggesting phonological convergence in code-switched sentences. No such difference was found in non-habitual switchers, indicating they maintain phonetic distinctions between both languages in code-switched sentences. The difference between habitual and non-habitual code-switchers suggests that phonological convergence manifests differently with language use.

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6:00-7:30 PM (3101)

Language Selection Errors in Switching: Inhibition and Monitoring. XIAOCHEN ZHENG, ARDI ROELOFS and KRISTIN LEMHÖFER, *Radboud University* (Sponsored by

Herbert Schriefers) — To investigate how bilinguals control and monitor their languages, we recorded event-related potentials (ERPs) in unbalanced Dutch-English bilinguals in a cued language-switching task. We introduced time pressure to induce speech errors and manipulated the number of same-language trials before a switch (long vs. short runs). Behavioral results show that speakers made more language selection errors when switching from their second language (L2) to the first language (L1) than vice versa. Furthermore, they made more errors when switching to L1 after a short compared to a long run of L2 trials, consistent with a top-down control account of language selection. Our EEG analysis focused on two ERP components: the stimulus-locked N2, reflecting inhibition of the nontarget language, and the response-locked error-related negativity (ERN), reflecting monitoring of speech errors. We discuss the results in terms of ERP modulation by language and run length, and their implications for theoretical accounts of language selection.

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6:00-7:30 PM (3102)

Bilingual Semantic Memory: Concreteness Effects in Second Language Lexical Decision and Semantic Relationship Judgment Tasks. ERIKA EXTON, CHALEECE SANDBERG and JANET G. VAN HELL, *Pennsylvania State University* (Sponsored by Janet van Hell) — Numerous studies on semantic memory observed that monolinguals are faster and more accurate in processing concrete than abstract words. However, many aspects about bilingual semantic processing and lexical-semantic memory are not yet fully understood, including concreteness effects in second language (L2) processing. This study, as part of a larger project on the neurocognitive correlates of semantic processing in younger and older monolinguals, bilinguals, and individuals with aphasia, examined concreteness effects in lexical decision and semantic relationship judgment tasks in the second language in Dutch-English bilinguals. Concreteness effects in L2 lexical decision were small and depended on second language proficiency. Robust concreteness effects were found in the L2 semantic relationship judgment task; moreover, for abstract, but not for concrete words, performance was better for associative pairings than for similarity pairings. Implications for lexical-semantic activation during L2 concrete and abstract word processing and bilingual semantic memory will be discussed.

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6:00-7:30 PM (3103)

The Cross-Language Activation of Korean and English in a Monolingual Setting. SUNHEE KIM, *University of Maryland College Park* (Sponsored by Jared Linck) — Bilingual lexical access is hypothesized to be language non-selective. The non-selective hypothesis states that both languages are activated simultaneously. While many studies support this account, there is limited research on cross-language lexical access of languages with different orthographies. The current study investigated whether Korean-English bilinguals activate Korean while performing an English masked priming LDT with Korean-English interlingual homophones as primes and targets (e.g.,



“bee” and “rain”). The results from 28 Korean-English speakers show a significant priming effect in average RT between conditions (i.e., homophone vs. control condition) of 39.50 ms., unseen in the native English group. Using linear mixed effects models after inverse transforming all RTs, the Group by Condition was marginally significant ($b = -0.04$, $SE = 0.01$, $p < .10$), where the Korean speakers were responding faster to the targets on the homophonic trials providing tentative support for language non-selectivity in a single language task.
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6:00-7:30 PM (3104)

Language Specificity in Monolingual and Bilingual Later Lexical Development. ANNE WHITE, GERT STORMS and STEVEN VERHEYEN, *KU Leuven - University of Leuven*, BARBARA MALT, *Lehigh University* (Sponsored by Barbara Malt) — We examined the acquisition of more- vs. less-similarity based word use in later lexical development for monolingual and bilingual children. We evaluated (1) the time course of acquiring language specificities for monolingual and bilingual children, (2) whether bilingual children differentiate the languages less than monolingual children, (3) whether bilingual convergence is manifested in cases where the languages are relatively more similar, less similar, or both? Free naming data were collected for pictures of nearly 200 household containers. A total of 499 five- to 14-year old Belgian children and adults raised with either (a) both French and Dutch; (b) only French; or (c) only Dutch named the pictures. We found that monolinguals start differentiating the languages at age 8, and bilinguals only at age 12. Furthermore, bilingual children never differentiate the languages to the extent monolingual children do. Bilingual convergence is manifested both where naming patterns are more heavily similarity-based and where they are less so.
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6:00-7:30 PM (3105)

When and Why do Nonnative Languages Interfere More Than Native Ones? BRENDAN TOMOSCHUK, *University of California, San Diego*, WOUTER DUYCK, *Ghent University*, VICTOR S. FERREIRA, *University of California, San Diego*, ROBERT HARTSUIKER, *Ghent University*, TAMAR H. GOLLAN, *University of California, San Diego* (Sponsored by Tamar Gollan) — Studies in applied linguistics suggest that second- and third-language knowledge interfere more than either does with the native language. Two experiments investigated the cognitive mechanism underlying this interference and test a potential explanation for it. In Experiment 1, Dutch-English-French trilinguals performed a letter monitoring task. Rejection trials asked for letters from one of their other languages, or had no relation with the word. Other-language letters resulted in more errors than letters with no relation, and in French (L3), English (L2) interfered significantly more than Dutch (L1). In Experiment 2, subjects learned novel words via Dutch or English retrieval practice before performing the monitoring task. Instruction language interacted with the language of interfering phoneme such that Dutch and English interfere in the third language differentially

based on instruction language. These results support the idea that nonnative languages mutually interfere and suggest that instruction language impacts interference in a novel third language.

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6:00-7:30 PM (3106)

Effect of Bilingualism on Working Memory. SIQI NING and RANDI C. MARTIN, *Rice University* (Sponsored by Randi Martin) — Mixed findings have been reported regarding whether bilinguals perform differently from monolinguals on verbal working memory (WM) tasks. We investigated two possible influences on WM with potentially opposing effects for Spanish-English bilinguals relative to English monolinguals: 1) enhanced executive function abilities that improve performance, and 2) interference from the non-target language that impairs performance. Experiment 1 used a short-term directed forgetting paradigm with category-cued recall. Monolinguals showed significantly greater intrusions for category appropriate lure items relative to control items from the “forget” lists than did bilinguals. Experiment 2 examined parallel language activation effects by manipulating phonological similarity of list items in the nonresponse language in serial recall. No difference in performance between the bilingual and monolingual groups was obtained. The results support the conclusion that bilinguals may perform better on WM tasks with high executive control demands. Directions for future research on the influence of the nontarget language are discussed.

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6:00-7:30 PM (3107)

The Reliability and Validity of Procedural Memory Assessments Used in Second Language Learning. JOSHUA BUFFINGTON and KARA MORGAN-SHORT, *University of Illinois at Chicago* (Sponsored by Kara Morgan-Short) — Research has examined the role of domain-general cognitive factors in second language (L2) acquisition, with emerging evidence implicating a role for procedural memory, a long-term memory system (e.g., Morgan-Short et al., 2014). Strong conclusions regarding the role of procedural memory are hindered by the lack of knowledge regarding the reliability and validity of procedural memory assessments. In this study, participants ($N = 27$) completed three assessments of procedural memory that have previously been used to study L2 learning, along with assessments of declarative memory, working memory, and an artificial L2 learning task. Results indicated that the procedural memory assessments showed evidence of reliability and discriminant validity, but, somewhat surprisingly, evidence for convergent validity was lacking. Finally, one procedural memory assessment showed predictive validity for the L2 learning task. Implications for future research on the role of procedural memory in L2 acquisition will be considered in light of these results.

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6:00-7:30 PM (3108)

Effects of Semantic Context and Crosslinguistic Interactions on Non-Native Word Recognition in Noise. SARA GUEDICHE, *Basque Center on Cognition, Brain and Language*, MARTIJN BAART, *Basque Center on Cognition, Brain and Language and Tilburg University*, ARTHUR G. SAMUEL, *Basque Center on Cognition, Brain and Language* — Spoken language communication often takes place in noisy environments. Such adverse listening conditions are detrimental to word recognition for native listeners, and even more so for non-native listeners. The availability of disambiguating context, such as a semantically related word, facilitates word recognition—at least for native listeners. Thus far, studies have not found semantic facilitation of speech in noise for non-native listeners. However, low second language proficiency and/or crosslinguistic interactions may contribute to these null findings. The current study investigates the effects of semantic context and crosslinguistic interactions on the perception of words in noise (reversed speech babble) in proficient Spanish-Basque bilinguals' non-native language (Basque). Preliminary results show that semantic context does facilitate word recognition. In addition, crosslinguistic interactions seem to impact performance. Together, the results show that proficient non-native listeners can benefit from a flexible perceptual system that integrates semantic context under challenging listening conditions.

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LANGUAGE PRODUCTION

6:00-7:30 PM (3109)

The Effectiveness of Precues in Proactively Controlling Emotional Interference During Speech Production. KATHERINE K. WHITE, LISA R. HSI and EMILY C. WATKINS, *Rhodes College*, LISE ABRAMS, *University of Florida* — This research investigated proactive control of emotional interference during speech production. Two experiments presented target pictures superimposed with taboo, negative, or neutral distractors. Proactive control was manipulated by presenting precues that signaled whether a taboo, negative, or neutral distractor would appear on the next trial. Experiment 1 included one block of trials with precues and one without. Experiment 2 mixed precued and uncued trials. Consistent with previous research, taboo distractors slowed picture naming relative to negative and neutral distractors in both experiments. Evidence that precues engaged proactive control to reduce interference from taboo distractors was found in Experiment 1. In contrast, mixing precued trials in Experiment 2 reduced the benefit of cues, with equivalent taboo interference on precued vs. uncued trials. These results suggest that proactive control can be engaged to reduce taboo interference during speech production, but is limited when the control demands of the task are already high.

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6:00-7:30 PM (3110)

Phonological Regularity, Perceptual Biases, and the Role of Grammar in Speech Error Analysis. JOHN ALDERETE, *Simon Fraser University - Burnaby* — Speech errors tend to

respect the phonotactic rules that govern regular combinations of sounds. For example, slips of tongue in English can result in word-initial clusters like /fl/ but not /vl/, because /vl/ is not allowed word-initially. This research investigates the impact of perceptual biases on the analysis of phonological regularity in speech errors, and finds the standard assumed in prior research (99% regular, only 1% violate phonotactics) is too high. In particular, we examine phonotactic violations in a corpus of 2,073 English speech errors collected from audio recordings employing a set of verification protocols that are robust to perceptual bias. We found that approximately 5% of the corpus violated English phonotactics. These findings are consistent with prior attempts to model phonological regularity in speech errors using simple recurrent networks, where phonological regularity is emergent from the contingent probabilities of sound sequences.

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6:00-7:30 PM (3111)

Individual Differences in Planning Strategies Among French, German, and English Speakers. BENJAMIN SWETS, *Grand Valley State University*, CATERINA PETRONE, *Laboratoire Parole et Langage*, SUSANNE FUCHS, *Zentrum fuer Allgemeine Sprachwissenschaft*, JELENA KRIVOKAPIĆ, *University of Michigan and Haskins Laboratories* — Previous research has shown that individual differences in working memory capacity (WMC) predict the scope of planning in sentence production within different languages, suggesting that planning scope is flexibly adaptive to cognitive constraints. In the present study, we adopted a novel approach by examining whether the effects of individual differences in advance planning strategies might vary across languages. In our study, speakers of German, English and French described images presented on a computer monitor while their utterances and eye movements were recorded. We coded several speech-based measures of planning, including pauses, initiation times, and utterance durations. In addition, we measured participants' WMC and processing speed. We will present analyses that examine the extent to which individual differences in WMC and processing speed predict individual differences in planning tendencies within languages, and whether these patterns of individual differences vary across the three languages tested.

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6:00-7:30 PM (3112)

Multi-Stage Interactions in Speech Errors: Replications and Extensions. THOMAS DENBY, EMILY CIBELLI, GIA EAPEN, ERIN MADIGAN and MATTHEW GOLDRICK, *Northwestern University* — Recent examination of experimental studies in psychological science has suggested that many published experiments may greatly overestimate effect sizes (Open Science Collaboration, 2015). Replication has never been more critical, but some studies that are resource-intensive—such as those requiring thousands of hours of detailed phonetic analysis—are unlikely to be replicated. Utilizing recently developed acoustic analysis tools (Goldrick, Keshet, Gustafson, Heller, and Needle, 2016) to automate aspects of the analysis, we present high-powered replications of two tongue twister

studies, both of which explore interactions between multiple stages of speech production. Goldrick, Baker, Murphy, and Baese-Berk (2011) found that lexical frequency of targets affects the phonetic form of errors. McMillan and Corley (2010) found that phonological context affects the variability of phonetic form. Our replications and extensions of these studies allow more detailed examination of the interaction of lexical and phonological factors with low-level articulatory processes. Email: Thomas Denby, ThomasDenby2018@u.northwestern.edu

6:00-7:30 PM (3113)

The Effects of Outcome Salience on Decisions From Experience. JARED M. HOTALING and BEN R. NEWELL, *University of New South Wales*, ANDREAS JARVSTAD, *Oxford University*, CHRIS DONKIN, *University of New South Wales* — Decisions from experience require that individuals learn about their choice alternatives by observing potential outcomes. Consequently, attention and memory play crucial roles in the choice process as individuals decide which alternative offers them the best prospect. In an experiment aimed at investigating the links between attention, memory, and decision making, participant made a series of choices between pairs of risky gambles represented as urns containing different mixtures of blue and red balls. Participants began each trials by sampling balls from each urn. After observing a representative sample from each urn, participant chose which urn they would like to draw from for a consequential payment. Critically, some outcome samples were highlighted to increase visual and auditory salience. Our analyses demonstrate that increasing the salience of rare events during sampling led participants to place greater weight on these outcomes when making their choices. We discuss the implications of these findings on our understanding of the interplay between attention, memory, and choice.

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6:00-7:30 PM (3114)

Task Demands and Segment Priming Effects in the Naming Task. BRYAN B. HOLBROOK, ALAN H. KAWAMOTO and QIANG LIU, *University of California - Santa Cruz* — It is typically assumed that all participants in a naming task adopt the same response criterion. However, it is possible that standard instructions can lead to the strategic adoption of different response criteria, making interpreting the results of segment priming studies ambiguous. Participants named monosyllabic words with either no segments primed, the initial segment primed, or the first two segments primed, and were instructed in ways to induce either a segment criterion or a word criterion. Data were analyzed by acoustic latency, articulatory latency, and initial segment duration. Contrary to phonological encoding accounts, no priming benefits were found for acoustic latency when a word criterion was adopted. Latency benefits of priming the second segment were contingent on the manner of the initial segment and the adoption of a segment criterion.

The results show the importance of clarifying task demands and support an articulatory based account of segment priming effects.

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6:00-7:30 PM (3115)

Distinct Neural Mechanisms for inflected and Derived Words in Spelling. VICTORIA P. SHUSTER and MICHELE MIOZZO, *The New School* (Sponsored by Matt Goldrick) — Linguists have long recognized that a major distinction in morphology concerns inflection (e.g., *painted*) and derivation (e.g., *painter*). Neuropsychological studies have found a double dissociation for the processing of inflection and derivation in speaking, in which either inflection or derivation is more impaired. We explored whether different mechanisms also underlie inflection and derivation in writing. We investigated an English-speaking individual (RB) with acquired brain lesions and a spelling deficit more severely affecting orthographically irregular words for which phonologically plausible errors (PPEs) were produced (e.g., *giraffe* » *jurraf*). PPEs were observed for all types of words, including derived words. In contrast, the suffixes of inflected words were spared, even though many inflectional suffixes consist of irregular sound-print mappings (e.g., *walked* » */wɔkt/*). This deficit provides the first evidence that distinct neural mechanisms support inflection and derivation in spelling. Results further demonstrated that the production of inflected words in spelling is supported by sub-lexical mechanisms that are responsible for probability-based sound-print mappings.

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6:00-7:30 PM (3116)

Exploring the Effect of Writing on Reading in Chinese Skilled Readers. MINGJUN ZHAI and SIMON FISCHER-BAUM, *Rice University* (Sponsored by James Pomerantz) — Reading Chinese has been argued to depend on writing Chinese (Tan et al., 2005). In the current study, we investigate this hypothesis; specifically asking whether knowledge of the sequence of strokes required to write a character influence on how it is visually processed by skilled readers. Expert and naïve readers of Chinese performed a same/different judgment task on pairs of Chinese characters. Using linear mixed-effects model, we analyzed the influence of the visual, phonological, semantic and stroke-motoric similarity between the pairs of characters on the time it took to decide that they were different. Both the expert and naïve group showed significant effects of visual similarity on reaction times, and the expert group showed an additional effect of semantic similarity. However, stroke-motor similarity did not influence same/different decision times for either group, indicating that knowledge of how to write Chinese characters does not influence character recognition, even for skilled readers.

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6:00-7:30 PM (3117)

The Phonological Unit of Japanese Kanji Words Revisited: Evidence From Picture Naming. MASAHIRO YOSHIHARA, *Waseda University*, MARIKO NAKAYAMA, *Rikkyo University*,



VERDONSCHOT G. RINUS and YASUSHI HINO, *Waseda University* (Sponsored by Yasushi Hino) — Previous studies investigating the phonological unit of speech production in Japanese consistently found mora priming effects. Using the masked priming, however, Yoshihara, Nakayama, Verdonschot and Hino (2017) found that the mora priming effects were observed only when the whole sound of the initial Kanji characters was overlapped between the prime and target (e.g. a prime, 貨物 /ka-mo.tu/ but not 角度 /ka.ku-do/ produced a priming effect for a target, 火山 /ka-za.N/, although both primes share the initial mora /ka/ with the target). In the present study, we examined this issue further using the masked priming picture naming task in order to examine the effect of the task demands (i.e. participants were asked to name a picture instead of a word). Our results were consistent with those in Yoshihara et al (2017). Based on these results, we discuss the nature of the phonological unit.

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SPEECH PERCEPTION II

6:00-7:30 PM (3118)

Sentence Recognition in Noise: Effects of Talker Intelligibility and Linguistic Complexity. DORINA STRORI, ANN BRADLOW and PAMELA SOUZA, *Northwestern University* — The challenge of foreign-accented speech recognition in adverse conditions likely depends on a combination of talker, environment, and linguistic factors. However, studies have typically tested linguistically simple sentences, which offer a limited window into everyday speech experience. In the present study, participants transcribed both low-complexity (i.e. mono-clausal, canonical declarative syntax) and high-complexity (i.e. multi-clausal, passive) sentences, played in noise at two signal-to-noise ratios. The sentences were spoken by three talkers: one native, one high and one low intelligibility L2 English speaker. As expected, recognition accuracy dropped with decreasing talker intelligibility and decreasing signal-to-noise ratio. However, a cost in accuracy due to increasing linguistic complexity was observed only for the native and high intelligibility talkers. Sentence complexity did not predict recognition accuracy for the low intelligibility talker. These findings suggest qualitatively different speech processing strategies, with sentence-level linguistic factors only emerging for speech above a threshold of overall intelligibility.

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6:00-7:30 PM (3119)

Age-Related Changes in the Contribution of Lexical Knowledge to Speech Segmentation by Statistical Learning. SHEKEILA PALMER and SVEN MATTYS, *University of York* — Research has shown that known words serve as anchors for discovering new words in connected speech. However, this finding has been based exclusively on populations of infants and young adults. In this study, we investigated whether older adults would show a similar lexical bootstrapping effect when asked to discover new words through statistical learning. Groups of young (18-25 years) and older (65-85 years) adults listened to a continuous stream of speech which contained either (1) four

novel words, (2) four novel words plus two known words, or (3) six novel words. Learning was tested using a two-alternative forced-choice task. Results showed that while younger adults benefited from the presence of known words in the stream, older adults did not. However, older adults showed superior performance when the stream contained six nonwords. Results are discussed in the context of top-down knowledge vs. statistically driven contributions to speech segmentation.

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6:00-7:30 PM (3120)

Target-Masker Sex Mismatch Affects Linguistic Release From Masking. BRITTANY T. WILLIAMS, *University of Kansas*, NAVIN VISWANATHAN, *University of Kansas and Haskins Laboratories* — During speech-in-speech recognition, listeners perform better when the masker speech is a foreign language (i.e., linguistic release from masking; LRM). A combination of energetic and informational masking has explained LRM, but their roles remain unclear. To dissociate these contributions, we investigated the effects of English and Dutch maskers on the intelligibility of English targets. Specifically, the target and masker talker sex were either matched or mismatched to provide segregation cues and reduce overlap between target and masker. Surprisingly, when talker sex was mismatched, listeners performed worse in the Dutch compared to the English masker (reverse LRM). To examine whether this pattern of results is mostly due to energetic contributions to LRM, in Experiment 2, we created speech shaped noise analogues of maskers. Interestingly, reverse LRM was not present, indicating that the reverse LRM effect in Experiment 1 was due to informational masking differences.

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6:00-7:30 PM (3121)

Perceptual Learning of Speech Using Lexical Frequency. ALEX CARROS and CYNTHIA CONNINE, *Binghamton University, State University of New York* — The seminal finding of perceptual learning in speech via lexical representations (Norris, McQueen & Cutler, 2003) generated a large body of research designed to investigate the conditions under which learning occurs. This work has largely focused on speaker characteristics to determine the stability and flexibility of perceptual learning. We investigated whether lexical frequency – a property known to influence the efficiency of word recognition – modulates perceptual learning. In a standard perceptual learning paradigm, listeners heard words with ambiguous onsets in which either the ‘b’ or ‘p’ interpretation was a higher frequency word. Identification responses to a ba-pa continuum showed more b responses for the high frequency b group. A second experiment demonstrated that shallow learning conditions (an easy lexical decision discrimination task) reduced the perceptual learning frequency effect. The findings suggest that perceptual learning is modulated by lexical frequency and depends on the type of encoding during learning.

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6:00-7:30 PM (3122)

The Potsdam Comics Corpus (Pococo): An Annotated Corpus and a Database of Eye Movements for the Study of Attentional and Linguistic Processing During Multimodal Reading. JOCHEN LAUBROCK and SVEN HOHENSTEIN, *University of Potsdam*, EIKE M. RICHTER, *Technical University Berlin* — Much eye tracking research has been devoted to reading and scene perception, but little is known about how they interact. Graphic literature presents an ideal testbed. We present the Potsdam Comics Corpus (PoCoCo), an annotated corpus of eye movements collected from 100 readers of passages from graphic novels. Panels, main characters, and text are annotated using an XML dialect. Results suggest a strong contribution of top-down mechanisms of attentional selection: Text, faces, characters, and salient objects capture attention, whereas large parts of even structured backgrounds are neglected. Time spent on visual rather than textual elements correlates positively with comics expertise. Experiments using gaze-contingent manipulation of panel or speech preview suggest that parts of the scene can be processed in peripheral vision, as elements can be selectively targeted from the previous panel. A formal description of scene saliency in terms of the output of the neural network model DeepGaze II (Kümmerer et al., 2016) is compared to empirical eye movements. Although the network has been trained on photographs, it generalizes well to comics drawings, and can explain a large fraction of readers' fixation distributions.

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6:00-7:30 PM (3123)

An Exploration of Factors That Affect Perception of Pitch Changes in Speech. JEFFREY M. GREENSPON, *Hobart and William Smith Colleges*, KATELYN H. DEHART, JESSICA S. NELSON and MARILYN K. BUCK, *William Smith College* — Music and language are both forms of human communication having elaborate sound structures that vary in pitch over time in complex and subtle ways. We hypothesize that music and language have a common origin, which has evolved into a shared system to perceive auditory features in music and speech, independent of semantic content. We tested 61 participants' (27 male and 34 female) ability to detect pitch changes in semantically neutral sentences spoken by male and female voices. Stimuli were presented using head speakers (60db). A test trial consisted of a semantically neutral sentence, 5 seconds of silence, and then the sentence was repeated in the same or different pitch (pitch could differ by -2 to +2 semitones, in half semitone steps). There were 18 trials (9 female voice, 9 male voice) presented randomly for pitch changes and sex of voice. Participants were tested on whether they perceived a pitch change, direction and comprehension of sentences. We found: 1) listeners perceived negative pitch changes better than positive, 2) listeners perceived pitch changes better hearing a female voice compared to male, and 3) females with high musical aptitude outperformed all other listeners in detecting pitch changes of voices.

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6:00-7:30 PM (3124)

Marching Bands and Butter Bombs: Semantic Association Modulates the Auditory N100 Response to Speech Sounds. LAURA M. GETZ and JOSEPH C. TOSCANO, *Villanova University* — An unresolved issue in speech perception concerns how and when top-down linguistic information influences perceptual responses. We addressed this using the event-related potential (ERP) technique to measure cross-modal semantic priming effects on the auditory N100, an index of both acoustic cue encoding and attention. Participants saw visual primes that either led to an expectation of a specific word ("MARCHING band"), led to no specific expectation ("BUTTER bomb"), or consisted of a visual mask. Auditory targets began with voiced (/b,d,g/) or voiceless (/p,t,k/) stop consonants, an acoustic difference that yields differences in N100 amplitude. We found a priming effect in $N=21$ listeners' RTs ($p<0.001$), as well as larger N100s for voiced than voiceless targets ($p<0.001$). We also found that expectation primes produced smaller N100s overall ($p=0.049$), suggesting that semantic context modulates attention to upcoming targets. Follow-up studies are planned to see whether top-down information specifically modulates encoding of those targets.

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6:00-7:30 PM (3125)

The Phonographic Network of Language: Using Network Science to Investigate the Phonological and Orthographic Similarity Structure of Language. CYNTHIA S.Q. SIEW, *University of Warwick*, MICHAEL S. VITEVITCH, *University of Kansas* — The tools of Network Science were used to simultaneously characterize the phonological as well as orthographic similarity structure of words in English. In the *phonographic network* of language, links are placed between words that are *both* phonologically and orthographically similar to each other, i.e., a link exists between words such as 'pant' (/p^nt/) and 'punt' (/p^nt/). Conventional psycholinguistic experiments (auditory naming and auditory lexical decision) and an archival analysis of the English Lexicon Project (visual naming and visual lexical decision) were conducted to investigate the influence of two network science metrics derived from the phonographic network—*phonographic degree* and *phonographic clustering coefficient*—on spoken and visual word recognition. Results indicated a facilitatory effect of phonographic degree on visual word recognition, and a facilitatory effect of phonographic clustering coefficient on spoken word recognition. The present findings have implications for theoretical models of spoken and visual word recognition, and for increasing our understanding of language learning and language disorders.

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6:00-7:30 PM (3126)

The Influence of Vocal Fry on Listener Judgments of Speaker Intelligence and Likeability. MICHELLE A. PARKER and STEPHANIE A. BORRIE, *Utah State University* (Sponsored by Stephanie Borrie) — There is little consensus about how the use of vocal fry in the speech of college-aged American women influences listener judgments of the speaker. This



study investigated how vocal fry in this population influences judgments of speaker attributes by taking into account the surrounding acoustic-prosodic context. Speech samples were elicited from female speakers who presented with varying combinations of pitch (low/high), rate (slow/fast), and vocal fry (presence/absence). Judgments from 463 adults regarding impressions of speaker intelligence and likeability were collected via online crowdsourcing. Generalized estimating equation models revealed significant three-way interactions between pitch, rate, and vocal fry. While vocal fry had favorable effects in some contexts (i.e., high pitch, fast rate) it had detrimental effects in others (e.g., low pitch, fast rate). Listener judgments are not solely based on the presence or absence of vocal fry but rather a combination of features which interact with one another in unique ways.

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6:00-7:30 PM (3127)

Classification of English Stop Consonants: A Comparison of Multiple Models of Speech Perception. ABIGAI BENECKE (Graduate Travel Award Recipient) and JOSEPH C. TOSCANO, *Villanova University* (Sponsored by Joseph Toscano) — How do listeners cope with speech cues that are highly variable across contexts? One possible solution is to combine multiple cues to overcome this variability. Evaluating this hypothesis has been difficult due to limited large-scale acoustic measurements of potential cues. We address this by measuring 35 cues for stop consonants in a corpus of 1,068 utterances. We evaluated the reliability of each cue and trained multinomial regression classifiers to identify phonemes from subsets of the cues. We sought to determine whether massive cue-integration approaches improve recognition, whether phoneme or feature-based classifiers performed better, and whether factoring out contextual variability helped. Models performed well above chance, with the best performance observed for the feature-classification model trained on all 35 cues (83% accuracy). The results support the hypothesis that large-scale cue-integration may provide a viable solution to the lack of invariance problem. Email: Abigail Benecke, abenecke@villanova.edu

6:00-7:30 PM (3128)

What You See Isn't Always What You Get, or Is It? Re-examining Semantic Priming From McGurk Stimuli. JOSH DORSI (Graduate Travel Award Recipient), *University of California, Riverside*, RACHEL OSTRAND, *IBM Research*, LAWRENCE D. ROSENBLUM, *University of California, Riverside*, JAMES DIAS, *Medical University of South Carolina* — In the McGurk effect (McGurk & McDonald, 1976) visible articulations alter the perception of auditory speech. For example, a (silent) video of a speaker saying 'date' dubbed onto audio of a speaker saying 'bait' will often be perceived as the visual word (e.g. 'date'). Ostrand, Blumstein, Ferreira, and Morgan (2016) reported that when using McGurk words, the auditory—but not the visual/perceived—stimuli primed word identifications in a lexical decision task. For example Visual 'date' + Auditory 'bait' was found to prime 'worm', but not 'time'. We replicate the design of the original study, now restricting stimuli to McGurk words with initial 'b' and 'v' segments (i.e.

Visual 'Vote' + Auditory 'Boat') which is known to produce very reliable McGurk effects (e.g., Saldana & Rosenblum, 1994). Our results contrast with those of Ostrand et al., (2016), showing that the visual stream of McGurk stimuli can support semantic priming.

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6:00-7:30 PM (3129)

Detecting the Prevalence of Developmental Phonagnosia (the Voice Homologue to Prosopagnosia). BRYAN E. SHILOWICH and IRVING BIEDERMAN, *University of Southern California* (Sponsored by Irving Biederman) — A web-based survey assessed the distribution of voice recognition abilities. 730 Respondents heard two brief voice clips, one spoken by a celebrity and the other by a non-famous person (matched for gender, age, and accent) while they viewed 1-4 named celebrity headshots. They then judged which voice was the celebrity and then selected the specific celebrity speaker, with a confidence rating for each choice. Prior to the recognition task, the subjects provided voice familiarity ratings of the celebrities which allowed a residual score to be computed that was "corrected" for familiarity. 3.2% of the population comprised an outlier tail of potential congenital phonagnosics. These poor voice recognizers, who also have difficulty in imagining familiar voices, are not simply the low end of normal variation; the tail is more than three times greater than expected from a normal distribution and thus conforms to a distinct cognitive deficit.

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6:00-7:30 PM (3130)

Is Perceiving Your Own Shadowers' Speech Easier? SHARON CHEE, JOSH DORSI and LAWRENCE D. ROSENBLUM, *University of California, Riverside*, JAMES W. DIAS, *Medical University of South Carolina* (Sponsored by Lawrence Rosenblum) — Listeners often imitate subtle aspects of a talker's speech when producing a spoken response (Goldinger, 1998). This phonetic convergence between talkers may serve to enhance mutual comprehension during conversation (Pardo, 2006). To test this possibility, the current study explores whether a perceiver would better understand talkers who were asked to shadow words produced by that perceiver. Ten perceivers were recorded uttering 320 words. Groups of four shadowers were then asked to listen to a perceiver's words and say each 'quickly and clearly' as they were being recorded. The original perceivers then returned to the lab and listened to words recorded by their own four shadowers, as well as by four shadowers who listened to another perceiver's words. Perceivers heard all the words against three levels of noise. Initial results indicate that perceivers more easily understood words produced by the shadowers who shadowed them, suggesting that phonetic convergence may serve comprehension.

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6:00-7:30 PM (3131)

Contextual Expectations Manifest at Different Times in Language Production and Comprehension. DANIEL KLEINMAN and KARA D. FEDERMEIER, *University of*



Illinois at Urbana-Champaign — How long does it take to access a word's representation in long-term semantic memory? EEG studies using comprehension tasks show that readers maximally differentiate between expected and unexpected words 400 ms after word onset. However, recent EEG studies using production tasks suggest that speakers begin to retrieve picture names within 200 ms. To explore this discrepancy, we directly compared the time courses of lexical access in comprehension and production in a single population using a single task context. Participants read RSVP sentences as we recorded their EEG. On 50% of trials, sentences were completed with an expected or an unexpected word. On the other 50% of trials, sentences were instead completed with a blank, prompting participants to produce their own completions. We observed a negative effect of sentence constraint and a positive effect of response probability in both tasks, but these effects manifested around 400 ms post-onset in comprehension (N400) and around 200 ms in production (P200). Furthermore, effects for each task had similar topographies and were present in the same participants. These findings suggest that preparing to speak changes when — and possibly how — contextual expectancy impacts processing. Email: Daniel Kleinman, dgk@illinois.edu

READING

6:00-7:30 PM (3132)

Investigating the Relationship Between Attention and Oculomotor Programming Using Lexical Decision. STEPHEN C. WALENCHOK, *Arizona State University*, ERIK D. REICHLER, *Macquarie University*, STEPHEN D. GOLDINGER, *Arizona State University* — The premotor theory of attention posits that attention and eye movement programming are strictly coupled processes (e.g., Moore & Fallah, 2004; Rizzolatti, 1987). Following this theory, covert attention is yoked to the upcoming location of a saccade, which is incompatible (Serenio et al., 2003) with a central assumption of the E-Z Reader model of eye movement control during reading—that oculomotor programming and attention are distinct (Reichle et al., 2003). We tested these competing hypotheses using a lexical decision task. The task required people to attend to a central location in order to make a difficult lexical discrimination, while simultaneously programming a saccade to a peripheral location, cued either endogenously (a central arrow) exogenously (a flashing peripheral dot). Lexical decision accuracy was high overall and reliably varied as a function of word frequency in both conditions, supporting the E-Z Reader assumption that oculomotor programming and attention are distinct and dissociable. Email: Stephen C. Walenchok, swalench@asu.edu

6:00-7:30 PM (3133)

The Construction and Maintenance of Generalization Inferences. KRISTIN A. RITCHEY, KYLE OLSON, SHELBY SMITH and JORDYN GRIMES, *Ball State University* — Readers construct generalization inferences to represent multiple subordinate concepts under a single superordinate theme, such as inferring “The children were playing” subsumes “Mary was building a sand castle and Sue was blowing bubbles.”

(Kintsch, 1993; van Dijk, 1980). Generalizations are often required for expository text comprehension, but the factors affecting their construction are not well understood (Lorch, 2015). Memory-based reading theory (Myers & O'Brien, 1998) predicts that topic elaboration and topic distance affect inference construction. These factors' effects on college readers' ($N = 131$) generalization inferences from expository text were studied in a 2 (elaboration: same vs. new topic) \times 2 (distance between concepts: low vs. high) \times 2 (target sentence: consistent vs. inconsistent with implied generalization) repeated measures design. An ANCOVA (with covariate of reading ability) showed inferencing through faster reading of consistent than inconsistent targets and an interaction between distance and elaboration. Implications for expository text comprehension are discussed.

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6:00-7:30 PM (3134)

Can Eye Movement Behaviors in Non-Linguistic Tasks Predict Reading and Academic Achievement? JOHN L. JONES and MICHAEL P. KASCHAK, *Florida State University* — There are stable individual differences in eye movement behavior across linguistic and non-linguistic visual tasks, and across time. One key piece of evidence missing from this research, however, is how these individual differences relate eye-movement behaviors to efficient and adaptive behavioral selection. We report a replication and extension of these findings aimed at the development of a method of predicting reading and/or academic achievement with a non-linguistic task. Preliminary analysis indicates a successful replication of the correlations in fixation durations between text reading and scene memorization, pseudo-reading, and scene search with university undergraduates (r 's = .34, .58, and .59, respectively). In addition to replicating the correlations we evaluate the extent to which individuals' eye-movement behavior in these tasks can predict academic achievement (i.e., SAT/ACT scores). We will discuss the possibility that non-linguistic visual tasks can be used to predict literacy achievement.

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6:00-7:30 PM (3135)

When is a Schema Violation not a Schema Violation? JENNIFER GALLANT and EMALIE HENDLE, *Laurentian University* — It has been found that violating schemas slows processing speed, e.g. “Jane and her wife.” However, what has not been evaluated is the impact of violating schema for sexuality, e.g. “Jane and her wife had their hair and make up done.” This study investigates how manipulating sexuality and gender schemata (using stereotypes) impacts both reading time and attribute ratings. Eye-tracking measures were recorded during reading task with schema congruent or incongruent information being presented. The data suggest that the violation of both hetero- and homosexual male schemas slows participants' processing speed evenly. Furthermore, it was found that all attributes were significantly impacted by schema congruence, with the exception of likeability. It is supposed



that this finding is the result of social desirability, according to which participants didn't want to rate any of the subject words (gay/straight men, lesbian/straight women) as being unlikeable. Email: Joël Dickinson, jdickinson@laurentian.ca

6:00-7:30 PM (3136)

The Impact of Confidence Judgments on First Order Processes. JEAN-RÉMY MARTIN, *Université Libre de Bruxelles*, CLOTILDE CHAPPÉ, *Sorbonne, Paris*, JÉRÔME SACKUR, *EHESS, Paris* — Most studies on confidence judgments do not investigate the extent to which asking participants to reveal the subjective estimation of their first-order performance has an impact on it (but see Baranski & Petrusic, 2001). Here, in three experiments we directly address this issue through a comparison of performance in a orientation discrimination task, when it is, or is not, followed by a judgment of confidence. We show that in blocks with confidence judgments, participants are systematically slower but more accurate than in blocks without. By means of a diffusion to absorbing bounds model of the first order decision, we are able to parse the sub-components of this speed-accuracy trade-off: not only does the distance between the bounds is increased, in accord with the notion that participants are more cautious when performing the task under their own scrutiny, but also the non-decision time is lengthened. Our results show that performance of first and second order tasks are hard to untwine, which has implications both for the instrumental and intrinsic study of confidence judgments.

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6:00-7:30 PM (3137)

Second-Language Proficiency Modifies Attention Networks Across the Whole Brain: A Multivariate ERP Investigation of the IOR Paradigm. JOHN GEORGE GRUNDY, *York University*, ELENA PAVLENKO, *Freie Universität Berlin*, ELLEN BIALYSTOK, *York University* — Constantly managing two languages that compete for selection has been shown to modify domain-general cognition in bilinguals. For example, recent evidence has shown that increased L2 proficiency is associated with more rapid disengagement of attention, but the neural correlates of these processes are unknown. Here, we explored the relation between L2 proficiency and the electrophysiological correlates of disengagement using EEG while participants performed an inhibition of return (IOR) paradigm. Behaviourally, increased L2 proficiency was associated with more rapid disengagement. Electrophysiologically, the disengagement processes were captured in a wide range of networks across time and locations. The findings are discussed in terms of how extensive experience in managing two languages leads to changes in the networks responsible for the disengagement of attention. Implications for current debates about when and where the IOR effect is captured in the brain are also discussed; specifically, there is no single electrophysiological marker for IOR.

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6:00-7:30 PM (3138)

Uninformative Contexts Support Word Learning for High-Skill Spellers. MICHAEL A. ESKENAZI, NATASCHA K. SWISCHUK, CASSIDY G. CAMPBELL and PAIGE L. KEMP, *Stetson University*, ASHLEY N. ABRAHAM and JOCELYN R. FOLK, *Kent State University* — Varied informative contexts support novel word learning (Bolger, Balass, Landen, & Perfetti, 2008), and uninformative contexts presented after informative contexts diminish novel word learning (Webb, 2007). However, this effect may be moderated by spelling skill, as high-skill spellers process words more efficiently (Veldre & Andrews, 2014). Participants read sentences with 18 novel words (e.g. blaff) embedded in them. The novel words were presented in three different context conditions: *Informative* with six informative contexts, *Mixed* with three informative then three uninformative, and *Uninformative* with six uninformative contexts. In Experiment One participants read sentences for five seconds each, and in Experiment Two participants read sentences at their own pace while their eye movements were monitored. Results indicated that high-skill spellers continued to learn words in uninformative contexts in the mixed condition, whereas low-skill spellers were unable to use uninformative contexts to support word learning in the mixed condition. Results are consistent with a resonance theory of word learning and the lexical quality hypothesis (Bolger et al., 2008; Perfetti, 2007).

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6:00-7:30 PM (3139)

The Perceptual Span in Reading and the Transposed-Letter Effect: TL Words Slow You Down But Don't Reduce Parafoveal Preview. STEVEN G. LUKE and TANNER JENSEN, *Brigham Young University* — The perceptual span in reading decreases under increased foveal load; readers fixating low-frequency words extract less information from word N+1 (Henderson & Ferreira, 1990). In the present study, parafoveal information availability was manipulated. Foveal load was also manipulated via letter transpositions (TL Words; e.g. jugde for judge). TL words had increased reading times, as expected, but critically there was no interaction between the TL condition of word N and the preview benefit on word N+1. That is, increased processing difficulty from the TL did not reduce parafoveal preview benefit. Post-hoc analyses of non-target words revealed that preview condition did interact with word frequency; as word N frequency increased, the preview benefit at word N+1 increased. These results suggest that foveal orthographic processing is resolved prior to shifting attention to word N+1.

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6:00-7:30 PM (3140)

Task Cues and Across-Text Integration During Moment to Moment Processing. KARYN HIGGS, JOSEPH P. MAGLIANO and M.A. BRITT, *Northern Illinois University* — Many academic literacy tasks require reading and learning from multiple documents. However, integrating information across texts is challenging. This study investigated how semantic and structural schema cues in task instructions affected memory and integration related to a causal model that could be extracted



across texts. Participants read the texts under one of three task instruction conditions, and then saw them again while producing verbal protocols at target locations. Task instructions that included both a semantic cue and causal structure schema cue increased memory and within-text integration during moment-to-moment processing more than instructions providing only a semantic cue. However, the semantic cue alone was sufficient to increase across-text integration in participants' recall relative to a no-cue condition. Neither cue affected cross-text integration during moment-to-moment processing. The results suggest that readers may be more focused on extraction and local integration during reading, raising questions about when integration across texts typically occurs.

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6:00-7:30 PM (3141)

Investigating a Deficit in the Dorsal Visual Stream Through Object Recognition in Dyslexia. MARY-JANE BUDD and JANUSZ ZIELINSKI, *University of East London* — Developmental Dyslexia is a language disorder which manifests itself in the inability to learn to read adequately when IQ and vision are normal. Problems in reading and writing and phonological processing shown by Developmental Dyslexics may lie in poor visual coding from a deficit in the visual dorsal stream (Vidyasagar & Pammer, 2010). One approach to studying visual processing is object recognition and perceptual closure. Images are presented in fragmented forms and are presented successively less fragmented until recognised. An Event Related Potential (ERP) called the closure negativity N_{cl} can be measured with each successive presentation of the image. The N_{cl} increases until the image is recognised and then the N_{cl} becomes stable. The N_{cl} of Dyslexics and non-dyslexics were compared, along with the preceding P1 component, an indicator of dorsal stream neural activity. Differences in these components between the two participant groups are discussed in relation to how deficits in the visual mechanisms using the dorsal ventral stream involved in reading lead to impairments in visual processing of graphemes and how these are translated into phonemes through the reading process.

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6:00-7:30 PM (3142)

Statistical Learning and Reading Acquisition. VALENTINA PESCUA, MARIA KTORI and BENEDETTA CEVOLI, *SISSA, Trieste*, FRANCESCA FRANZON, *SISSA, Trieste and University of Padova*, DAVIDE CREPALDI, *SISSA, Trieste* — Research in the last thirty years has revealed much about how we acquire literacy. Still, the cognitive mechanisms that allow young humans to become proficient readers are rather unclear. Also, much of what we know is based on highly non-ecological paradigms, which allow good experimental control in the lab, but are far from everyday reading experience. In this study, we attack this limitation by tracking eye movements in primary school children during the natural reading of age-appropriate stories. Early (e.g., skipping, first-of-many fixation duration) and late (e.g., refixation, total looking time) proxies for word processing will be analysed as a function of word features (e.g., length, frequency, grammatical class) and morphological

structure (e.g., number and length of morphemes). Critically, we will also check for sensitivity to word and letter co-occurrence statistics, so as to gauge the extent to which literacy acquisition relies on the implicit learning of these regularities.

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6:00-7:30 PM (3143)

Character Complexity Effects in Reading and Visual Search.

LILI YU, *Macquarie University*, QIAOMING ZHANG, *Ludong University*, CASPIAN PRIEST, *University of Southampton*, HEATHER SHERIDAN, *University of Albany*, ERIK REICHLER, *Macquarie University* — Three experiments were conducted to examine how Chinese character complexity (i.e., number of strokes) influences different readers' eye-movement behaviors in different tasks. In Experiment 1 and 2, native English and native Chinese readers searched for specific low-, medium-, and high-complexity target characters in a multi-page text. In Experiment 3, Chinese readers read and comprehended the same text as previous experiments. Complexity effect of fixated characters was observed across participants and tasks in all the measures (i.e. skipping rate, first fixation duration, and dwell times). Target complexity effects were also found in the visual search task, however, the pattern was different between English and Chinese readers. These results together suggest that character-complexity effects on eye movements may not reflect lexical processing per se, but may instead reflect whatever visual processing is required to know whether a character corresponds to an episodically-represented target.

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6:00-7:30 PM (3144)

Eye Movements and Reading Comprehension in Individuals With Mild Traumatic Brain Injury.

ILEANA RATIU, LINDSAY L. MURNION and SCHEA N. FISSEL, *Midwestern University*, TAMIKO AZUMA, *Arizona State University* — This study examined reading comprehension and eye movements in adults with and without a history of mild traumatic brain injury (mTBI). Participants with a history mTBI and healthy control participants completed working memory, vocabulary, and reading comprehension tasks. In the reading comprehension task, participants' eye movements were measured as they read expository and narrative paragraphs and responded to multiple choice questions. The two groups performed similarly on working memory and vocabulary tasks, but the mTBI group performed poorer on reading comprehension questions relative to the control group. While subtle differences in eye movement patterns between groups were observed, the results indicate that reading comprehension deficits in individuals with mTBI may be more strongly related to executive function processes than persistent oculomotor deficits.

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6:00-7:30 PM (3145)

Predictability Effects During Reading in the Absence of Parafoveal Preview.

ADAM J. PARKER, JULIE A. KIRKBY and TIMOTHY J. SLATTERY, *Bournemouth University* (Sponsored by Tim Slattery) — The predictability of upcoming words facilitates spoken and written language comprehension (see



Kuperberg & Jaeger, 2016 for a review). One difference between these language modalities is that readers' routinely have access to upcoming words in parafoveal vision while listeners must wait for each word from a speaker. Despite readers' potential glimpse into the future, it is not clear if and how this information aids prediction. The current study manipulated the predictability of target words and their location on a line of text. Targets were located in the middle of the line (preview available) or as the first word on a new line (preview unavailable). This represents an innovative method for manipulating parafoveal preview which utilizes return sweeps to deny access to parafoveal preview of target words without the use of invalid previews. The study is the first to demonstrate gaze duration word predictability effects in the absence of parafoveal preview.

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6:00-7:30 PM (3146)

Differences Between Comics and Texts in Reading Comprehension: Evidence From Eye-Tracking. LORENA ALICIA MARTÍN-ARNAL, JOSÉ ANTONIO LEÓN, RICARDO OLMOS, JOSÉ MANUEL IGOA and JUAN BOTELLA, *Universidad Autónoma de Madrid* (Sponsored by Juan Botella) — We explored differences in relative amounts of attention given to images and texts when adults were presented coherent and incoherent stories in a comprehension task. We used an eye tracker to record the visual fixations of the subjects. Adults were presented a series of comic and text stories, each of them with either coherent or incoherent endings. Results showed a significant effect of the interaction between “Type” - comic or text - and “Vignettes” - coherent and incoherent - for fixation durations and number of fixations. There were also significant differences in eye fixation data between Vignette and Type conditions. In the comic condition, fixation durations were significantly longer in the incoherent versions than in the coherent versions, whereas the inverse results were found for texts. This effect in the text conditions could be due to the fact that people adopted a search strategy until they found whether or not the story included any incongruity. The results indicate that different processing strategies could be employed in reading text and viewing comics, even if story comprehension is a common goal.

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6:00-7:30 PM (3147)

Recurrent Properties of Text Comprehension Processes. LAURA K. ALLEN, AARON D. LIKENS, CECILE A. PERRET and DANIELLE S. MCNAMARA, *Arizona State University* (Sponsored by Danielle McNamara) — Comprehension relies on the processing of information for the purpose of extracting meaning. Think-aloud methodologies are often used to identify online comprehension processes; however, they often rely on aggregate measures of reading behaviors. Thus, they provide little information about variability in readers' on-line processes, nor the ways these processes unfold over time. The current study addressed this gap by using dynamical techniques to analyze the temporal organization of students' responses to text. Students (n=142) generated typed self-explanations while reading a science text and answered comprehension questions.

Recurrence Quantification Analysis was used to visualize and quantify the word patterns in these self-explanations. Qualitative analyses indicated that comprehension processes were observable through visualizations of word use over time. Quantitative analyses indicated that variation in comprehension performance was predicted using a combination of summative and recurrent measures of this word use. Our results point toward the role of dynamics in understanding comprehension processes.

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6:00-7:30 PM (3148)

Show me an Example First: Concreteness Fading on Comprehension. DEREK T. STOECKENIUS, *University of California, Los Angeles*, VERONICA X. YAN, *University of Texas, Austin*, ROBERT A. BJORK and ELIZABETH LIGON BJORK, *University of California, Los Angeles* (Sponsored by Robert Bjork) — Clear, effective communication of research—whether as a publication, conference presentation, teaching, or even, a brief “elevator pitch”—is an often overlooked, but important skill. In describing new concepts and research findings, how should we begin? Do we start with the more abstract theoretical background or with concrete examples? We varied the presentation order the abstract and the concrete in scientific papers (Exp. 1), and of legal terms (Exp. 2). In Experiment 1, participants read the introduction and methods sections of a psychology journal article. We varied whether the introduction section or the methods section was read first. In Experiment 2, participants learned the meanings of 20 legal terms. For half of these, they saw the legal definition first; for the other half, they saw a case example in which the legal term was used. Across both experiments, we examined the effects of varying presentation order on memory and comprehension.

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6:00-7:30 PM (3149)

Keep It Simple: Elaborating Main Ideas in Text Imposes a Time Cost Without Enhancing Learning. NOLA DALEY and KATHERINE A. RAWSON, *Kent State University* (Sponsored by Katherine Rawson) — Textbook passages commonly include elaborations (details supporting main ideas), with the assumption that elaborations will improve learning. However, elaborations increase text length, subsequently increasing reading time of that text. Do the learning benefits of elaborations outweigh the time cost imposed by including elaboration within textbook passages? In two experiments, we systematically investigated the cost and benefits of including elaborations in texts. Students studied elaborated versus unelaborated versions of psychology textbook passages. Two days later, students completed final tests, including main idea cued recall and comprehension (requiring students to apply and classify key concepts). In both experiments, we found a cost in terms of increased study time for the elaborated text but no evidence of increased memory or comprehension to offset this cost. These results indicate elaborations embedded within a text may not facilitate learning.

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HUMAN LEARNING AND INSTRUCTION II

6:00-7:30 PM (3150)

How Much is Remembered as a Function of Presentation Modality? VIVIAN I. SCHNEIDER, ALICE F. HEALY, KENNETH W. CARLSON and CAROLYN J. BUCK-GENGLER, *University of Colorado Boulder*, IMMANUEL BARSHI, *NASA Ames Research Center* — According to a widespread claim often used for teaching recommendations, students remember 10% of what they read, 20% of what they hear, 30% of what they see, and 50% of what they see and hear. Clearly, the percentages cannot be correct, and there is no empirical evidence even for the ordering. To investigate the ordering, we used a laboratory paradigm that has already revealed some findings regarding the ordering of modalities for remembering information. In this paradigm, subjects are given messages instructing them to move in a grid of four stacked matrices by clicking a computer mouse. The current experiment compared 3 modalities presented either once, *see* (visual arrows), *hear* (auditory words), *read* (visual words); twice in succession, *see see*, *hear hear*, *read read*; or in two different successive modalities, *see hear*, *hear see*, *see read*, *read see*, *hear read*, *read hear*. We found better performance for messages presented twice than for those presented once, regardless of modality. For the twice-presented messages performance varied as a function of the second modality, with best performance for *see* and worst for *read*.

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6:00-7:30 PM (3151)

The Effect of Interactive vs. Static Imagery on Memory for Vocabulary Learned Using the Keyword Method. ROBERT J. CRUTCHER and EMILY WRIGHT, *University of Dayton* — Using the Keyword Method to learn a word pair like *batu-rock* by first relating the foreign word *batu* to a similar-sounding English keyword (e.g. *bat*); then forming a visual image involving the keyword and translation (e.g. *hitting a rock with a bat*) is an effective mnemonic. However, its effectiveness depends upon generating a similar-sounding keyword (Crutcher & Shea, 2007) and an effective image linking the keyword and translation (Crutcher, Castle, Walden, & O'Marro, 2009). Whereas our earlier studies manipulated imagery formation with general imaging instructions to participants, the current study influenced imagery formation directly by presenting pictures of the keyword and English translation with a specific description of an image involving the items. *Interactive* imagery produced significantly higher recall ($M = .37$) of vocabulary pairs than *static* imagery ($M = .29$). Additional task decomposition analyses showed this difference was due to the retrieval step involving the image.

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6:00-7:30 PM (3152)

Adding the Keyword Mnemonic to Retrieval Practice: A Potent Combination for Foreign Language Vocabulary Learning? TOSHIYA MIYATSU and MARK A. MCDANIEL, *Washington University in St Louis* — The keyword mnemonic and retrieval practice are two cognitive techniques that have

each been identified to enhance foreign language vocabulary learning. However, little is known about the use of these techniques in combination. In the current experiments, we focused on a situation in which retrieval practice was limited to twice per item. We advance the view that the keyword mnemonic catalyzes the effectiveness of retrieval practice in this learning context. Experiments 1 (48-hour delay) and 2 (1-week delay) generally supported this view. There was no testing effect with retrieval practice alone, but the keyword-retrieval combination promoted better retention of Lithuanian-English word pairs than retrieval practice alone and the keyword mnemonic alone. Analyses of participants' self reports of retrieval routes illuminated the mechanism through which the keyword mnemonic catalyzed a retrieval practice benefit: The keyword mnemonic provides a retrieval route which can be solidified through a limited dose of retrieval practice.

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6:00-7:30 PM (3153)

Unconscious Attentional Control of Alpha Oscillations. MARTIJN E. WOKKE and TONY RO, *City University of New York* — We assessed whether endogenous attentional control occurs in the absence of explicit top-down goals. Here, we used cues that provided contextual information that was predictive of whether a target would appear or not. Crucially, participants had no explicit knowledge of the relationship between cue and target appearance. In a second experiment, we provided information about the predictability of the targets by the cues. In both experiments we recorded EEG signals, allowing us to assess whether implicit information employs attentional control via differential or similar neural mechanisms as conscious attentional control. Results demonstrate that despite unawareness of the contextual information provided by the cues, responses were significantly faster and more accurate when the cue predicted an upcoming target. Further, we observed that implicit contextual information modulated alpha oscillations in frontal and occipital channels, whereas alpha in parietal channels were altered when participants had explicit knowledge about the nature of the cues.

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6:00-7:30 PM (3154)

The Implications of Feedback Sequencing on Learning and Transfer. DUNCAN L. MCCOLLUM and DANIEL R. KIMBALL, *University of Oklahoma, Norman* — This study investigated the role of varying feedback specificity on later learning and memory performance. Prior work has shown mixed results as to the effect of information-rich feedback. Specific feedback likely helps learners recognize key elements in solving a problem, but also limits the extent of exploration processes that allow learners to recognize central features on their own, thereby facilitating learning. In this study, participants were trained on GRE math problems, during which they received either a single type of feedback or different types of feedback. We tracked learning improvement to measure any effects of the multiplicity or order of feedback. Additionally, we tested participants' performance on a set of novel math problems in the absence of feedback to determine if such performance was



influenced by the different feedback conditions from earlier training. Results are discussed in terms of theories of feedback-related effects on learning and memory.

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6:00-7:30 PM (3155)

Learning From Online Lectures in STEM: Investigating Learning With Transparent Whiteboards. ANDREW T. STULL, *University of California, Santa Barbara*, LOGAN FIORELLA, *University of Georgia*, RICHARD E. MAYER, *University of California, Santa Barbara* — Research is needed to better understand how best to design videos for online instruction that foster student learning. This research assessed the potential of transparent whiteboard technology as a method of promoting learning by comparing learning from a 20-minute STEM video lecture with the instructor using either a conventional whiteboard (CW) or a transparent whiteboard (TW), in which the instructor faces the students while talking and drawing. Both lecture conditions incorporated verbal descriptions and drawn diagrams to demonstrate how molecules are represented. Results revealed that students viewing TW lectures were better than those viewing CW lectures on an immediate test of diagrammatic reasoning (Study 1: $d = 0.64$; Study 2: $d = 0.64$) and conceptual understanding (Study 1: $d = 0.92$), although not on a delayed test (Study 2). Finally, students viewing TW lectures gave higher ratings of enjoyment for the lecture topic ($d = 0.71$), welcomed future lessons ($d = 0.60$), felt more rapport with the instructor ($d = 0.62$), thought the instructor was more engaging ($d = 0.77$), and reported greater motivation to learn ($d = 1.04$). These results are interpreted in terms of theories of multimedia learning.

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6:00-7:30 PM (3156)

Matching Questions: On Par With Multiple-Choice Questions for the Retention of Tested and Related Information? COLBY K. CLARK, GIANNINA G. IMPERIAL, MARY F. BLENDERMANN and JERI L. LITTLE, *Hillsdale College* — Multiple-choice testing can improve the later recall of both tested information and non-tested related information included as incorrect competitive alternatives. This benefit presumably occurs because on the initial multiple-choice test, participants may sometimes choose their answers by retrieving information about the incorrect alternatives in order to reject them— an indirect testing effect. The present experiment investigates whether matching questions (i.e., four definitions, with a choice of five terms, one of which is not correct) would also improve recall of related information included as that extra term. Participants first answered trivia questions in multiple-choice and matching formats. On a final cued-recall test, matching questions produced a benefit for related information that was as large as that afforded by multiple-choice questions. This experiment suggests that matching questions may lead to the spontaneous recall of information about terms that are missing definitions, producing beneficial effects similar to multiple-choice questions.

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6:00-7:30 PM (3158)

Is it Preterite or Imperfect? Investigating the Interleaving Effect for Spanish Verb Conjugation Skills. STEVEN C. PAN (Graduate Travel Award Recipient), JAHAN TAJRAN, JARRETT LOVELETT, JESSICA OSUNA and TIMOTHY RICKARD, *University of California, San Diego* (Sponsored by Hal Pashler) — Do the cognitive benefits of interleaving—the method of alternating between two or more skills or concepts during training—extend to foreign language learning? Across four experiments, we investigated the efficacy of interleaving vs. regular blocked practice for a difficult language learning task: conjugating Spanish verbs in the preterite and imperfect tenses. When training involved one session and interleaving began relatively early (Exp 1), delayed final test performance was better in the blocked condition; when interleaving was withheld until after introductory materials had been covered (Exp 2), final test performance was equivalent across both conditions. When training involved two weekly sessions (where the interleaved condition trained on both tenses per session and the blocked condition trained on one tense per session, with equal amounts of training per condition), interleaving yielded substantially better final test performance (Exps 3 and 4). Error analyses confirmed that interleaving enhances tense discrimination. Overall, these results reveal that the benefits of interleaving—when implemented after initial learning and under multi-session training conditions—are indeed observable for Spanish verb conjugation skills.

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6:00-7:30 PM (3159)

Word and Sentence Level Tests of Morphological Awareness in Reading. STUART E. BERNSTEIN, JENNIFER L. COOPER and TIMOTHY N. ODEGARD, *Middle Tennessee State University* — Common tests of morphological awareness measure both morphology and syntax by requiring participants to fit words and pseudowords into sentences by adding or removing affixes. We report the results of two studies of a word level task. College students viewed transparent words (without phonological or orthographic shifts) and used a keyboard to indicate whether the items contained 1, 2, 3, or 4 morphemes. Morpheme counting accuracy was strongly and significantly correlated with sentence level tests of morphological awareness, suggesting that the tasks measure a similar construct. Morpheme counting accuracy was also strongly and significantly correlated with the word identification and passage comprehension measures from the WJ-IV as well as ACT reading and science scores. In hierarchical regressions morpheme counting accuracy accounted for unique variance in reading comprehension after removing variance accounted for by word reading and decoding. Our findings suggest that conscious knowledge of root words and affixes can be directly measured at the word level without a syntactic component to the task and that knowledge of the morphological structure at this level facilitates reading comprehension.

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6:00-7:30 PM (3160)

The Impact of Seductive Details on Students Lecture Learning. LAURA FRIES and GERARDO RAMIREZ, *University of California, Los Angeles*, MARCI DECARO, *University of Louisville* — Previous research has found that informational text containing irrelevant, interesting information – i.e. “seductive details” – disrupts learning. However, much of this research has been conducted in low-stakes laboratories removed from authentic learning environments. To address this, the current study explored the effects of seductive details and student motivation via acute pressure. Participants ($n=242$) received matrix algebra video lecture instruction in a randomly assigned 2 (pressure: high, low) x 2 (seductive details: with, without) design. Results demonstrate a significant pressure x seductive details interaction, $F(1,238)=4.40$, $p=.037$, such that seductive details harmed academic performance in low-pressure conditions as expected. However, in high pressure conditions seductive details benefitted learning, particularly for students low in prior knowledge. We posit that affective experiences influence what learners attend to and ultimately encode. Additionally, this study suggests authenticity in educational research is an integral factor in the generalizability of laboratory studies to classroom contexts.

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6:00-7:30 PM (3161)

Does Retrieval Activate Mediators More Than Presentation? HANNAH HAUSMAN and MATTHEW G. RHODES, *Colorado State University* (Sponsored by Matthew Rhodes) — Retrieving information enhances learning more than restudying. One hypothesis is that retrieval activates mediators more than presentation (e.g., *zoo-lion* can be mediated by *animal*). Tests of this hypothesis have yielded mixed results. Lehman and Karpicke (2016) found no evidence that retrieval primes mediators more than presentation, but they also made the target easier to recall by providing the first two letters (e.g., *zoo-li__*). The present experiments replicated Lehman and Karpicke and tested whether mediator activation following a retrieval attempt depends on the accessibility of the target information. A target was considered less versus more accessible when fewer versus more retrieval cues were given during retrieval practice (Experiments 1 and 2) and when the target had been studied once versus three times initially (Experiment 1). Although there was a small effect such that retrieval primed mediators more than presentation, mediator activation was not reliably related to target accessibility.

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6:00-7:30 PM (3162)

Lost in Translation: Category Learning Without Categories. JUDY XU and JANET METCALFE, *Columbia University* (Sponsored by Janet Metcalfe) — Inductive learning occurs when one makes inferences about new, unlearned items based on previously learned exemplars. Past research has shown that spaced practice results in better inductive learning than does massed practice. Previous studies have always provided the exemplars that were specifically paired with their category names, however. Three within-participant experiments

investigated massed and spaced induction using English words paired with Chinese ideograms. All ideograms in each category shared an embedded radical, which the participants needed to discover. Our data indicated that although spacing was beneficial, the benefits of spacing was diminished when presentation rate is higher or when fewer exemplars are shown. More importantly, the efficacy of spaced practice was dependent on the strength of the semantic relation between the category and its exemplars. Finally, participants were unaware of the conditions that resulted in better learning. The implications for second-language learning and educational practice are discussed.

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6:00-7:30 PM (3163)

The Effects of Instructor Fluency and Expertise on Students' Overconfidence. ALEXANDER R. TOFTNESS and SHANA K. CARPENTER, *Iowa State University*, SARAH UMA TAUBER and PAIGE E. NORTHERN, *Texas Christian University* (Sponsored by Shana Carpenter) — Students judging their own learning are often overconfident in the amount they believe to have learned. Partly contributing to this overconfidence is fluency, or the perceived ease with which information is acquired. The present study manipulated instructor fluency within a 31-minute video lecture. The fluent instructor presented information in a dynamic and energetic manner, whereas the disfluent instructor presented the same information in a disengaged manner, reading from notes and speaking in a monotone. Half of the participants were informed that the instructor was experienced and half were informed that the instructor was inexperienced. The fluent instructor was rated significantly higher than the disfluent instructor on ratings of teaching effectiveness. Although participants who viewed the fluent instructor believed they learned more than those who viewed the disfluent instructor, test scores were no different between the groups. Instructor experience did not affect any outcomes, nor did it interact with any variables.

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6:00-7:30 PM (3164)

Make a Mental Note: The Effects of Expectation on Note Taking Strategies and Lecture Comprehension. IRINA GHILIC, ASHLEY AVARINO, VICTORIA M. ROZYCKI and DAVID I. SHORE, *McMaster University* (Sponsored by David Shore) — As instructors, we urge our students to take “good notes”. The external storage function of note taking is quite valuable; class notes are a key study material. However, not all notes are created equal. Study and note taking strategies are modulated by prior knowledge of testing circumstances. Expectations, such as test modality, play a major role in the encoding of information. Stimuli are encoded differently in anticipation of a recognition or free-recall test (Tversky, 1973). Note taking studies show a similar effect. For example, students expecting an essay examination take notes on sentences more important to the overall meaning of the text than students anticipating a multiple choice test (Rickards & Friedman, 1978). Our study aimed to further examine the effects of expectation on note taking. Participants in a deception condition were



asked to take notes, either written or typed, and told they would be given time to review their notes before testing. The notes were then taken away before examination and participants were asked to complete the test without their notes. Comparisons of test performance between deception and non-deception conditions will be made, analyzing how note taking changes when reviewing is anticipated.

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6:00-7:30 PM (3165)

Matching Presentation Mode to Knowledge Structure Does Not Aid Recall. MATTHEW A. SWAFFER, COURTNEY LUCE and JAMES KOLE, *University of Northern Colorado* (Sponsored by James Kole) — Participants studied three different scientific topics in one of three randomly assigned presentation modes: text, static images, and animation. Each topic contained key terminology (categorically related information), process knowledge (temporally related information) and general knowledge (topically related information). After each topic was presented, recall tests assessed each knowledge type separately: free recall for key terminology, ordering task for process knowledge and cued recall for general knowledge. No interaction was found between presentation mode and knowledge type, however, participants recalled general knowledge with cued recall significantly better under the animation condition than text and marginally better under the animation condition than static images. The finding is not explained by the amount of time spent studying the materials. These results do not support the assumption that matching presentation formats to knowledge structures aids learning.

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6:00-7:30 PM (3166)

Spatial Context vs. Prediction Error: Cues That Trigger Reconsolidation. CHRISTOPHER KILEY and COLLEEN M. PARKS, *University of Nevada, Las Vegas* (Sponsored by Colleen Parks) — Accessing a consolidated memory renders it labile, and it must be reconsolidated to stabilize. A three-session procedure is used to test reconsolidation in episodic memory: participants encode material on day one, are exposed to a reminder and new material on day two, and are tested on material from the previous sessions on day 3. Some studies suggest that reconsolidation only occurs if old and new information is presented in the same spatial context on day one and two. Other results indicate that reconsolidation only occurs when prediction errors are created on day two. Our results supported both hypotheses. Experiment 1 showed that spatial context triggered reconsolidation but that another salient cue did not. Experiment 2 showed that prediction error triggered reconsolidation when spatial context was controlled. These results indicate that there may be multiple mechanisms by which reconsolidation is triggered and that the mechanisms may depend on the task demands.

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6:00-7:30 PM (3167)

The Effect of Self-Referenced Example Generation on Learning Declarative Concepts. KEIGO OSHIO, *Hosei University* (Sponsored by Tetsuya Fujita) — The effect of example generation is supported by some prior researches (e.g., Oshio, 2016; Rawson & Dunlosky, 2016). But there are few studies have examined why example generation is effective. Example generation is likely to be specialized to use prior knowledge sufficiently. The current research question is, will declarative concept learning be more promoted by generating self-referenced examples, which are based on own experiences. A one-way between-subjects design was employed, with one variable is example type (reading example, generating example, generating self-referenced example). After study condition for 12 terms, 18 undergraduate freshmen completed the final tests involving matching and example classification. The results shows that there was a main effect on example classification test, $F(2, 15)=12.23, p<.05$. In sum, it is possibly indicated that the effect of example generation is interpreted from the perspective of self-reference effect.

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RECOGNITION MEMORY

6:00-7:30 PM (3168)

Hierarchical Modelling of Eye-Tracking Data Reveals Flexibly Changing Spatial Patterns of the Sense of Familiarity. KIYOFUMI MIYOSHI, *Nagoya University*, HIROSHI ASHIDA, *Kyoto University*, JUN KAWAGUCHI, *Nagoya University* — This study statistically models the spatial patterns of the sense of familiarity for horizontally and vertically written Japanese words. Participants made binary old/new recognition memory judgements for stimuli presented at random positions on an eye-tracking monitor. The research uses stimulus position within the visual field to predict the judgement of familiarity. The results reveal stimulus-type-specific spatial patterns of the sense of familiarity. The trend, according to which a stimulus presented farther towards the left was more likely to be judged as old, was stronger for horizontally written words. Further, the trend, according to which a stimulus presented further upward was more likely to be judged as old, was stronger for vertically written words. These flexibly changing spatial patterns can be explained by a working memory hypothesis, which was originally proposed by space-number research. Stimulus-type-specific spatial templates may be encoded in long-term memory on the basis of experience. The presentation of a stimulus automatically cues the temporal activation of the associated spatial template in working memory, and the relative position of the stimulus unconsciously affects the viewer's sense of familiarity.

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6:00-7:30 PM (3169)

Familiarity as a Default Preference: The Case of Consistency With Prior Knowledge. NIV REGGEV, *Harvard University*, ANAT MARIL, *The Hebrew University of Jerusalem* — Familiarity and novelty have both been described as dominant forces underlying human cognition. While novelty plays an important

role in information-theory and evolutionary perspectives, long standing research traditions highlight the contribution of familiarity to many daily functions. This talk will provide multi-methodology evidence that familiarity, rather than novelty, is the default preference of our mind. Importantly, all reported experiments rely on conceptually-defined familiarity and novelty (as consistency and inconsistency with prior knowledge, respectively) to provide enhanced generalizability compared to previous experimental definitions. Only conceptually familiar events were associated with typically robust neural phenomena such as neo-cortical repetition suppression and memory effects. Examining baseline fMRI connectivity, mnemonic performance was associated with hippocampus - medial prefrontal cortex patterns, again only for conceptual familiarity. Behaviorally, mnemonic performance for familiar (and not novel) events was robust to an experimental manipulation affecting their distinctiveness. Altogether, these data favor a description of familiarity-tuned cognitive system.
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6:00-7:30 PM (3170)

The Effects of Concreteness, Frequency, Language Dominance, and Sentence Context in Item Recognition. RANDOLPH TAYLOR, JUAN CARLOS ETIENNE and WENDY FRANCIS, *University of Texas at El Paso* — One explanation for why concrete words are better remembered than abstract words is that it is easier to access contextual information for concrete words. We examined whether context availability mediates the effects of concreteness, word frequency, or language dominance in recognition memory. We manipulated context availability by presenting words either in isolation or as part of a sentence context at study and tested memory using a yes-no recognition task. As in previous research, recognition performance of Spanish-English bilingual participants was more accurate for concrete words, low-frequency words, and L2 words. Although words studied in isolation were better recognized than words studied in a sentence context, encoding context did not interact with the other factors. Therefore, the present results do not support the context availability account. Considerations of the critical components of contextual experience and the mechanisms by which context might impact explicit memory suggest new avenues for investigating its role in explaining why memory performance differs across word types. The results also have implications for models of bilingual memory.
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6:00-7:30 PM (3171)

Intrahemispheric Recognition Decisions Made More Accurately, Though not Necessarily More Quickly. ALESSANDRA MACBETH and CHRISTINE CHIARELLO, *University of California Riverside* — Past research is conflicted as to whether visual information is better remembered when shared across cerebral hemispheres, or maintained within one hemisphere. We previously demonstrated nonverbal visual stimuli are recognized best when initially encoded and retrieved within the same visual field (VF). Here we examined whether retention interval affected participants' intra- vs interhemispheric memory. We replicated our intrahemispheric

advantage such that encoding and test stimuli presented within one VF were recognized more accurately across all lags. A VF by lag interaction indicated change in response time across lags is dependent upon VF condition, $F(3,189)=4.12$, $p=.01$. Response time was significantly faster on within VF test trials at a lag of one, $t(63)=3.43$, $p=.001$, but this advantage disappeared by a lag of sixteen, $t(63)=1.40$, $p=.17$. These findings suggest recognition decisions for within VF stimuli occur more quickly only at shorter lags, because a stronger memory representation is held in the initial hemisphere of processing as opposed to the indirectly stimulated hemisphere.
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6:00-7:30 PM (3172)

Cognitive Control of Auditory Attention: Temporal and Identity Cueing in the Cocktail Party. SOPHIE NOLDEN and IRING KOCH, *RWTH Aachen University* — The goal of the present study was to investigate preparatory mechanisms of auditory selective attention. Participants performed a magnitude-judgment task on one of two dichotically presented spoken number words, one spoken by a female, one spoken by a male. The onset of the two voices varied by 200 ms. A cue indicated gender of the relevant speaker in Experiment 1, and the temporal position of the relevant speaker in Experiment 2. Cued attention repetitions and switches occurred randomly. The cue-target interval (CTI) was either 400 ms or 1200 ms. In both experiments, participants responded faster when the attentional focus repeated than when it switched. Increasing the CTI led to reduced response times, but not to reduced switch costs. Performance enhancements due to increased time to prepare for the attentional focus of the upcoming trials thus seems to be independent from the attentional focus of the previous trial.
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6:00-7:30 PM (3173)

The Ignored Alternative: Limitations of Luce's Low-Threshold Model. RYAN M. MCADOO and SCOTT D. GRONLUND, *University of Oklahoma* — Using a ranking paradigm and measure of conditional probability adopted from Kellen and Klauer (2014), McAdoo and Gronlund (2016) found evidence supporting continuous mediation of recognition memory for facial stimuli (e.g., signal detection theory; SDT) compared to discrete mediation (one high-threshold). However, Kellen et al. (2016) found that SDT and a different discrete model, the low-threshold model (LTM; Luce, 1963), fit data from Kellen and Klauer (2014) equally well. We fit data from McAdoo and Gronlund (2016) to the SDT and LTM models and found a similar result. However, there is a limit in the LTM such that the model is unable to predict certain patterns of observable data, especially when memory of the test items is weak. Three recognition memory experiments were conducted to explore this limit more fully. Results indicate that while quantitative fits of SDT and the LTM are similar across the three experiments, qualitative analysis favors SDT.
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6:00-7:30 PM (3174)

Individual Differences Drive Recognition Memory Confidence Ratings. JUSTIN KANTNER, *California State University, Northridge*, IAN G. DOBBINS, *Washington University in Saint Louis* — Confidence ratings during old-new recognition memory are thought to index the strength of memory evidence. However, various subject-specific factors may also influence reported confidence, including perceived self-efficacy, and idiosyncratic interpretation of the confidence scale. To measure the contribution of subject-specific variables to confidence ratings, we performed regression analyses on extant data from six recognition experiments encompassing procedural variations in feedback, encoding, and stimuli, testing the relative degree to which the “subject” factor and response accuracy predict rated confidence. Overall, confidence was more variable across subjects, and less linked to changes in accuracy, for “new” than for “old” judgments. The subject factor was often as predictive of confidence as accuracy for “old” judgments, while for “new” judgments the subject factor was substantially more predictive of confidence than accuracy. These results suggest that measured confidence is largely a function of who is making the rating, especially when items are identified as “new.”

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6:00-7:30 PM (3175)

Retrieval Failures Enhance Memory as Much as Retrieval Success in Recognition Memory. KALIF E. VAUGHN, *Northern Kentucky University*, NATE KORNEILL, *Williams College* — We had participants study weakly-related cue-target pairs (e.g., gamble: chance) and then attempt retrieval via a standard test trial (e.g., gamble: _____). Items correctly recalled were discarded. Retrieval failures were followed by either a copy trial (e.g., gamble: chance; gamble: _____) or by a fragment trial (gamble – ch__e). The follow-up copy trial reflected a retrieval failure plus feedback condition, whereas the follow-up fragment trial reflected a retrieval failure followed by eventual retrieval success. Target recognition memory was assessed after a 2-day delay. Target recognition performance did not differ between items receiving copy trials versus fragment trials. These results support the two-stage framework: Transitioning from Stage 1 (the retrieval attempt) to Stage 2 (the processing of feedback) improves memory regardless of whether or not the retrieval attempt is successful.

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6:00-7:30 PM (3176)

The Effects of Isolation, Encoding Strength, and Feature Distinctiveness on Recognition and Categorization. OSUNG SEO and MICHAEL KALISH, *Syracuse University* (Sponsored by Michael Kalish) — Global matching models predict that old items that are isolated in a similarity space are more difficult to remember in terms of perceptual old-new recognition. Although there is much experimental evidence that supports this prediction, it can sometimes be the case that isolated items can have both higher hit rates and lower false alarms rates than the typical items. We investigated the effects of isolation, encoding strength and feature distinctiveness on both recognition and

categorization. The results of the experiment suggest that when encoding strength or feature distinctiveness of the isolated items is increased, hit rates for the isolated items go up, and false alarms can come down. In addition, while increased encoding strength of the isolated items increases generalization to nearby transfer items, increased feature distinctiveness results in weaker generalization. These results have implications for attempts to unify categorization and recognition.

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6:00-7:30 PM (3177)

Effects of Item Relatedness on Output Interference in Recognition Memory. JENNIFER F. SLOANE and RYAN A. CURL, *Syracuse University*, COREY N. WHITE, *Missouri Western State University* (Sponsored by Corey White) — In recognition memory tasks, output interference (OI) effects manifest as a decrease in performance over the course of a test list. This work investigates the relationship between item relatedness and OI in memory, comparing semantically related (e.g. animal names or emotional words) to unrelated items to better understand memory and decision processes. Because the related items share similar features and are more confusable, it was predicted that there would be a greater amount of OI for related items. Using a single item recognition task, results showed evidence for OI, but no difference in OI between related and unrelated words. The drift diffusion model was implemented to further understand the components of memory and decision processes that either stay constant or change over the course of the test list.

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6:00-7:30 PM (3178)

Evidence for Continuous Mediation of Recognition Memory Using a Critical Test of Confidence Ratings. RYAN M. MCADOO, KYLIE N. KEY and SCOTT D. GRONLUND, *University of Oklahoma* (Sponsored by Scott Gronlund) — Using a ranking paradigm and conditional probability measure (adopted from Kellen & Klauer, 2014), McAdoo and Gronlund (2016) extended evidence for continuous mediation of recognition memory (e.g., Signal Detection Theory) to face stimuli. However, Kellen and Klauer (2015) found evidence of discrete mediation for words when participants utilized a confidence rating task. Motivated by these seemingly conflicting findings, we conducted four experiments using the confidence rating task from Kellen and Klauer (2015) to examine recognition mediation of words and faces. Although we found evidence of continuous mediation in three out of the four experiments, our results suggest that there may be stimulus- or paradigm-specific effects that require further investigation. Moreover, the inability of participants to sometimes distinguish among response options at the low-end or the high-end (Mickes et al., 2010) of the confidence scale, may have implications in the domain of eyewitness identification for ROC analysis and confidence-accuracy assessment.

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6:00-7:30 PM (3179)

Recollecting Episodic Memories: The Role of the Parietal Cortex. SYANAH C. WYNN, MARC P.H. HENDRIKS, SANDER M. DASELAAR and DENNIS J.L.G. SCHUTTER, *Donders Institute* (Sponsored by James McQueen) — To test the hypothesis that the angular gyrus (AG) is necessary for recollecting episodic memories, we applied transcranial magnetic stimulation (TMS) over the left AG to alter recollection-related processes. Participants performed a verbal memory task, during which participants received 20 minutes of inhibitory TMS between the encoding and retrieval of the words. Participants completed two sessions, one with TMS over the left AG and one with TMS over the vertex (active control). Results showed that AG TMS had no effect on recollection, as compared to vertex TMS. This suggests that activity in the left AG is not necessary for recollection. However, after a post-hoc median-split analysis, participants with a lower memory performance showed an enhancement in familiarity after AG TMS. One speculative hypothesis is that inhibition of the left AG facilitates familiarity-related processes in other brain regions in a larger memory network, but only if there is room for improvement.

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6:00-7:30 PM (3180)

Tracking Relational Memory and Pattern Separation Across the Life Span. CHI T. NGO (Graduate Travel Award Recipient), YING LIN, INGRID R. OLSON and NORA S. NEWCOMBE, *Temple University* (Sponsored by Nora Newcombe) — Episodic memory is multifaceted and undergoes significant changes across the life span. Episodic memory relies on relational memory among elements of an event (relational memory; RM) and the ability to discriminate among similar memories (pattern separation; PS). Here, we examined the developmental trajectories of these two key processes, and asked whether their developmental changes relate to each other in a life-span sample using a dynamic animation task that taps both processes. We found that RM develops significantly from ages of four to six, with no difference between 6-year-olds and adults, and a significant decrease in older adults, relative to young adults. For PS, four-year-olds performed worst, whereas the other age groups did not differ. Importantly, RM and PS only correlated in older adults, but not in any other age groups, suggesting that while RM and PS may develop in a dissociable manner, their declines are coupled in normal aging.

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6:00-7:30 PM (3181)

Is Cursive Worth Saving? Handwriting as a Desirable Difficulty. JASON GELLER, *Iowa State University*, MARY L. STILL, *Old Dominion University*, VERONICA J. DARK, *Iowa State University* (Sponsored by Veronica Dark) — When exposed to difficult-to-process stimuli, participants have difficulty identifying or interpreting that information. Those same stimuli, though, may be better remembered than easy-to-process stimuli. This counterintuitive finding is referred to as the disfluency effect. Evidence for this disfluency effect, however, has been equivocal. We examined two factors that

may contribute to these inconsistencies: type of disfluency manipulation and retention interval between study and test. Using a mixed design, we examined immediate and 24-hour delayed recognition memory performance. Typed stimuli and two types of cursive stimuli were also used. The cursive manipulation – easy-to-read and hard-to-read – was intended to tap different word processing loci – prelexical and lexical, respectively. Results indicated that the processing locus, not delay, modulated the disfluency effect. A disfluency effect was observed for both easy-to-read and hard-to-read cursive words, however, easy-to-read cursive words tended to be even better remembered than hard-to-read cursive words. These results have theoretical and practical implications.

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6:00-7:30 PM (3182)

A Critical Test of the Continuous Dual-Process Model of Recognition. JIHYUN CHA and IAN G. DOBBINS, *Washington University in St. Louis* (Sponsored by Ian Dobbins) — In Dual-process models of recognition, familiarity is generally assumed to reflect continuous evidence, whereas there is debate whether recollection relies on continuous or thresholded evidence. Here we test the Continuous Dual-Process (CDP) model which assumes continuous recollection and familiarity signals are summed to determine recognition judgment and confidence. We show through simulation that it makes strong predictions about relationships among recollection, familiarity, and overall recognition confidence. For example, the model predicts that for any particular level of confidence, recollection and familiarity will often be negatively correlated and that recollection and familiarity will jointly and similarly contribute to reporting of confidence. In two experiments, observers rated the perceived strength of recollection and familiarity following each positive recognition and confidence report. Several empirical findings categorically conflict with the predictions of CDP (assuming either independent or correlated recollection and familiarity signals), suggesting the central summing operation is incorrect, and that recollection and familiarity have fundamentally different psychological scales.

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6:00-7:30 PM (3183)

Do Some Images Seem Newer Than Others? Examining Recognition Memory Response Bias at the Item Level. KAITLYN FALLOW and D. STEPHEN LINDSAY, *University of Victoria* (Sponsored by D. Stephen Lindsay) — Recognition memory response bias is conservative on average when images of unfamiliar paintings are used as stimuli, and we have recently obtained similar effects with photos of faces and of scenes. However, just as not all individual participants in these experiments exhibit this bias to the same degree (or at all), individual images also vary in the extent to which they tend to elicit “new”/“not studied” responses. Previous analyses have demonstrated this with painting stimuli and, critically, shown that these item-based differences are remarkably consistent across experiments. Here we discuss some of these results and



present more recent results from comparable analyses with faces and scenes, focusing primarily on differences in the item-level equivalents of response bias (c) and sensitivity (d').
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WORKING MEMORY II

6:00-7:30 PM (3184)

Attachment Anxiety Benefits From Security Priming: Evidence From Working Memory Performance. AHU GOKCE and MEHMET HARMA, *Kadir Has University* — Previous research indicates association between attachment dimensions and cognitive performance (Gillath et al., 2009). It has been also suggested that priming security-related cognitions can be seen as equivalent to exposure to an attachment figure and this process create effects that could mirror dispositional attachment security characteristics (Mikulincer & Shaver, 2007). This study investigated whether attachment dimensions, measured by the ECR-R scale, predict working memory (WM) performance across secure vs. neutral priming conditions. WM capacity was measured by the n-back task using relationship-related and neutral words as stimuli. Structural equation modeling revealed divergent patterns on WM performance for different attachment dimensions. In neutral-priming condition, increased attachment anxiety was associated with decreased n-back task performance; whereas, in security-priming condition, high attachment anxiety was associated with increased performance in n-back task for both relationship-related and neutral words. Results suggest that security-priming may help to boost WM performance of individuals with high attachment anxiety.

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6:00-7:30 PM (3185)

Impact of Visual Imagery Training on Quantity and Quality of Visual Working Memory and Gaba/Glx Neuroarchitecture in Right Parietal Cortex. MARO G. MACHIZAWA, *Hiroshima University*, NICOLAAS PUTS, *Johns Hopkins University*, TAKEO WATANABE, *Brown University*, SHIGETO YAMAWAKI, *Hiroshima University* — Imagery training could be a fundamental strategy for training visual working memory (VWM) functions; however, little consensus has been established as to how imagery training influences our neuro-functional and neuro-chemical architectures. Here we encouraged volunteers to induce visual mental imagery by quantifying and visualizing the usage of the VWM resources in real-time, with an online neurofeedback. Participants were trained to increase lateralized sustained negativity over the parietal cortex on a total of 5 sessions over a few weeks. Participants were required to freely create mental imagery as far as their feedback score improves. At pre- and post-training sessions, behavioral performances for quantity and quality of VWM were assessed by color change-detection tasks, and neurochemical excitatory-inhibitory balance in the right parietal cortex was traced by edited MRS. The results suggest that an increase in the neurochemical excitatory-inhibitory balance within the parietal cortex correlated with behavioral improvement of color-quality of

visual working memory but not for color-quality. Accumulating evidence of this neurofeedback technique may shed a new light on the power of visual imagery training without stimulus.

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6:00-7:30 PM (3186)

Improvements in the Recovery of Information From Secondary Memory, but not Fluid IQ in a Double-Blinded, Placebo-Controlled, Randomized Working Memory Training Study. KATHRYN J. RALPH, BRADLEY S. GIBSON, DAWN M. GONDOLI, PEDRO SZTYBEL and JOSEPH R. PAUSZEK, *University of Notre Dame*, ROBERT W. MILLER, EMILY LITZOW, *University of Notre Dame* — Working memory (WM) capacity includes active maintenance in primary memory (PM) and cue-dependent search and retrieval from secondary memory (SM). Previously, researchers have found that existing WM training regimens fail to enhance SM, a component that mediates the relationship between WM and fluid reasoning (gF). A double-blinded, placebo-controlled, randomized trial was conducted to elucidate whether SM could be targeted by a novel training regimen versus two active control trainings. Participants were 168 adolescents whose SM and gF was measured before, immediately after and six months after training using both verbal and spatial delayed free recall and reasoning tasks. The results indicated that the treatment condition improved the recovery of information from SM relative to the control condition, but there was no coincident improvement in gF scores. These findings demonstrate a dissociation between the enhancement of SM retrieval parameters and higher-level cognition.

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6:00-7:30 PM (3187)

How do Reminder-Based Warnings Protect People From Misinformation? ROBERT B. MICHAEL AND WILLIAM P. ARMSTRONG, *University of Louisiana at Lafayette* — Over four decades of research demonstrates that human memory is prone to distortion. Frequently, these distortions are due to people mistaking misleading information about a previous event as being part of that event. This misinformation effect is robust and can be difficult to thwart, even when people are given warnings. Recent research, however, suggests that warnings could be more effective when paired with a distinctive reminder. We therefore wondered to what extent a reminder-based warning would protect people from misinformation. Subjects watched a video of a simulated crime, then read a brief narrative about the events in the video. The narrative contained several misleading details. Subjects were given either no warning about the misinformation, a general warning, or a warning associated with a visual reminder. The results represent a novel contribution to the literature on the role of warnings in protecting people from misinformation.

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6:00-7:30 PM (3188)

Motor Determinants of Verbal Serial Short-Term Memory: Convergent Neural and Behavioural Evidence. JOHN EVERETT MARSH and MELISSA ESME BARKER, *University*



of Gävle, ROBERT WYNN HUGHES, *Royal Holloway, University of London*, CASSANDRA RICHARDSON, *University of Central Lancashire* — Several theories ascribe an instrumental role to motor-planning in verbal serial short-term memory (STM; Baddeley, 2007; Hughes et al., 2009; Jones et al., 2004) while others deny any such role (Lewandowsky & Oberauer, 2015). We provide new convergent neural and behavioural evidence for the motoric basis of verbal serial STM performance. Consistent with previous findings, behavioural interference from changing-state irrelevant sound was found during verbal serial-STM (probed-order recall) but not verbal item-STM (the missing-item task). Using functional near-infrared spectroscopy, we found that the pre-supplementary and supplementary motor areas (SMAs) of the brain were more activated during the verbal serial-STM task and to a greater extent than during the verbal item-STM task. The results suggest that motor-planning plays a central role in verbal serial-STM and its susceptibility to distraction.
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6:00-7:30 PM (3189)

Relative Contributions of Short-Term and Working Memory in Oral and Typed Spelling. KERRY A. CHALMERS, *University of Newcastle*, JENNIFER S. BURT, *University of Queensland*, EMILY E. FREEMAN, *University of Newcastle* — Working memory capacity has been shown to relate to reading and spelling ability in children. In this study, we investigate the relationship between working memory and spelling in adults. Sixty undergraduate students completed two spelling tests, one requiring oral responses, the other requiring typed responses. Participants also completed tests assessing verbal and visuospatial short-term and working memory (digit span, dot matrix, listening recall, spatial recall). Spelling accuracy was higher in the typed than the oral response condition. Significant correlations were found between spelling accuracy and verbal short-term memory (assessed by digit span) and verbal working memory (assessed by listening recall). Regression analyses revealed that only digit span uniquely predicted both oral and typed spelling. Analysis of covariance results suggested the difference between oral and typed spelling performance may be due to individual differences in verbal short-term/working memory. Implications of these results for theories of working memory and spelling are considered.
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6:00-7:30 PM (3190)

How Not to Fall for the White Bear: Flexible Control of Negation Processing. ROBERT WIRTH, WILFRIED KUNDE and ROLAND PFISTER, *University of Würzburg* (Sponsored by Wilfried Kunde) — Processing negated mental representations comes with a price: Negations are harder to resolve than affirmative statements, and they may invoke ironic effects, producing the exact opposite of the intended outcome. These negation effects also behave ironically when subjected to high-frequency training, when they are confronted often, the difficulty to process negations strangely increases. Here, we show that negation effects can be mitigated under certain circumstances. Based on models of executive control, we

hypothesized that negation effects diminish when two criteria are met: negations have to be resolved not only frequently, but also just recently. We confirmed this prediction via a two-dimensional finger tracking design, in which we measured the influence of the original semantic content during negation processing. Negation effects were present throughout the experiment, but drastically reduced when a high frequency and recency were able to work in concert. The combined influence of frequency and recency thus seems to be the most successful and promising attempt to mitigate ironic negation effects on overt behavior. These findings are discussed against the background of general executive functions.

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6:00-7:30 PM (3191)

The Effects of Prior Familiarity on Working Memory Representations and Processes. WEIWEI ZHANG and WEIZHEN XIE, *University of California, Riverside* — Prior stimulus familiarity can influence visual working memory (VWM) representations and processes in various ways based on some recent behavioral and Event-Related Potential findings. First, VWM representations for familiar stimulus can be accessed faster than unfamiliar stimulus. Second, this speed advantage can also manifest to VWM consolidation in that familiar stimulus is encoded into VWM faster than unfamiliar stimulus. Third, faster VWM consolidation for familiar stimulus could in turn lead to increases in the amount of information retained in VWM when VWM consolidation is interrupted, but not when encoding time is sufficient. Consequently the presence and absence of the consolidation effect could potentially account for the mixed findings on the capacity effects of familiarity in the literature. These findings have illustrated various sources for the facilitation of working memory by familiarity and highlighted the pivotal roles of VWM processing in the interactions between prior knowledge and moment-by-moment memory processing.
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6:00-7:30 PM (3192)

Deception as Cognitive Load: Working Memory, Blink Rate, and Pupil Dilation. REINALYN ECHON, KANDI JO TURLEY-AMES and CHARLES PARKER, *Idaho State University* (Sponsored by Kandi Jo Turley-Ames) — The present study seeks to understand why the cognitive load approach to deception detection appears to more accurately discriminate between truths and lies than other approaches. Participants told the truth and lied about controversial topics while pupil size and blink rate were measured via eye tracker. Since lying is more cognitively demanding than truth telling (e.g., Vrij, Fisher, Mann, & Leal, 2008) and pupil dilation and blink rate are indicators of cognitive load (e.g., Dionisio, Granholm, Hillix, & Perrine, 2001; Holland & Tarlow, 1972), lie statements should show increased pupil dilation and decreased blink rate compared to truth statements. Greater working memory capacity should mitigate, in part, the cognitive load of lying (Vrij



et al., 2008). Results suggest that statement condition type and working memory performance are independently predictive of cognitive load, as measured by pupil dilation and blink rate.

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6:00-7:30 PM (3193)

Working Memory, Intelligence, and Decision Making: An Analysis of Component Abilities. JINAN N. ALLAN, *University of Oklahoma*, SAIMA GHAZAL, *University of the Punjab*, ADAM FELTZ, *Michigan Technological University*, JESSICA POPE, *University of Oklahoma*, ROCIO GARCIA-RETAMERO, *University of Granada*, EDWARD T. COKELY, *University of Oklahoma* (Sponsored by Edward T. Cokely) — Decision making is a general skill that is related to life outcomes (e.g., health, wealth, happiness). Theory suggests that working memory may often play a pivotal role in decision making quality; however, converging research indicates that the influence of statistical numeracy (e.g., practical probabilistic math skills) tends to be far greater than that of working memory or other general cognitive abilities (e.g., fluid intelligence). To further map and test the robustness of observed relations, here we report results from one of the most comprehensive integrative studies of cognitive abilities and decision making skill—i.e., Study 2 of the five year Risk Literacy Components Study (see RiskLiteracy.org), including data from 500 healthy young adult participants who completed a five hour assessment battery over the course of 5-12 weeks. Discussion focuses on refined structural and factor analytic estimates of component cognitive abilities in relation to general decision making skill.

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6:00-7:30 PM (3194)

Multiple Intervals of Events can be Represented in Working Memory as Discrete Items. ZHIWEI FAN and YUKO YOTSUMOTO, *The University of Tokyo* (Sponsored by Yuko Yotsumoto) — Previous studies on time perception and temporal memory focused primarily on single intervals, and how multiple intervals are perceived and maintained is still unclear. Here, we used Sternberg's paradigm to examine the working memory for multiple intervals and compared its characteristics with those for visual textures. In Experiments 1 to 3, gratings with different spatial frequencies and intervals were sequentially presented as study items, followed by a grating as a probe. Participants determined whether the probe matched one of the study items, in either the temporal dimension or the visual dimension. The results exhibited typical working memory characteristics such as the effects of set size, serial position and similarity between probe and study items, similar for intervals and for textures. However, serial position effect seemed weaker for intervals than for textures, and stronger for intervals in sub-second than in supra-second range. These results suggest that multiple intervals can be represented in working memory as discrete items as but "softer" than those in other modalities. As the magnitude of intervals increases, it may be difficult to hold them as discrete items.

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6:00-7:30 PM (3195)

Arabic in Verbal Short-Term Memory: Nonconcatenative Morphological Influences on Serial Recall. HAIDER CATAN, STEVEN ROODENRYS and LEONIE MILLER, *University of Wollongong* (Sponsored by Steven Roodenrys) — Research investigating how long-term representations of language can support performance in verbal short-term memory tasks has exclusively involved the study of Indo-European languages, and predominantly English. Languages with features not found in English, offer an alternative means of gaining insight into the processes that are involved in verbal memory. Arabic is a derived morphology-based language and remarkably systemized, in which each word is built from two components, the root and pattern, which represent a different level of morphology from that found in Indo-European languages. Studies suggest these features play an active role in word processing in Arabic and other similar languages, thus an investigation of the influence of such factors in short-term memory tasks may shed further light on both verbal memory and more general language processes. Two experiments are reported examining serial recall for Arabic nonwords. Experiment 1 showed better recall for lists of nonwords containing roots with high type and token frequency. Experiment 2 showed better recall for lists of nonwords containing patterns with high type and token frequency, and an advantage for nonwords with real roots.

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6:00-7:30 PM (3196)

On-the-Job Training of Working Memory. LAKSHMI A. LALCHANDANI and ALICE F. HEALY, *University of Colorado Boulder* (Sponsored by Alice Healy) — Twenty-four chefs participated in two levels of an *n*-back working memory task during their work shifts. The chefs were divided into 2 groups based on occupational position, managerial chefs and line chefs. All chefs completed both *n*-back tasks (2-back and 4-back) in a counterbalanced order. Proportion of correct responses and number of hits were used for analysis. The line chefs, but not the managerial chefs, must hold in working memory the various orders given to them during service, often without written tickets. It was, therefore, expected that this extensive practice of working memory might strengthen working memory ability. In accordance with the hypothesis that occupational skillsets can lead to increased working memory capacity, the line chefs outperformed the executive chefs on the more difficult 4-back task, but not on the easier 2-back task. The pattern of results suggests that there is transfer of occupational training in the wild to laboratory working memory tasks.

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6:00-7:30 PM (3197)

Estimates of Working Memory Capacity: What Researchers Think We Know vs. What Participants Think They Know. CHRISTOPHER L. BLUME and NELSON COWAN, *University of Missouri* (Sponsored by Nelson Cowan) — Three experiments were run examining the beliefs children and adults have about their personal working memory capacities. The experiments presented participants with an array of colored squares followed by a single probe item to be determined as the same as a color



from the array or a different color. In addition, we required participants make a storage judgment between study and test concerning how many of the colors they believed themselves to have in mind. Each age group overestimated how many items they believed themselves to have memorized compared to our k estimates of capacity. However, the judgments were shown to be a significant predictor of capacity estimates despite the overestimation. In Experiment 1, the youngest group of children had poor accuracy in their estimates compared to all other age groups, which showed a developmental relationship between the error in capacity beliefs and k estimates. In Experiment 2, given a blocked design, young children could estimate their capacity as well as young adults. A third experiment was designed to determine whether young children sometimes use inappropriate heuristics to make the judgments when capacity is overloaded or when there is insufficient time to orient to the task.

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6:00-7:30 PM (3198)

Graded Loss of Information From Working Memory After Long Retention Intervals. NICOLE HAKIM and EDWARD K. VOGEL, *University of Chicago* (Sponsored by Edward Vogel) — Previous research has found decrements in mean working memory (WM) performance, but not in precision, after long (10 seconds) compared to after short (1 second) retention intervals and has suggested that representations terminate suddenly and completely (Zhang & Luck, 2009). Since previous research has used single-probe measures of WM, what remains unclear is whether all information is lost from WM or if individual items are dropped from WM independently after long retention intervals. Here, we use a Discrete Whole Report task, which tests memory about all items in an array, with varying retention intervals (1.5 and 10 seconds) to test whether decrements in performance are caused by a complete or partial loss of information. Based on model simulations of the distribution of performance, we found that decrements in performance after long retention intervals are driven by a graded decrease of information, rather than a complete loss of information. Additionally, after the long retention intervals, participants were still able to perform at the same maximum capacity as after the short retention intervals on a subset of trials.

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6:00-7:30 PM (3199)

The Benefits and Challenges of Implementing Motivational Features to Boost Cognitive Training Outcome. SHAFEE MOHAMMED, *University of California, Irvine*, LAUREN FLORES, JENNI DEVEAU, RUSSELL COHEN HOFFING and CALVIN PHUNG, *University of California, Riverside*, CHELSEA PARLETT, ELLEN SHEEHAN, DAVID LEE and JACKY AU, *University of California, Irvine*, MARTIN BUSCHKUEHL, *MIND Research Institute*, VICTOR ZORDON, *Clemson University*, SUSANNE M. JAEGGI, *University of California, Irvine*, AARON R. SEITZ, *University of California, Riverside* (Sponsored by Martin Buschkuhl) — In the current literature, there are many cognitive training studies that use N-back tasks as their training vehicle; however, the interventions are often

bland, and many studies suffer from considerable attrition rates. Implementation of motivational features is a common approach to increase participant engagement; yet, the effects of such “gamification” on learning have been inconsistent. Here, we report the results of a training study where 47 participants trained on a basic color/identity N-back with no motivational features, whereas 68 participants trained on a gamified version. Participants who trained on the gamified version enjoyed the training more, exerted more effort, and improved more during training. However, there were no differences in transfer measures suggesting that inclusion of motivational features neither hurts nor benefits learning. Overall, our findings provide guidelines for task implementation to optimally target participants’ interest and engagement to promote learning, which might ultimately lead to better training adherence.

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SENSATION AND PERCEPTION

6:00-7:30 PM (3200)

Effects of Realism and Self-Agency on Goal-Directed Behavior in Virtual Environments. KRISTEN L. MACUGA and BRIGITTA BURGESS, *Oregon State University* — Research on embodiment in virtual environments has primarily focused on subjective measures, such as the user’s sense of presence, assessed via self-report. Here, we examined the behavioral and physiological responses of participants experiencing varying levels of graphical or immersive realism, as well as self-agency (controlling one’s own actions versus those of an avatar), within a virtual environment. The participants’ goal, motivated by a countdown timer, was to reach the other side of a deep pit with a plank across it as quickly as possible. Completion times and heart rates were measured. Participants completed the task more efficiently when controlling their own self-movements via immersive walking. However, when controlling an avatar, they completed the task faster with a game pad. Furthermore, controlling one’s own actions from a first-person perspective yielded higher heart rates than controlling an avatar’s, but increasing graphical realism had no impact on movement times or heart rates.

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6:00-7:30 PM (3201)

Emotional Music Influences Visual Perception of Facial Expressions During Binocular Rivalry. ROBERT JERTBERG, CARMEL LEVITAN and ALEKSANDRA SHERMAN, *Occidental College* — Binocular rivalry occurs when two percepts, each presented to a single eye, compete for perceptual dominance. We investigated whether emotional music influenced perceptual dominance of an emotionally-congruent face. Participants heard music (happy, fearful, none) while viewing an emotional face pitted against a neutral face or emotional faces pitted against each other. As expected, emotional faces significantly dominated over neutral faces, irrespective of music. For happy-fearful pairings, fearful faces were predominantly reported as initial percepts, and this bias was attenuated by positive music. Interestingly, the negativity bias did not persist for the duration of the trial, for which happy



faces dominated perception, overall. Further, music drove attention to congruent expressions, particularly for happy faces. Finally, when participants explicitly attended either happy or fearful faces, a negativity bias still emerged for initial percepts, and was again attenuated by positive music. Together, these findings demonstrate how emotional sounds automatically drive attention to congruent faces.

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6:00-7:30 PM (3202)

Perceptual and Conceptual Integration Effects on Duration Judgments. LAUNA LEBOE-MCGOWAN, DOUGLAS ALARDS-TOMALIN, JANIQUE FORTIER and JASON LEBOE-MCGOWAN, *University of Manitoba* — Alards-Tomalin et al. (2014) reported that participants perceived the duration of a silent interval as shorter when the interval was flanked by digits that were similar in magnitude (8/9) than when they were relatively dissimilar (2/9). In this study, we manipulated both the magnitude and perceptual similarity of flanking digits, observing that both dimensions of similarity biased participants' to judge a temporal interval as shorter. We also observed that the *conceptual* goodness-of-fit between events flanking a silent interval contributed to participants' tendency to judge the interval as shorter. Specifically, participants tended to judge the duration of time separating a sentence stem (*When the music started he asked her to*) as shorter when it was followed by a terminal word that fit the context (*DANCE*) than when it was incongruent (*LAUGH*). These results suggest that ease of integrating the events surrounding a temporal interval compresses the perceived duration of that interval.

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6:00-7:30 PM (3203)

The Combined Effect of Numerical Distance and Magnitude on Perceived Interval Duration. DOUGLAS ALARDS-TOMALIN, LAUNA C. LEBOE-MCGOWAN and JASON P. LEBOE-MCGOWAN, *University of Manitoba* — Previously, we found that people judge the durations of the two intervals occurring between three sequentially presented numbers (AXB) by factoring numerical distance into their estimates (Alards-Tomalin et al., 2014). Currently, we examined if people would also incorporate numerical magnitude into these interval judgments. Previously, we used 1 and 9 as boundary stimuli (AB), and defined numerical distance intervals of 1-7 and 7-1 by using 2 and 8 as middle occurring values (X). In the current study, we set three boundary conditions (1 and 6; 2 and 7, 3 and 8) each with numerical distance intervals of 1-4 or 4-1. We found that: 1. numerical distance was used to infer interval duration (4-1 sequences were reported as "long-short" more frequently than 1-4), and 2. the magnitude of the first number in the sequence determined the immediately following interval estimate (8X3 sequences were categorized as "long-short" more than 6X1 sequences). These results reveal that, although task-

irrelevant, the quality of events both preceding and flanking a time interval exert a bias over the perceived duration of the interval.

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6:00-7:30 PM (3204)

Hot or Not: Attractiveness Effect of the Color Red Depends on Gender of the Wearer, Article of Clothing, and Gender of the Beholder. JOYCE M. OATES, ISMAIL I. HASSAN, RODA I. AL-HOR and ZEINA A. DARWICHE, *Carnegie Mellon University in Qatar* — The color red is important for signaling social intention. According to the avoid-approach theory, social contexts determine whether red is perceived as threatening or as attractive, (Elliot and Maier, 2014). Pazda and Elliot (2016) demonstrated that females' perceptions of imaged male attractiveness can be enhanced when males are described as wearing red shirts. Of current interest are effects of gender of wearer, location of article of clothing, and gender of perceiver. We extended Pazda and Elliot by testing descriptions of both females and males, red clothing (hat, shirt, pants, or shoes), and female and male participants. Results showed differences in attractiveness ratings dependent on gender of participants. Specifically, female participants had preference for red clothing on the male upper body, whereas male participants had no preference for location of red on females. Lastly, a mediator of these effects may be whether the colored clothing is perceived as feminine or masculine.

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6:00-7:30 PM (3205)

Investigating the Action Effect From the Perspective of Feature-Based Attention. ZIXUAN WANG and PEI SUN, *Tsinghua University*, BLAIRE J. WEIDLER and RICHARD A. ABRAMS, *Washington University in St. Louis* — Recent studies have revealed an action effect, in which a simple action towards a prime stimulus biases attention allocation in a subsequent visual search task. However, it remains unclear what attentional units are affected by the action. In the current study, we examined the action effect from the perspective of feature-based attention. Participants were first presented with a shape name followed by a prime. When the shape name and prime matched, participants responded with a simple key-press action. Participants then performed a visual search task in which one element of the search array shared either the color or the shape (or neither) of the prime. The results showed shorter reaction times when the target matched either the color or shape of the prime— but only after an action, indicating that feature-based attention can be altered by a simple action.

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6:00-7:30 PM (3206)

EEG Amplitude Envelopes Track Temporal Structure of Duet Music Performance. ANNA ZAMM and CAROLINE PALMER, *McGill University*, ANNA-KATHERINA R. BAUER and MARTIN G. BLEICHNER, *University of Oldenburg*, ALEX P. DEMOS, *University of Illinois at Chicago*, STEFAN DEBENER, *University of Oldenburg* — The ability to produce



precisely timed movement sequences is critical for coordination of rhythmic joint actions such as ensemble music performance. In the current study, we investigate the neural dynamics that accompany coordination of rhythmic actions with a partner during duet music performance. Twenty pairs of pianists performed musical duets, first at one pianist's tempo and then at the partner's tempo, while EEG was recorded with a mobile system. Amplitude envelopes of EEG and inter-keystroke interval (IKI) time-series were computed by filtering the duet performances at the mean tempo of each performance. Amplitude envelopes of both EEG and behavioural IKIs were highly correlated within individuals, suggesting neural tracking of musical structure within pianists. Furthermore, partners' EEG amplitude envelopes were correlated higher than chance surrogate pairings, suggesting that duet performers exhibit synchronous neural activity that supports joint rhythmic action. Email: Anna Zamm, anna.zamm@mail.mcgill.ca

6:00-7:30 PM (3207)

Perception of Maximum Crutching Distance. JEFFREY B. WAGMAN and VINCENT T. CIALDELLA, *Illinois State University*, PETER J.K. SMITH, *Illinois State University* — Affordances are opportunities for behavior determined by the fit between action capabilities and environmental properties. Perception of affordances for a given behavior generally reflects this fit - even for unusual or unfamiliar behaviors. Participants reported the farthest distance that they could step using crutches by instructing the experimenter to move a marker on a remote-controlled car toward or away from them. Perceived maximum distance (P_{MAX}) scaled to leg length - P_{MAX} was longer for long legged than for short legged participants but there was no difference in the ratio of P_{MAX} to actual maximum distance (A_{MAX}) across these groups. Moreover, participants both with and without experience using crutches were remarkably attuned to their ability to perform this task. On average, the ratio of P_{MAX} to A_{MAX} was 1.02, a value that was not significant different from 0. The results highlight that people can perceive affordances for both familiar and unfamiliar behaviors. Email: Jeffrey B. Wagman, jeffreywagman@illinoisstate.edu

6:00-7:30 PM (3208)

Effects of the First-Person Perspective on External Perception and the Sense of Self During Full-Body Illusion. CHIHARU TOI and AKIRA ISHIGUCHI, *Ochanomizu University* (Sponsored by Akira Ishiguchi) — We can feel “we are in our bodies, and we can move our bodies freely.” In regards to this body-related sense of self (bodily self-consciousness), previous studies using multisensory body illusion have shown that body ownership is formed by three factors: the multisensory integration, the plausibility of the bodies, and the first-person perspective. Under the full-body illusion, we have focused on the first-person perspective to investigate its effects on our perception of the external world, including our bodies. In this study, we further tested the degree of the illusion and the size and distance perception of objects or the participants' bodies using various heights and relative positions to their own bodies

of the visual perspective during full-body illusion. We predicted that the stronger is the illusion, the more distorted the perceived sizes would be. Our results partly confirmed our predictions. Email: Chiharu Toi, chiharu.toi@gmail.com

6:00-7:30 PM (3209)

Action-Planning Biases Size Representation in Visual Working Memory. JIHYUN SUH (Graduate Travel Award Recipient) and RICHARD A. ABRAMS, *Washington University in St. Louis* (Sponsored by Richard Abrams) — It has been known that planned action biases visual processing to the action-relevant feature dimensions. The present study examined whether a planned action also alters representations of action-relevant features in visual working memory. In a series of experiments, participants planned either a grasping or a pointing hand movement while remembering and reporting the size of a geometric shape. Interestingly, the remembered size of the memory shape was bigger when grasping was planned compared to when pointing was planned. In addition, the effect of action disappeared when the memory shape preceded the presentation of the action cue implying that the planned action most likely influenced perceptual encoding, not the maintenance of items in memory. Email: Jihyun Suh, jihyun.suh@wustl.edu

6:00-7:30 PM (3210)

Role of Production Rates and Musical Expertise in Auditory-Motor Synchronization. REBECCA SCHEURICH, ANNA ZAMM, ASHLEY BROWN-NOTARGIACOMO and CAROLINE PALMER, *McGill University* — What factors influence auditory-motor synchronization across production rates? Rates at which individuals spontaneously produce familiar musical sequences (spontaneous production rates, SPRs) affect subsequent synchronization; synchronization accuracy between musical partners decreases as their difference in SPR increases. Musical expertise also affects synchronization accuracy; musicians synchronize more accurately than nonmusicians. We implemented a novel musical tapping task to compare the role of SPRs in rate flexibility between musicians and nonmusicians. Participants tapped the rhythm of a familiar melody on a force-sensitive resistor at a comfortable rate (the SPR). Participants then synchronized tapping with a metronome set faster than, slower than, or at their SPR. All participants anticipated more at rates slower than their SPR and lagged more at rates faster than their SPR. Musicians synchronized more accurately and consistently across rates than nonmusicians, indicating greater flexibility. These findings suggest that auditory-motor synchronization is constrained by the SPR and enhanced by musical expertise. Email: Rebecca Scheurich, rebecca.scheurich@mail.mcgill.ca

6:00-7:30 PM (3211)

Actor Specific Kinematics and Affordance Judgments for Others. GRANT POINTON, SARAH CREEM-REGEHR and JEANINE STEFANUCCI, *University of Utah* (Sponsored by Jeanine Stefanucci) — Observers use actor-specific kinematic information to improve their affordance judgments for others (Ramenzoni et al., 2010; Weast, Shockely, & Riley, 2011; Weast



et al., 2014). We investigated whether two forms of kinematics differentially impacted affordance judgments for two different affordances. Participants in our study made reach-with-jump (RWJ) and long jump (LJ) affordance estimates in a pre and posttest, and observed either squat or calf raise kinematics in between. These two affordances may differentially rely on body-based versus kinematic-based judgments. Preliminary results from one actor show that observers perceived RWJ accurately but their estimates did not change based on the kinematics they observed. Observers underestimated LJ estimates and also showed no pre-post changes based on the kinematics they experienced. Given these somewhat unexpected results, the role of individual differences in actors' and observers' capabilities will be further analyzed and discussed.

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6:00-7:30 PM (3212)

Variance Discrimination of Empty Time Interval: Comparison Among Auditory, Visual and Audio-Visual Condition. MIDORI TOKITA, *Mejiro University*, YI YANG and AKIRA ISHIGUCHI, *Ochanomizu University* — It has been suggested that we have an ability to perceive statistical structures of surrounding objects and/or events. In particular, it is of great importance to perceive variance since it can be used in estimating and predicting changes in our environment. In this experiment, we tested how the performance of variance discrimination of time interval would differ among markers with auditory (beep sound), visual (flash light) and audio-visual stimuli. Two trains of stimuli, a standard and a comparison trains, were sequentially presented through speakers and/or on a computer monitor. Observers were asked to judge which train had larger variance in interval. The threshold was obtained using the method of constant stimuli. Our results showed that 1) the performance on auditory condition was higher than visual and audio-visual condition; 2) that on audio-visual condition was intermediate between visual and auditory condition. Multimodal integration of variance discrimination will be discussed.

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STATISTICS AND METHODOLOGY

6:00-7:30 PM (3213)

Should Normality Be Judged by Eye or by Algorithm? ANTHONY J. BISHARA, CHRISTIAN CONLEY, DEVIN K. MCSWEEN and JIEXIANG LI, *College of Charleston* — Normality assumptions underlie numerous statistical techniques, ranging from simple t-tests and correlations, to structural equation modeling and beyond. However, there is no generally agreed-upon method for assessing whether normality has been adequately satisfied. In 3 experiments, we compared human judgments of graphs (histograms, qq-plots, etc.) to the performance of several algorithms (Shapiro-Wilk test, Anderson-Darling test, etc.). Participants attempted to classify graphs as normal or not using a 6-point Likert scale. ROCs showed lower discriminability for human judgments than for most formal statistical algorithms. This pattern occurred even after participants were given 400 training trials with feedback,

a financial incentive, and realistic distributions for stimuli. An important problem for future research is to identify appropriate decision thresholds (alpha levels) for formal statistical tests of normality.

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6:00-7:30 PM (3214)

Distributions and Sampling Variance for Five Effect Size Measures of Variance Overlap. ERIN M. BUCHANAN, *Missouri State University*, JOHN E. SCOFIELD, *University of Missouri*, CALEB Z. MARSHALL, *Missouri State University* — Recent research indicates that Cohen's d follows a non-central t -distribution, even as the central limit theorem approximates normal, contrary to the assumption that effects match the distribution of their test statistic (Cumming, 2012; Kelley, 2007; Smithson, 2003), and little research to date has focused on the variance overlap family of effects. Likewise, meta-analytic techniques also depend on accurate sampling variance estimations of effect sizes. To address this issue, we simulated 1,000 multivariate normal datasets for 1,152 combinations of varying sample sizes, standard deviations, levels, and level correlations. Eta, generalized eta (Olejnik & Algina 2003), omega, and all partial statistics were calculated for between and within subjects ANOVAs. Simulation results indicated an interactive pattern of mean effects and variances across conditions, with variance overlap measures reliably following a beta distribution. We discuss the impact of design and data type on the measured effect and variance, as well as provide R scripts for simulations to adequately estimate sampling variance for meta-analyses.

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6:00-7:30 PM (3215)

Do the Languages we Speak Shape the Phonological Unit Sizes in Bilingual Speech Perception? A Mouse Tracking Study. YU-CHENG LIN, *University of Texas Rio Grande Valley*, PEI-YING LIN, *University of Saskatchewan* — As with speech production, although speech perception is a fundamental cognitive ability of human beings, it is unknown whether a bilingual speech system can adjust the phonological unit sizes depending on the languages used. The current study considers the following research question: how do highly proficient Chinese-English bilinguals and English monolinguals recruit phonology when the phonological unit size differs across native and non-native languages? Using two mouse-tracking tasks, participants listened to spoken words (either presented in English or Chinese) while viewing a display of two written words. In the Chinese task, Chinese-English bilingual participants experienced a larger phonological competition in syllabic condition indicating that they used syllables when listening to L1 Chinese words. In contrast, during the English task, Chinese-English bilinguals exhibited a greater phonological competition in subsyllabic conditions that mirror those reported with English monolinguals. The finding suggests that subsyllabic units are recruited in English L1 and L2 speech

perception. Our results demonstrate that the languages we use affect our perceptions of the phonological unit size during bilingual speech perception.

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6:00-7:30 PM (3216)

lab.js: Create, Run and Share Browser-Based Experiments Using a Graphical Interface. FELIX HENNINGER, *University of Koblenz-Landau*, ULF K. MERTENS, *University of Heidelberg*, YURY SHEVCHENKO, *University of Mannheim*, BENJAMIN E. HILBIG, *University of Koblenz-Landau* — Web-based data collection is increasingly popular for both experimental and survey-based research, as it enables efficient, location-independent data collection. While dedicated experimental software for laboratory-based research is commonplace, researchers looking to implement their studies in the browser have heretofore often manually constructed their studies' content and logic using code. We introduce lab.js, a free, open-source experiment builder and JavaScript library designed to vastly simplify the realization of browser-based experiments. Using our tool, researchers with a basic knowledge of HTML and CSS can construct studies through a drag-and-drop interface, in many cases without further programming. By adding JavaScript code, studies can be customized further and adapted to even complex requirements. Our tool bundles all necessary code for data collection on any server. Studies can also be shared, archived, re-used and adapted, enabling effortless, transparent replications, and cumulative science. The software, code, and extensive documentation are available from <https://felixhenninger.github.io/lab.js/>.

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6:00-7:30 PM (3217)

Characterizing Individual Differences in Foraging Behavior. ANDRIY A. STRUK, JHOTISHA MUGON, ABIGAIL A. SCHOLER and JAMES DANCKERT, *University of Waterloo* — In this study, we present an in-lab method to characterize differences in foraging behavior. To do this, we developed a foraging task in which participants explore a virtual field of berries by dragging their finger across a touchscreen and tapping on red "berries" to collect them. 284 undergraduates completed the foraging task with the goal of collecting as many berries as possible within a 5-minute period. As a first step of characterizing foraging strategies we quantified global spatiotemporal properties of search paths using Recurrence Quantification Analysis. Next, we utilized a Dirichlet Process Mixture Model to cluster strategies on the basis of foraging path properties, resulting in 5 distinct foraging strategies. We explore the validity of identified foraging strategies and conclude that the presented method is an effective way to measure and characterize foraging strategies in humans.

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6:00-7:30 PM (3218)

The Influence of Sign Language Knowledge on Iconicity Judgments. ZED SEVCIKOVA SEHYR, DAN FISHER and KAREN EMMOREY, *San Diego State University* — We hypothesized that the perception of iconicity (form-meaning

mappings) in American Sign Language (ASL) is impacted by language-specific knowledge. Deaf signers and hearing nonsigners completed iconicity judgments for 992 signs from a lexical database for ASL (<http://asl-lex.org>). Sign iconicity was categorized as follows: transparent (guessable), metonymic, metaphorical, classifier-based, or opaque. Participants rated each sign on a 7-point scale based on "how much the sign looks like what it means" (1 = not iconic at all). Nonsigners were given the English translation for each sign. Results revealed that nonsigners rated transparent signs (e.g., DEER, depicting antlers) as more iconic than deaf signers, whereas deaf signers rated classifier-based signs (e.g., GARAGE, incorporating the ASL vehicle classifier) as more iconic than nonsigners. This pattern suggests that ASL knowledge reduces sensitivity to transparent iconicity but increases sensitivity to patterned iconicity (i.e., shared iconic properties across signs).

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6:00-7:30 PM (3219)

Bayes Factors for Hierarchical Cognitive Models: A Look at Thermodynamic Integration and Steppingstone Sampling. JEFFREY ANNIS, NATHAN J. EVANS, BRENT J. MILLER and THOMAS J. PALMERI, *Vanderbilt University* — The computation of the Bayes factors, necessary for Bayesian model selection, involves computing the marginal likelihood for each model and taking the ratio. The marginal likelihood is obtained by integrating over the entire parameter space, making the estimation of Bayes factors for models with more than a few dimensions, such as hierarchical cognitive models, problematic. Early Monte Carlo methods such as arithmetic/harmonic mean estimators or reversible-jump MCMC have been used with some success, but still face problems (Friel & Wyse, 2012). Other solutions exist, such as using GPUs (Evans & Brown, in press), but are challenging to implement and are done on a model-by-model basis. Here, we briefly review Monte Carlo techniques to compute marginal likelihoods and present recent advancements including *thermodynamic integration* (Friel & Pettitt, 2008; Lartillot & Philippe, 2006) and *steppingstone sampling* (Xie, Lewis, Fan, Kuo, & Chen, 2011). The methods are general, and can be easily implemented in existing MCMC code. We validate the methods by comparing marginal likelihoods for the Linear Ballistic Accumulator to the findings in Evans and Brown.

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6:00-7:30 PM (3220)

Using Large Natural Image Datasets to Study Cognition. JOSHUA C. PETERSON and THOMAS L. GRIFFITHS, *University of California, Berkeley* (Sponsored by Thomas Griffiths) — Modern technology along with industrial interest in the applications of computer vision have given rise to a number of massive, publicly available image datasets augmented by human-relevant labels and descriptions. These datasets provide a unique opportunity to study human cognition using more ecologically valid stimuli at scale. Further, models developed by computer scientists allow for these complex images to be characterized by rich, yet relatively low-dimensional representational spaces that may serve as a tractable starting point for modeling human behavior. Recent



work has attempted to take the first few steps in this direction, quantifying the degree to which abstractions learned from these datasets correspond to humans, and evaluating classic psychological theories within a new context. More broadly, we argue that large datasets should help to overcome the inherent problem of noise in complex stimuli that more closely resemble the real world from which human cognition often appears most impressive.

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6:00-7:30 PM (3221)

“Big Data” at Scale: Spontaneous Typing Reveals Word Predictability. RICK DALE and DAVID W. VINSON, *University of California, Merced* (Sponsored by Rick Dale) — “Big data” provides a playground for cognitive scientists to begin to validate long standing theories formulated by much smaller samples collected in controlled laboratory settings. However, what makes data big is partially dependent on the methods we use to analyze it. Even a dataset of a few hundred participants can be big at scale. Here we show the microstructure of language production – expressed in the keystroke-to-keystroke dynamics of spontaneous writing – shows a reliable “echo” of word predictability. This challenges long-standing theories of the encapsulation of the production system during typing. A unique feature of the data here is that it is based on a large dataset of spontaneous language production. When combined with corpus estimations of word predictability, it may be possible to capture “echoes” of the flow of the cognitive processes that support language production, at least in the composition of text. Email: David Vinson, dvinson@ucmerced.edu

6:00-7:30 PM (3222)

The Effects of Executive Functioning on Teens’ Type One Diabetes Regulation. ASCHER MUNION, CYNTHIA BERG and JONATHAN E. BUTNER, *University of Utah*, DEBORAH J. WIEBE, *University of California, Merced* (Sponsored by Frances Friedrich) — Individuals with type 1 diabetes with low executive function are at risk for poor diabetes management but may benefit from social regulation. We model self-regulation (represented by adherence behaviors) of teens ($n=202$), social-regulation (represented by disclosure to mother) and how longitudinal changes are modified by executive functioning ($M_age_time1=17.7$). We address whether there is a stable pattern of self- and social-regulation across three years during emerging adulthood, through the attractive nature of adherence, the coordination of disclosure to mothers and if individual differences in executive function moderated the set or homeostatic point the system is pulled back to. Using SEM, we assessed coordination between changes in disclosure and adherence. The attractor for adherence was weaker for those with lower executive function. The coordination of the regulation system is tied to adherence and disclosure to mothers, and different for those with high executive functioning compared to those with lower executive functioning.

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6:00-7:30 PM (3223)

A Generalized Processing Tree Framework for Discrete-State Modeling of Discrete and Continuous Variables. DANIEL W. HECK and EDGAR ERDFELDER, *University of Mannheim* (Sponsored by Edgar Erdfelder) — Psychological theories often assume that responses are due to qualitatively distinct cognitive processes. To test such discrete-state theories, we propose a new class of statistical models that account for discrete and continuous data jointly by assuming finite mixture distributions. These generalized processing tree (GPT) models extend the popular class of multinomial processing tree models and assume a psychologically meaningful structure on the mixture weights that is constrained by the probabilities of latent processing paths. Depending on the type and dimensionality of continuous data, latent component distributions can be modeled by normal, ex-Gaussian, or other continuous distributions with either separate or shared parameters across states. Thereby, GPT models can be developed for response times, eye fixation durations, or other continuous measures. We highlight the benefits of jointly modeling discrete and continuous data using a simulation and an empirical example

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6:00-7:30 PM (3224)

Mousetrap: Open-Source and Cross-Platform Software for Mouse-Tracking Data Collection and Analysis. PASCAL J. KIESLICH, *University of Mannheim*, FELIX HENNINGER, *University of Koblenz-Landau*, DIRK U. WULFF, *University of Basel*, JONAS M.B. HASLBECK, *University of Amsterdam*, MICHAEL SCHULTE-MECKLENBECK, *University of Bern* (Sponsored by Balazs Aczel) — Mouse-tracking – the analysis of mouse movements in computerized experiments – is becoming increasingly popular in psychological research. Mouse movements are taken as indicator of commitment to or conflict between choice options during the decision process. Using mouse-tracking, researchers have gained insight into the temporal development of cognitive processes across a growing number of psychological domains. We present software that offers users easy and convenient means of recording and analyzing mouse movements. First, we introduce the mousetrap plugin that adds mouse-tracking to OpenSesame, a popular general-purpose experiment builder. It allows for the creation of mouse-tracking studies through a graphical interface, without requiring programming skills. Second, we present the mousetrap library for the statistical programming language R. This library imports mouse-tracking data from a variety of sources. It offers functions for preprocessing, analyzing, clustering, and visualizing mouse movements, and calculates many established measures for curvature, complexity, and velocity. Mousetrap is available from <http://pascalkieslich.github.io/mousetrap/>.

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6:00-7:30 PM (3225)

Examining Composite Face Processing Using Systems Factorial Technology and Logical-Rule Models. XUE-JUN CHENG and CALLUM MCCARTHY, *The University*



of Melbourne, TONY WANG, *Brown University*, THOMAS J. PALMERI, *Vanderbilt University*, DANIEL R. LITTLE, *The University of Melbourne* (Sponsored by Daniel Little) — Previous research shows that faces are processed holistically (i.e., represented according to their whole and not their constituent parts) and one famous experimental paradigm used to investigate this is the composite face paradigm. However, the pattern of results obtained from the composite task can also be explained by a failure of selective attention, a phenomenon which is logically and empirically distinct from holistic processing. Using Systems Factorial Technology, we operationalised holistic processing as coactive processing and a failure of selective attention as a form of independent, featural processing (i.e., serial or parallel processing) to allow distinction between these two accounts. With this framework, we investigated the processing capacity and architecture of morphed and schematic faces. If faces are holistically processed as results from the composite paradigm suggest, we should find coactive processing. However, we rarely observed coactivity and instead found processing consistent with parallel or serial processing. This suggests that what the composite paradigm is measuring may not be holistic processing but a process that gives rise to results which look like holistic processing.
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6:00-7:30 PM (3226)

Does Everyone or Do Some Not? Model Comparison With Variation in Strategy. JULIA M. HAAF and JEFFREY N. ROUDER, *University of Missouri - Columbia* (Sponsored by Jeffrey Rouder) — Most statistical models characterize individual differences as graded variation across people. In contrast, there is a long tradition in cognitive psychology to use mixture models, where different people are on qualitatively different levels of performance. One example of such a mixture could be in a subliminal priming experiment, where for some people primes are truly visible and for some they are truly not. To assess the need of mixtures of strategies we developed a Bayes factor approach. We propose a mixture model with spike-and-slab prior specifications on people's true effects. We compare this mixture to an alternative that there is a true effect across all people, and to the null model that there is truly no effect. We use Bayes factor model comparison to determine which model predicts the data best. We apply these models to common perceptual tasks such as Stroop and Simon interference to illustrate the case.
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6:00-7:30 PM (3227)

Consequences of Power Transformations on Trial-Level Analyses of Chronometric Data. VAN RYNALD T. LICERALDE (J. Frank Yates Student Travel Award Recipient) and PETER C. GORDON, *University of North Carolina, Chapel Hill* (Sponsored by Mark Hollins) — Power transformations (e.g., log- and inverse-transforms) have been routinely applied to chronometric data (e.g., reaction times, fixation durations) to avoid violating the assumption of residual normality. However, researchers have recently revived the idea that power transforms are not theoretically innocuous and can generate unintended

and undesirable practical consequences. Specifically, power transforms distort the scale in which cognitive processes are known to occur, thereby potentially introducing spurious effects or obscuring real effects. This project investigates how often researchers can expect to encounter these costs of power transforms by running realistic simulations, whose parameters are based on analyses of the entire lexical decision dataset of the Semantic Priming Project. Results indicate that no absolute statistical power is gained from meeting the normality assumption by using power transforms. Moreover, consistent with previous findings, power transforms obscure effects present in the raw time scale, particularly for effects that exhibit low statistical power.
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6:00-7:30 PM (3228)

System Factorial Technology's Power is Greater for Capacity Than Architecture When Recovering the Processing Qualities of Models That Simulate Lexical Processing Data. CHARLES J.H. LUDOWICI and ALEX O. HOLCOMBE, *The University of Sydney* (Sponsored by Alexander Holcombe) — To determine the capacity, architecture (serial or parallel), and stopping rule of human processing of stimuli, researchers increasingly use Systems Factorial Technology (SFT) analysis techniques. The associated experiments typically use a small set of stimuli that vary little in their processing demands. However, many researchers are interested in how humans process kinds of stimuli that vary in processing demands, such as written words. To assess SFT's performance with such stimuli, we tested its ability to identify processing characteristics from simulated response times derived from parallel limited-, unlimited- and super-capacity linear ballistic accumulator (LBA) models, which mimicked human response time patterns from a lexical decision task. SFT successfully identified system capacity with <600 trials per condition. However, for identifying architecture and stopping rule, even with 2000 trials per condition, the power of these tests did not exceed .6. To our knowledge, this is the first test of SFT's ability to identify the characteristics of systems that generate RT variability similar to that found in human experiments using heterogeneous stimuli. The technique also constitutes a novel form of power analysis for SFT.
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6:00-7:30 PM (3229)

A Cognitive Latent Variable Model for Transfer of Training. COLIN NICHOLAS KUPITZ, *University of California, Irvine*, MARTINBUSCHKUEHL, *MIND Research Institute*, SUSANNE M. JAEGGI and JOACHIM VANDEKERCKHOVE, *University of California, Irvine* (Sponsored by Joachim Vandekerckhove) — Cognitive training is an increasingly popular research subject, yet the efficacy of training – and transfer-of-training (ToT) to untrained tasks – remains controversial. This controversy may be in part due to the field's current paradigms: traditionally, ToT studies make inferences about summary statistics. This approach has two shortcomings: 1) it provides no account of the psychological phenomena driving observed effects; 2) many studies fail to account for natural population heterogeneity. Here, we revisit a previous ToT study on visual



working memory, using a diffusion model basis to construct a cognitive latent variable model (CLVM). This addresses both shortcomings of the traditional approach: the CLVM produces a psychologically interpretable, process-driven model that can account for population effects as well as structured individual differences. This approach to ToT allows for stronger, more concrete inferences about the effects of working memory training on the underlying cognitive processes.
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6:00-7:30 PM (3230)

Within-Subject Mediation Analysis for Experimental Data in Cognitive Psychology and Neuroscience. MATTI VUORRE and NIAL BOLGER, *Columbia University* (Sponsored by Peter Balsam) — Statistical mediation allows researchers to investigate potential causal effects of experimental manipulations through intervening variables. Although mediation is common in certain areas of psychology, it is rarely applied in cognitive psychology and neuroscience. One reason for the scarcity of applications is that these areas commonly employ within-subjects designs, and it is only recently that statistical mediation has been worked out satisfactorily for such designs. Here, we draw attention to the importance and ubiquity of mediational hypotheses in within-subjects designs, and we present a free and open source software package for conducting Bayesian within-subjects mediation analyses in the R programming environment. The software package is easy to use and provides methods for preparing data for multilevel mediation analysis, estimating the mediation model, and summarizing and plotting the results. We use experimental data to illustrate the practice and benefits of within-subject mediation for theory testing and comparison.

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6:00-7:30 PM (3231)

A Generalized Linear Mixed Model Approach to Signal Detection Theory in Recognition Memory Experiments. MAXIMILIAN M. RABE, *University of Victoria*, REINHOLD KLIEGL, *University of Potsdam*, D. STEPHEN LINDSAY, *University of Victoria* (Sponsored by Reinhold Kliegl) — Signal detection theory (SDT) is commonly applied by calculating C (response bias) and d' (sensitivity) from hit and false alarm rates per subject. We used a generalized linear mixed modeling (GLMM) approach to analyze behavioral data from recognition memory experiments in a SDT framework. The approach accounts for both subject and item-level variance and facilitates detailed analyses on both levels in a single model. It can help overcome several problems such as loss of precision due to data aggregation or corrections for ceiling effects, and it facilitates maximum-likelihood or Bayesian estimation. We demonstrate the ease of estimating grand and group means of C and d' , item and subject-level estimates (random effects) of these, and simple and complex hypothesis testing in experimental designs using this method. The approach also easily transfers to other experimental paradigms employing SDT analyses.

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6:00-7:30 PM (3232)

String-Mediated Inertial Force-Based Haptic Perception of Disk Diameter. COREY M. MAGALDINO, *Appalachian State University*, PATRICK A. CABE, *University of North Carolina - Pembroke*, KENNETH M. STEELE, *Appalachian State University* (Sponsored by Patrick Cabe) — Rotational inertia, the force required to change the velocity of an object rotating on its axis, has been well documented to inform the haptic system about object properties. Commonly, participants judged lengths of welded rods, with access to inertia about all the rods' principal axes. We examined whether people can identify another property, disk diameter, using an apparatus that restricted rotation to a single axis, providing information solely through rotational inertia. Participants rotated visually-occluded disks in opposite directions by pulling up and down on two strings, each operated by a single finger. Participants identified diameters of 5 disks from a 7-disk display, with unlimited sampling time. Participants readily differentiated disks. Judgments accurately and reliably tracked actual disk diameters. A second experiment added earplugs to reduce possible sound information; outcomes replicated the first experiment. These results extend previous findings that inertial forces inform haptic perception of objects.

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6:00-7:30 PM (3233)

Exploring Social Behavior With Dallinger, An Open-Source Experiment Automation Tool. ALEXANDRA PAXTON and JORDAN W. SUCHOW, *University of California, Berkeley*, THOMAS J.H. MORGAN, *Arizona State University*, THOMAS L. GRIFFITHS, *University of California, Berkeley* — Recent developments in crowdsourcing platforms hold promise for the study of social cognition and behavior. Not only do such platforms connect researchers to a pool of participants beyond undergraduate students, but in combination with new tools, these platforms open the door for researchers to develop complex online experiments that can be delivered at scale. Dallinger, an open-source experiment automation platform, is one such tool. By interfacing with Amazon Mechanical Turk, Dallinger provides end-to-end automation of the experimental pipeline: recruiting participants, obtaining their informed consent, arranging them in a network, managing their communication, recording their responses, compensating them, conditionally recruiting new participants, and managing the resultant data. While many online studies of social cognition and behavior are observational (e.g., mining social media) or survey-based, here we demonstrate how Dallinger can be used to run diverse experimental studies of human social behavior and cognition, with designs drawn from cultural evolution, social psychology, cognitive psychology, experimental economics, and more.

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POSTER SESSION IV

Saturday Noon

West Ballroom BCD

Viewing 11:00-1:30, Author Present 12:00-1:30 PM

ATTENTION CAPTURE II

12:00-1:30 PM (4001)

Do Visually Salient Singletons Capture Attention in a Grasping Task? THOMAS G. GHIRARDELLI, ELIA GOFFI, SOLIANA GOLDRICH, LEIGH ENGELKE, KATHRYN MONTHIE and ANNE WERKHEISER, *Goucher College* — Numerous studies have shown that a salient but irrelevant singleton can capture attention when observers perform a visual search task. Most of these studies however used 2D displays and a keypress response. We investigated whether singletons would interfere in a visual search task that requires interaction with stimuli in a 3D environment. Participants searched for and retrieved a target of a specified color among a set of LEGO-brand building bricks randomly distributed on a tabletop. We measured response time to retrieve the target as a function of the total number of LEGOs and whether or not a singleton of a different color than the target was present. Results showed no significant effect of the singleton distractor, consistent with previous research showing no effect of irrelevant singletons when participants know the feature value of the target. Additional studies with different combinations of target and distractor features are being carried out.

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12:00-1:30 PM (4002)

Knowing What to Ignore Next Reduces Attentional Capture in a Visual Search Task. ANNA SCHUBÖ, *Marburg University*, TOBIAS FELDMANN-WÜSTEFELD, *University of Chicago* — Intertrial priming, i.e., the phenomenon that targets are found more easily in a visual search task when their feature is repeated across trials can be considered an example of selection history. Recent findings suggest that priming of distractors can also improve search performance, likely because repeating distractor features allows for facilitated suppression. We examined whether the efficiency of distractor suppression depends on distractor repetition being systematic rather than random. We used the lateralization approach in the ERP to disentangle target and distractor related processes. Results showed no modulation of target processing in the NT component. The ND, however, reflecting distractor-induced attentional capture decreased monotonically with repetition of a distractor feature when distractor repetition was systematic. These results suggest that observers are able to benefit from distractor repetition only when they expect a specific distractor feature: if so, they can suppress the distractor and process the target more easily.

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12:00-1:30 PM (4003)

Location-Based Intertrial Biases in Covert Attentional Selection are Spatiotopic and Independent of Featural Intertrial Dynamics. THOMAS TÖLLNER, *Ludwig-Maximilians-University Munich*, DRAGAN RANGELOV,

University of Queensland, PAUL SAUSENG and HERMANN J. MÜLLER, *Ludwig-Maximilians-University Munich* — What we attentionally select on any given moment depends not only on the interplay between top-down and bottom-up factors, but also on previous trial conditions. Maljkovic and Nakayama (1996), for example, showed that visual search is modulated by previous target locations, with speeded responses for targets occurring at previous target, relative to distractor, positions. Due to the use of spatially invariant, central fixation crosses, however, it remained unknown whether this positional priming of pop-out (PoP) effect is mediated via retinotopic or spatiotopic coordinate systems. Here, we devised a visual search task with two alternating fixation crosses, occurring randomly in the left or right visual hemifield, and three possible target locations, with the middle location being shared by both displays. Based on electrophysiological measures (PCN waves, pre-stimulus alpha oscillations), we demonstrate that the positional PoP effect is spatiotopic in nature, and independent of cross-trial feature changes or the currently performed task-set.

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12:00-1:30 PM (4004)

Motion Onset Really Captures Attention. KENDRA C. SMITH and RICHARD A. ABRAMS, *Washington University* — Abrams and Christ (2003) reported that the onset of motion captures attention. Recent reports, however, have argued that data underlying those conclusions were contaminated by artifacts that are inherent to animated stimulus displays. We show here that the experiments that attempted to minimize the artifact were themselves flawed because they introduced an abrupt-onset item on every trial, rendering them inappropriate tests of capture by motion onset. Additionally, we present results from a new method that does not use animation, and hence cannot suffer from the artifact. The findings show again that motion onset does indeed capture attention.

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12:00-1:30 PM (4005)

Age Differences in Emotion-Induced Blindness: An Indication of the Automaticity of Older Adults' Positivity Effect? BRIANA L. KENNEDY, RINGO H. HUANG and MARA MATHER, *University of Southern California* — Older adults are particularly impaired in attentional tasks that require self-directed inhibition. But do undesired inhibition effects due to attention-grabbing emotional stimuli also differ across age groups? Across two experiments, we investigated if older adults inhibit information after an emotionally arousing distractor in the same way as younger adults. Young adult participants (ages 18-26) demonstrated a typical emotion-induced blindness (EIB) pattern, such that emotionally negative and positive distractors impaired reporting of task-relevant targets presented ~200ms later, but target performance improved with increased temporal distance between the emotional distractor and target. For older



adults (ages 59-80), the pattern of EIB after positive distractors was similar to young adults. However, negative distractors did not impair target performance ~200ms after the distractor, and target performance instead decreased ~500ms after distractors. This slowing of negative but not positive distraction with aging suggests older adults' "positivity effect" may operate at an early processing level.

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12:00-1:30 PM (4006)

Developmental Changes and the Role of Anxiety in Attentional Bias to Emotional Faces. SO-YEON KIM, MIHEE KIM and JI HYUN SONG, *Duksung Women's University* — This study aimed to examine developmental changes and the effects of anxiety levels on attentional bias to emotional faces. Twenty neurotypical adults (ages 18-23 years) and 20 typically developing adolescents (ages 12-15 years) were asked to detect a direction of a letter ("T") presented in the periphery while ignoring angry or neutral faces presented in the center of the screen. Anxiety levels of each participant were measured using the State-Trait Anxiety Inventory (Spielberger, 1983). The results revealed that, among adults, attentional bias did not differ based on the emotions of the facial stimuli. However, in adolescents, attentional bias was observed when the distracting stimuli contained threaten-related information (in the form of angry faces). Interestingly, modulatory effects of anxiety levels on the attentional bias to face stimuli were found in adults, whereas such effects were absent in adolescents. The development of a push-pull interaction between attention and emotion will be discussed.

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12:00-1:30 PM (4007)

Measuring Cognition in Nature—Neural Effects From Prolonged Exposure to Nature. RACHEL J. HOPMAN, EMILY E. SCOTT, SPENCER C. CASTRO, KRISTEN WEISSINGER and DAVID L. STRAYER, *University of Utah* (Sponsored by David Strayer) — Urban environments contain attributes that are foreign to human sensory processes and require directed attention to interpret stimuli. However, natural settings do not require directed attention, but rather capture attention through bottom-up processing. According to the theory of attention restoration, exposure to natural environments can restore attentional resources. Previous research demonstrates that exposure to nature can increase performance on cognitive tasks, improve mood, and decrease stress. The theta frequency in the midline frontal regions is associated with cognitive depletion and correlates to the onset of the attentional network. Our previous research shows midline frontal theta activity increases when talking on a phone, despite spending time in nature. We hypothesize that spending time in nature downregulates the attentional network, therefore upregulating the default mode network. In this study, we found theta activity at the midline frontal regions significantly decreased during a five day trip in nature compared to before and after the trip.

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12:00-1:30 PM (4008)

Active Inhibition of Attentional Capture by Irrelevant-But-Salient Stimuli. SEAH CHANG, CORBIN A. CUNNINGHAM and HOWARD E. EGETH, *Johns Hopkins University* (Sponsored by Howard Egeth) — The ability to inhibit irrelevant distractors is critical for efficiently finding targets in a visual search task. The current study tested whether an endogenous cue indicating the location of an upcoming color singleton distractor can modulate or even eliminate involuntary attentional allocation to such a stimulus. In Experiment 1, when a four-location cue and four-item display was used, a significant cue benefit was found whereas a singleton effect was absent. In Experiment 2, when a four-location cue and eight-item display was used, a significant singleton capture effect on neutral trials was eliminated on ignore trials. In both experiments, the compatibility effect was significant and independent of cue presentation. Observers seem to adopt the strategy of first selecting the cued location and then rapidly disengaging from it.

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12:00-1:30 PM (4009)

EEG Correlates of Attending and Remembering Dynamic Stimuli. CHLOE CALLAHAN-FLINTOFT and BRAD WYBLE, *Pennsylvania State University* (Sponsored by Brad Wyble) — To better understand how information is sampled from a single moment of a continuously changing stimulus, the latency of the N2pc and P3 were compared to a behavioral measure of attentional sampling latency. Participants were instructed to keep their eyes on a central fixation cross and attend to two colored disks (one on either side) smoothly changing color (4 degrees per 33ms frame). At some point during the trial, a cue (white or black circle) flashed around one of the disks, with a distractor circle on the opposite side. The disks continued to change for the remainder of the trial. Participants reported the disk's color at the time of the cue using a continuous color scale. This provided a measure of attentional latency on each trial. The EEG data from these same trials were divided at the median of this latency measure to compute separate ERPs for early and late attention trials. The preregistered analyses did not reveal a significant difference in N2pc or P3 latency. However, an exploratory behavioral analysis revealed a difference in the latency of attentional deployment depending on whether the cue appeared in the left or right hemifield.

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12:00-1:30 PM (4010)

Reinforced Attentional Orienting by Reward Based on Instrumental Learning. SANG A CHO and YANG SEOK CHO, *Korea University* (Sponsored by Yang Seok Cho) — It has been reported that a previously rewarded stimulus captures attention based on Pavlovian learning (Anderson et al., 2011; Bucker & Theeuwes, 2017; Le Pelley et al., 2015), but it remains unclear whether attentional orienting can be reinforced based on instrumental learning. The present study examined whether endogenous orienting is reinforced by reward. Participants were to identify a target letter (L or T) preceded by a red or green arrow cue at fixation. Critically, reward was provided for one of the two color cues, which was non-informative



(Experiment 1) or informative (Experiment 2), only on valid trials. Endogenous orienting was enlarged (Experiment 2) and induced (Experiment 1) by reward. To test the possibility that these results were due to the enhanced saliency of the cue by the cue color-reward association, a colored diamond cue preceded a gray endogenous cue in Experiment 3, and reward was given for orthogonal combinations of cue color and direction (e.g., red cue directing left and green one directing right) in Experiment 4. As a result, reward elicited attentional orienting in both experiments. Conclusively, top-down modulation of attentional orienting is induced by value based on instrumental learning.
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12:00-1:30 PM (4011)

Long-Term Memories Capture Attention, but Only When They Have Been Retrieved and Remain Active. JOSHUA L. HOELTER, ALLISON E. NICKEL and DEBORAH E. HANNULA, *University of Wisconsin - Milwaukee* (Sponsored by Deborah Hannula) — The current study examined whether and when attention is captured by long-term memory (LTM). Following scene-object encoding, participants completed a combined retrieval-attention task. Each trial began with the presentation of two scenes and participants retrieved the corresponding associates. Subsequently, a cue was presented indicating which retrieved associate should be prioritized for an end-of-trial recognition test. An attention array, presented between retrieval and test, consisted of 6 objects arranged around central fixation. Participants were to make a single saccade to the location of a uniquely colored object. Occasionally, encoded objects were present in the array. These objects were either 1) retrieved and prioritized, 2) retrieved but not prioritized, or 3) had not been retrieved. Results indicated that erroneous saccades were made more often to encoded than to baseline objects, but only when those objects were retrieved and prioritized. As such, capture by LTM may depend on active representation of retrieved content.
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12:00-1:30 PM (4012)

How Late do Foreign Languages Catch Our (Visual) Attention? LELA S. IVAZ and JON ANDONI DUÑABEITIA, *Basque Center on Cognition, Brain, Language* (Sponsored by Jon Andoni Duñabeitia) — Much remains unknown about where foreign language effects stem from: the difficulty in processing foreign languages, the emotional distance they evoke, or a combination of both these factors. The eye-tracking technique in combination with the perceptual matching and learning paradigm (i.e., the so-called “self-paradigm”) allows for the appraisal of the temporal course and the exact type of change in processing stimuli. We endeavored to determine whether there were qualitative or quantitative differences in how we process information in native vs. foreign languages. Differences driven by foreign-language-induced emotional distance would be observed as a different morphology in fixation proportions, while an increase in the cognitive cost would manifest as a temporal delay in the effects’ timing. Our results suggest no such temporal shift, but a change in the pattern of the probability of the eye-gaze fixation, such that visual attention is captured

earlier in the native-tongue context as compared to the foreign-language one. We argue that our results are evidence in favor of the emotional distance evoked by foreign languages.
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SCENE PROCESSING AND VISUAL SEARCH

12:00-1:30 PM (4013)

The Effects of Peripheral Priming Cues on Reflectance Reports in Real World Situations. JEFFREY ANDRE and KATIE MCCULLAR, *James Madison University* — White et al. (2013) found that color singleton or color circle cues could prime a location and improve contrast sensitivity for a given stimulus. The current study sought to extend this research beyond the lab into real world situations by using traffic signs as cues and manipulating pedestrian clothes reflectance. Our results support the findings of White et al. as error was significantly lower when the stimulus was presented in valid location as defined by the cue. Thus, the priming effect can be detected with more externally valid cues and stimuli. Our results also indicated that the more extreme reflectance levels mitigated the effects of validity with decreased reporting error. Finally, our results tended to show that a pedestrian sign resulted in the smallest difference in error between the valid and invalid locations. Implications will be discussed.
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12:00-1:30 PM (4014)

When Illusory Contour Helps: Interplays Between Temporal Attention and Visual Perceptual Organization. TETSUKO KASAI and SHIIKA MAKINAE, *Hokkaido University*, KEIICHI KITAJO, *RIKEN Brain Science Institute* — Temporal attention may bias early perceptual processing. The case of perceptual organization with Kanizsa square was examined in this study. Packmen aligned inward or outward were randomly presented with 50 ms duration, and the inter-stimulus interval was constant 1450 ms or randomly varied (850–2050 ms, 5 steps). The task was to judge the direction (left, right) of a small central arrow, presented infrequently (1/3) with the packmen. Correct responses were faster in constant blocks in comparison to random blocks; more importantly, this effect was more prominent for the inward, rather than outward, packmen. This suggests that temporal regularity or expectation facilitated task-irrelevant figural formation and to discriminate targets within the figure. On the other hand, miss responses for the inward packmen decreased in random blocks, indicating a contribution of figural enhancement to detect events that occurred at unexpected timing. We also found event-related-potential correlates of these operations.
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12:00-1:30 PM (4015)

Does Heart Rate Detect Event Boundaries? Orienting Responses as Implicit Measure for Changes in Event Models. TINO GK. MEITZ, *Friedrich Schiller University Jena*, MARKUS HUFF and FRANK PAPANMEIER, *University of Tübingen*, ALEXANDER ORT and ANDREAS FAHR, *University of Fribourg* — Our research draws on linking theories of event



perception to heart rate as an implicit measure of audio-visual media processing. In previous studies (theoretically based on event cognition) we showed that audio-visual media processing is liable to event based cognitive information. However, event cognition research traditionally measures people's segmentation behavior based on behavioral data. We assumed that heart rate as an indicator for orientating responses in perception allows for the observance of information search behavior across event boundaries. Corresponding research showed that heartrate deceleration guides the allocation of cognitive capacity as a function of information processing in regard to expected outcomes. Thus, we assume that updates of situation models in working memory are accompanied by heartrate de- and accelerations. Our findings show distinct varieties of heartrate deceleration prior to filmic cuts with event boundaries compared to filmic cuts without event boundaries. The depicted aggregated descent of heartrate prior to a cut with an event boundary gives reason to assume that orientating responses, prior to event boundaries, might proof as a suitable implicit measure for information search behavior.

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12:00-1:30 PM (4016)

Change Detection of Feature Position and Global-Local Processing. RICHARD D. WRIGHT and QIWAN SHI, *Simon Fraser University* — We used a flicker task to investigate the role of attention in object perception. In each experiment, participants saw many multi-colored squares in a flickering image and were required to find the one that was changing. We manipulated how color components changed positions within these squares and found that participants were slower to notice changes to inner than to outer components. This indicates that when searching for a target in an array of items, it can be more difficult to verify that an item is changing if the change only involves inner components than if it only involves outer (bounding) components. This suggests that the outer components of the stimuli were perceived more efficiently. And that the flicker task can be used to demonstrate that, under conditions of limited attention, an object's global properties may be more salient than its local properties.

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12:00-1:30 PM (4017)

Can High-Level Semantic Information Produce Contextual Cueing? OLIVIA PEREIRA, *Nemours/Alfred I. duPont Hospital for Children*, CHARLES L. FOLK, *Villanova University* — In "classic" contextual cuing, repeating the spatial configuration of displays improves search efficiency, suggesting that implicit associations between target location and spatial configuration can guide search (Chun & Jiang, 1998). Recent evidence suggests that the attention allocation system can be set for high-level semantic properties such as superordinate category information (Wyble, Folk & Potter, 2013). Here we explore whether implicit associations between target location and superordinate category information can produce semantically based contextual cuing. Participants searched four-item displays for a rotated T among rotated Ls superimposed on line drawings of objects. On half the trials in a given block, the target

appeared on one of 5 possible exemplars of a semantic category (e.g., sporting equipment). Across 10 blocks of trials, search was faster when the target appeared on exemplars relative to filler objects, regardless of whether participants were aware of the association, providing preliminary evidence for semantically based contextual cuing.

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12:00-1:30 PM (4018)

Spatial Misconceptions in 3D Spatial Reasoning From Maps and Cross-Sections. ALLISON J. JAEGER, THOMAS F. SHIPLEY, DOUG LOMBARDI and ALEXANDRA DAVATZES, *Temple University* — Structural geology is an area of Earth science that is especially dependent on spatial thinking for successful learning (Kali & Orion, 1996). Structural geology requires that the learner think about the deformational structures of the Earth's crust, and often requires reasoning about the spatial configuration of rocks from map distribution of rock outcrops. In this study we investigate the types of errors that college and high school students make when creating a cross-section from a geologic map. Students used a geologic map of the Grand Canyon to create a cross-section depicting what they thought the rocks looked like on the inside the Earth. While creating their cross-section sketch, students were prompted to think aloud. Few students created structurally correct cross-sections; two distinct categories of misconceptions were identified – errors in 3D orientation and failures to visualize in 3D. Conclusions about naive 3D spatial reasoning will be discussed.

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12:00-1:30 PM (4019)

Executive Control, Working Memory Capacity, and Fluid Intelligence: Investigating the Bermuda Triangle. ALODIE REY-MERMET and MIRIAM GADE, *Catholic University of Eichstätt-Ingolstadt*, ALESSANDRA SOUZA, *University of Zurich*, CLAUDIA VON BASTIAN, *Bournemouth University*, KLAUS OBERAUER, *University of Zurich* — In the last two decades, three cognitive psychometric constructs have been said to be closely related: executive control (EC, i.e., the ability to supervise thoughts and actions), working memory capacity (WMC, i.e., the ability to retain a limited amount of information) and fluid intelligence (gF, i.e., the ability to reason with novel information). However, previous studies have found it difficult to establish a strong correlation between EC and the other two constructs. This might arise from differences in measurement: EC is measured through reaction times, whereas WMC and gF are measured through accuracy. The present study investigates the relationships between the three constructs when EC is also measured through accuracy. The results showed good reliabilities for all measures. Yet, whereas WMC and gF measures correlated strongly with each other, they correlated only weakly with EC measures. Structural equation modeling identified a model with WMC and gF factors, but no model including an EC factor. Measuring EC through accuracy does not overcome the



difficulties with establishing EC as a psychometric construct. These findings challenge the assumption that WMC and gF are related to an ability to supervise thoughts and actions.
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12:00-1:30 PM (4020)

Knocking Out Saccadic Inhibition in an Interrupted Visual Search and Restoring It With a Spatial Working Memory Load. MARK MILLS, MATTHEW D. HILCHEY and JAY PRATT, *University of Toronto* — During scene search, saccades are slower to return to recently fixated locations (saccadic inhibition), whereas during scene memorization saccades are faster to such locations (Dodd et al., 2009). Is the lack of evidence for inhibited saccades in tasks emphasizing scene memory a consequence of a goal-dependent mechanism, or is the inhibition simply masked by other processes involved in scene memorization but not search? We provide evidence for the latter. Using an interrupted scene search task in which scenes abruptly expanded in size—which is considered to invoke memorial processes (cf. Thomas & Lleras, 2009)—we were able to eliminate saccadic inhibition. By applying a spatial working memory load prior to search, however, we were able to restore inhibited saccades. These data suggest that when confronting visual instability, observers will rely more on memorial processes than search processes.
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12:00-1:30 PM (4021)

Overestimation of the Effect of Monetary Reward on Visual Search Accuracy. YUKI MIYAZAKI, *Fukuyama University* — The purpose of this study was to measure the metacognitive accuracy of the effect of monetary rewards on visual search accuracy. Twenty participants completed a visual search task wherein they were asked to judge whether a target was present among an array of distractors under two conditions: monetary-reward and no-reward. In the former condition, they earned money in accordance with their correct answer rate (for a maximum of about \$50), while in the latter, they earned no money. Twenty different individuals (raters) were asked to predict the search performances (i.e., the mean correct answer rates) of the participants in both conditions. The raters overestimated the effect of the monetary reward: that is, visual search performance was predicted to be much better in the monetary-reward condition than in the no-reward condition, whereas participants' actual performance did not differ by condition. The results suggest that concerning the effect of monetary reward on visual search accuracy are inaccurate.
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12:00-1:30 PM (4022)

Viewing Mode Affects the Relationship Between Eye Movements and Memory Performance. MONICA L. ROSEN, *University of Nebraska - Lincoln*, MARK MILLS, *University of Toronto*, EDWIN DALMAIJER, *University of Oxford*, STEFAN VAN DER STIGCHEL, *Utrecht University*, MICHAEL D. DODD, *University of Nebraska - Lincoln* (Sponsored by Michael Dodd) — Visual behavior varies both as a function of task-set and task-switching, with task switching having been shown

to influence the time course of the shift between global (short fixations, long saccades) and local (long fixations, short saccades) viewing modes. Relatedly, in the recognition memory literature, a positive relationship between local-type fixations and object identification has been observed, suggesting viewing mode may influence memory accuracy. In the present study, participants viewed scenes while performing either a search, evaluation, or memorization task (task cued before each trial). The memory test emphasized either global (e.g., scene flipped) or local (e.g., item added/removed) properties, though participants had no way to determine which memory test they would receive. The results demonstrate that correct global memory responses were associated with longer global processing modes whereas correct local memory responses were associated with faster transitions to local processing with task switching/repetition mitigating these effects.

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12:00-1:30 PM (4023)

The Joint Processing of Global Properties in Scene Categorization. HANSHU ZHANG and JOSEPH HOUP, *Wright State University* (Sponsored by Joseph Houpt) — Scene images may be rated on a number of different global properties. However, there is limited evidence indicating how human observers process multiple global properties together. In the current research, we tested human observers' judgment of scene naturalness and openness using a cognitive modeling framework. Subjects tended to categorize "natural" as "open" when deciding between "open"/"closed". Furthermore, they responded faster to "natural and open" and slower to "manmade or closed" scene images compared to predicted performance based on subjects' response times to single global properties. These results indicate that information processing of these global properties is dependent for human observers.
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12:00-1:30 PM (4024)

Attentional Deployment in Scenes Depends on Context, not Target Similarity. ELLEN O'DONOGHUE and MONICA S. CASTELHANO, *Queen's University* (Sponsored by Monica Castelhana) — In visual search, performance is aided by knowledge of scene context (Castelhana & Henderson, 2007; Neider & Zelinsky, 2006). Pereira and Castelhana (2017) found that attentional deployment varied across scene regions: suddenly-onsetting distractors captured attention more readily in target-relevant regions than in target-irrelevant regions. In the present study, we extend these findings by examining how distractor-target similarity interacts with distractor placement. Distractors were either visually similar or dissimilar to the target, and appeared in either a target-relevant or target-irrelevant region (operationalized by the Surface Guidance Framework; Pereira & Castelhana, 2017). We found that target-relevant distractors were fixated significantly more often (30%) than target-irrelevant distractors (17%), with no effect of distractor-target similarity and no interaction. These findings support that attention is differentially distributed depending on



target-relevance, and further suggest that this distribution can bias attention independently of visual similarity to the target. Implications for scene and target processing will be discussed. Email: Ellen O'Donoghue, 0demo1@queensu.ca

12:00-1:30 PM (4025)

Mitigating Distraction by Irrelevant Items in Visual Search in ADHD. TESSA ABAGIS and JOHN JONIDES, *University of Michigan - Ann Arbor* (Sponsored by John Jonides) — A major symptom of Attention Deficit Hyperactivity Disorder (ADHD) is increased distractibility by irrelevant stimuli in the external environment, often resulting in less effective cognitive processing. We conducted a visual search task in which irrelevant color singleton distractors appeared during the visual search on 50% of trials. In the first half of the task, participants diagnosed with ADHD had more distractor interference than otherwise healthy participants. In the second half, participants with and without ADHD performed no differently from each other. However, participants with high rated inattention, regardless of ADHD diagnosis, performed the same as participants with low inattention throughout the entire task. Results suggest that people with ADHD may require more practice on a task to minimize distraction, but, with enough time, can perform as well as those without ADHD. Current studies are underway to evaluate how breaks during the task and the length of the task affect distraction in both ADHD and healthy participants. Email: Tessa Abagis, tabagis@umich.edu

REWARD, MOTIVATION AND DECISION MAKING

12:00-1:30 PM (4026)

Task-Switching and Eating Behavior: The Ability to Switch From Unhealthy vs. Healthy Food Stimuli. LINDSEY GEARHART and ELISE KURY, *Juniata College* — Given the current obesity epidemic in the U.S., it is important to study the attentional and cognitive mechanisms of unhealthy eating. In the present study, we examined the role of task-switching in unhealthy eating. Participants categorized pictures of foods as healthy (e.g., banana) or unhealthy (e.g., cupcake) and pictures of objects as inside (e.g., toaster) or outside (e.g., lawn mower). We hypothesized that participants would have greater difficulty switching away from an unhealthy food stimulus than a healthy food stimulus. We found that participants were significantly faster at correctly identifying healthy foods than any other stimulus. Participants were slower at completing the current trial when the previous trial involved categorizing an unhealthy food stimulus. These results suggest that switch cost may vary depending on the type of food, but more work is needed to disentangle the effects of distraction versus inhibition on food choices and eating behavior. Email: Rebecca Weldon, weldon@juniata.edu

12:00-1:30 PM (4027)

Social Rewards Promote Habitual Behaviour in Low-Autism Trait Adults. LEONIE BALTER and JANE E. RAYMOND, *University of Birmingham* — Performance on most complex tasks relies on a combination of habitual and goal-directed

(strategic) control over behaviour. In two studies using different methods to index habitual control over behaviour, we asked whether typical adults who are low versus high in autism-like traits (AQ) would show a greater propensity for habitual responding when social rewards were provided, reflecting the putative greater social skill of the former group. Although both high and low AQ groups behaved similarly when monetary rewards were available, only the low AQ group showed poor recovery from contingency change when social rewards were provided, and a greater propensity for model-free (versus model-based) responding in a two-state rewarded choice task. This supports the notion that people low versus high in autism-like traits more readily default to habitual control for some aspects of a social task, giving themselves greater capacity to solve the complex puzzles typical of many social interactions. Email: Jane Raymond, j.raymond@bham.ac.uk

12:00-1:30 PM (4028)

Carrot or Stick? Cognitive Control Depending on Motivational Valence. JONG MOON CHOI, JUYOUNG PARK and YANG SEOK CHO, *Korea University* — We examined the interaction between cognitive control and motivation induced by monetary incentives. Participants were encouraged to respond fast and accurately to gain reward (appetitive motivation) in Experiment 1 and to avoid punishment (aversive motivation) in Experiment 2 while performing a Simon task. In Experiment 1, the conflict effect after congruent trials was smaller when the expected reward size was large than it was small. However, the congruency sequence effect (CSE) was not observed in the blocks with large reward even though the CSE was evident in small reward. In Experiment 2, the conflict effect was greater in large punishment than small punishment. The CSE was equivalent regardless of the amount of punishment. The results indicate that the conflict resolution could be modulated depending on the motivational valence, and the sequential adjustment of conflict is independent from the current goal pursuit. Email: Jong Moon Choi, choi.jmoon@gmail.com

12:00-1:30 PM (4029)

The Dark Side of Peer Excellence: Do Exemplary Peers Undermine Motivation? JESSICA CANTU and KIT W. CHO, *University of Houston-Downtown* — A common technique implemented by educators is to use an exemplary student's work as an example for other students to strive towards. Although the principle behind this technique is to elevate the motivation of underperforming students, it may produce the opposite effect and cause students to disengage from the task, producing a discouragement by peer excellence effect. The current study's goals were to (1) replicate this effect using college students, and (2) determine whether this effect is intensified among nontraditional college students (e.g., work full time while in school, have dependents). Participants were first asked to write a short essay in response to a philosophical quote. They were then asked to read either poorly written or exemplary essays, purportedly written by their peers in response to the same quote. To measure discouragement by peer excellence, participants were then given an opportunity to write another



essay. Our results showed that traditional college students were less likely to write another essay if they had previously read exemplary essays, demonstrating the discouragement by peer excellence effect. However, this effect was absent among nontraditional college students.

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12:00-1:30 PM (4030)

Pokéballs and Gym Brawls: Ways of Knowing and Learning Pokémon Go. KATHLEEN M. GALOTTI, MICHAEL J. SCHNEEKLOTH, ANNA SMITH, CARL BOU MANSOUR and ANDREA LISA NIXON, *Carleton College* — This study explored implications of individual differences in epistemological approaches to knowledge and learning. We examine the relationship between “separate” and “connected” ways of knowing and assessments of how enjoyable and how important different intellectual activities are. We conducted this study online, with a sample of 200 undergraduate players of a new location-based, augmented reality game, *Pokémon Go* as it first came online. We correlated separate and connected knowing scores with various ratings of ongoing learning tasks—acquiring knowledge of different aspects of the game. Our results replicated previous findings of gender differences in separate knowing (SK) and connected knowing (CK) scores. SK and CK scores showed different and strong patterns of correlation with individuals’ enjoyment ratings with different aspects of learning the augmented reality game. Results are discussed in terms of the larger issue of beliefs students hold about learning activities and experiences.

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12:00-1:30 PM (4031)

Variations in the PRKG1 Gene Predict Differences in Human Goal-Directed Behaviour. ANDRIY STRUK, *University of Waterloo*, MARLA SOKOLOWSKI, *University of Toronto*, ABIGAIL SCHOLER and JAMES DANCKERT, *University of Waterloo* — Prior research has demonstrated that polymorphisms in the ‘foraging’ gene are associated with distinct behavioral patterns in various species. In one species, *Drosophila*, these polymorphisms are associated with two phenotypes: “rover” – animals that explore their environment widely, and ‘sitters’ – animals with more restricted pattern of exploration. We investigated the human homologue of the ‘foraging gene’ - PRKG1 in *human* goal-pursuit using self-report and a foraging task. Results demonstrate that PRKG1 polymorphisms correspond to ‘rover’ and ‘sitter’ behaviours in *Drosophila*. That is, distinct behavioural patterns associated with PRKG1 (rs13499) polymorphisms differentiated people who adopted either an Assessment regulatory mode – (i.e., making sure to “do the right thing”), or a Locomotion regulatory mode – (i.e., “just doing it”). Those with the PRKG1 variant characterized by Assessment were biased to ‘hug’ the boundary of our search environment. These results suggest a role for PRKG1 in goal-directed behaviour and demonstrate gene-behaviour conservation across species.

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12:00-1:30 PM (4032)

Measuring Individual Differences in Risk Tolerance: The Number Picker Task. SUSAN G. CAMPBELL, VALERIE P. KARUZIS and LELYN D. SANER, *University of Maryland College Park* — Most risk tolerance measures are designed for clinical populations and are therefore designed to correlate with pathological risk-taking behavior. We developed a measure of risk tolerance called the Number Picker task in order to predict non-pathological risk taking in the cybersecurity domain. This task involves a forced choice between two gambles in which the outcome probabilities and point values are visually countable, potentially reducing the effects of framing and numeracy. The task produces two dissociated outcome measures: the likelihood of gambling in equal-expected-value situations and the likelihood of picking the alternative with higher expected value in unequal-expected-value situations. Participants avoided gambling in the equal-expected-value case, but were sensitive to differences in expected value. The two outcomes were not related to each other, and correlations with cognitive measures assessed at the same time were also low. The measure produced outcomes which could be useful for predicting performance in cyber occupations.

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12:00-1:30 PM (4033)

Target Prevalence Influences the Effect of Feedback in a Face Matching Paradigm. DAWN R. WEATHERFORD, *Texas A&M University-San Antonio*, WILLIAM BLAKE ERICKSON, *University of Missouri*, JASMYNE THOMAS and MARY ELLEN WALKER, *Texas A&M University-San Antonio* — A person can look different from their ID card and similar to someone else’s ID card. Therefore, deciding if a person is a match or mismatch to an ID card can be difficult and error-prone. Research suggests that the prevalence of matches to mismatches (10/90; 50/50; 90/10) and feedback (complete, error-only, none) may interact to further affect error rates. In our study, participants viewed 100 trials of an image beside an ID card and made identity decisions from 1 (definitely different) to 6 (definitely same). For both match and mismatch trials, feedback (complete and error-only) interacted with prevalence by decreasing error rates at 90% prevalence and increasing error rates at 10% prevalence. More importantly, error rates were highest for mismatch trials when 10% prevalence was combined with feedback. We explore possible cognitive mechanisms that drive these effects as well as real-world implications for identity-matching professionals and researchers.

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12:00-1:30 PM (4034)

Alphabet Switching and Memory Load: A New Perspective on Bilingual Processing. DUŠICA FILIPOVIĆ ĐURĐEVIĆ, *University of Novi Sad*, LAURIE B. FELDMAN, *University at Albany; Haskins Laboratories* — We take advantage of the phonological ambiguity effect (PAE) in Serbian (Feldman & Turvey, 1983) to investigate the involvement of working memory in word recognition. We subject participants to a working memory load while they engage in a visual lexical decision task with phonologically ambiguous and



phonologically unambiguous renditions of the same words, presented in Cyrillic or Roman letters (sound-letter ambiguity varies with alphabet). We replicate the PAE and observe its increase with memory load as well as a secondary task by ambiguity interaction. Specifically, the load from phonological loop was more detrimental for phonologically ambiguous than unambiguous words, confirming the involvement of phonological processes in visual word recognition. Crucially, the phonological ambiguity effect was even larger during central executive load, thus revealing, for the first time, the involvement of executive functions in the process of alphabet switching thus making parallel activation in bialphabetism comparable to bilingualism.

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12:00-1:30 PM (4035)

The Impact of Appearance-Based Expectations on Cooperation and Punishment. LAURA MIETH, RAOUL BELL and AXEL BUCHNER, *Heinrich Heine University* — We tested how appearance-based expectations affect cooperation and punishment. Participants played a prisoner's dilemma game with partners who had a likable or unlikable facial appearance (Experiments 1) or a smiling or neutral facial expression (Experiment 2). After each round of the game, the participants decided whether they wanted to invest money to punish the partners by decreasing their payoffs. Aggregated over trials, participants spent more money to punish likable-looking and smiling defectors than to punish unlikable-looking and nonsmiling defectors. However, this effect was indirect rather than direct: Participants cooperated more with likable-looking and smiling partners, which provided the participants with more opportunity to punish moralistically when their cooperation was not reciprocated. When expressed as a conditional probability, moralistic punishment did not differ between likable-looking and smiling in comparison to unlikable-looking and nonsmiling faces.

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12:00-1:30 PM (4036)

A Comparison of Experience-Based vs. Description-Based Delay Discounting Tasks. ASTIN CORNWALL and DARRELL A. WORTHY, *Texas A&M University* — Humans and animals value rewards differently depending on whether they are received immediately or at some point in the future. To measure preference for immediate versus delayed rewards, researchers have traditionally used description-based delay discounting tasks. We developed an experience-based discounting task where participants were rewarded based on how long they took to press a response key. Larger rewards were given following longer delays, but reward receipt was probabilistic, and participants were more likely to receive smaller than larger rewards. Short response times led to highly probable small rewards, while longer response times led to larger, but less likely receipt of larger rewards. Performance in the experience-based discounting task was associated with performance in a standard delay discounting task. However, in the experience-based task

alone, men responded more slowly than women, indicating a greater willingness to risk gaining no reward for the possibility of gaining larger rewards.

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12:00-1:30 PM (4037)

How Does the Addition of Less-Definitive Conclusions Affect the Decision-Making of Fingerprint Experts?

KELLY CARTER, MACGREGOR D. VOGELSANG and BRANDI R. EMERICK, *Indiana University, Bloomington*, JOHN VANDERKOLK, *Indiana State Police*, THOMAS A. BUSEY, *Indiana University, Bloomington* — During fingerprint analyses, an expert examiner visually compares two fingerprints to determine whether or not they originated from the same source. They consider the amount of perceived detail in agreement to construct a value on an internal evidence axis. This value is then mapped to one of three conclusions: identification, inconclusive, or exclusion. The challenge with this three-conclusion scale is that it loses information when translating the examiner's continuous internal evidence value to a verbal conclusion. Using a naturalistic comparison task with fingerprint examiners, we contrasted this scale with one with two additional conclusions: 'support for common sources' and 'support for different sources'. Although this expanded scale more accurately reflects the nature of the evidence, it runs the risk of producing fewer positive conclusions and overall worse utility to the criminal justice system. Our results demonstrate how examiners use the expanded scale, which will guide policymaking in the forensic sciences.

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12:00-1:30 PM (4038)

Neural Correlates of Real-Life Self-Control: Deficient Error-Related Brain Activity Predicts Daily Self-Control Failures.

MARTIN KRÖNKE, MAX WOLFF, HOLGER MOHR, ANJA KRÄPLIN, MICHAEL SMOLKA, GERHARD BÜHRINGER and THOMAS GOSCHKE, *Technische Universität Dresden* — While deficient self-control has been associated with a wide range of harmful behaviors incurring severe personal and societal costs, the neurocognitive mechanisms underlying real-life self-control failures (SCFs) are insufficiently understood. Previous studies showed that SCFs were predicted by decreased activity in the right inferior frontal gyrus (rIFG) involved in inhibitory control. Here we investigated the hypothesis that insufficient recruitment of cognitive control in individuals showing low self-control may result from impaired performance-monitoring. Using a brain-as-predictor approach, we combined smartphone-based experience sampling of daily SCFs with fMRI of error-related brain activity in a Stroop task. In our sample of 118 participants, proneness to daily SCFs was reliably predicted by low error-related brain activation in a performance-monitoring network (including anterior mid-cingulate cortex, preSMA, anterior insulae), low post-error activation in the rIFG, and reduced post-error slowing. Results support the idea that deficient error monitoring may



increase proneness to daily SCFs due to insufficient recruitment of cognitive control in situations involving conflict between immediate desires and long-term goals.

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12:00-1:30 PM (4039)

The Relationship Between Physical and Cognitive Effort-Based Decision-Making. KAILEIGH A. BYRNE and DARRELL A. WORTHY, *Texas A&M University* (Sponsored by Darrell Worthy) — Current effort-based decision-making paradigms often contain confounds in cognitive ability. This study examined the relationship between physical and cognitive effort expenditure for rewards in order to develop a more precise cognitive effort measurement. Participants performed a working memory assessment and standard physical effort task as well as a novel cognitive effort expenditure for rewards task. The cognitive effort task utilized a category learning paradigm in which individuals chose to categorize a small number of stimuli (easy task) or a larger number of stimuli (difficult task). Results indicated that individuals are more willing to exert cognitive effort for rewards than physical effort, and secondly, working memory capacity is associated with cognitive effort, but not physical effort. Furthermore, effort expenditure for physical and cognitive effort tasks was not significantly correlated, suggesting that effort expenditure is domain-specific. This study demonstrates that motivation to attain rewards does not necessarily override task demands; rather, reward motivation may have different “costs” to some individuals compared to others, depending on whether the task entails physical or cognitive effort.

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12:00-1:30 PM (4040)

The Medium or Message: Using Delay Discounting to Understand Willingness to Drive Distracted. ASHLEIGH V.T. WISE, PAUL ATCHLEY and MOHAMMAD ALI SALEHINEJAD, *University of Kansas* (Sponsored by Paul Atchley) — Smartphones have been suggested to increase the willingness of drivers to engage with distraction. This work examined this suggestion using a delay discounting procedure in which participants chose between a smaller reward immediately or a delayed larger reward paired with the opportunity to respond to messages. Experiment one examined differences in urgency to respond to the same message but via a text message, postcard, or post-it note. The text produced the greatest sense of urgency. Experiment two examined if text messages were special in some way or if any message by smartphone is urgent by examining responses to texts, email, or voicemail. Participants did not differ in willingness to respond to different modes of communication by smartphone. These findings suggest messages received by smartphone produce a special sense of urgency, which can partially explain why drivers have such a hard time ignoring their phones while driving.

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12:00-1:30 PM (4041)

Explaining the Role of Option Complexity in Measuring Age Differences in Risk Attitude: A Drift Diffusion Modelling Approach. VERONIKA ZILKER and THORSTEN PACHUR, *Max Planck Institute for Human Development* (Sponsored by Thorsten Pachur) — It has commonly been concluded that older adults (OA) are less likely to choose risky gains than younger adults (YA). Many of the relevant studies have employed choice problems asking participants to choose between a safe and a risky option. However, safe options, defined by a single outcome, are easier to process than risky options, that require the integration of several probabilistic outcomes. OA with impaired fluid capacity may be particularly drawn to such simple, safe options. We test the hypothesized effect of age and complexity on risky choice in a set of lottery problems that disentangles risk and complexity. As predicted, safe gains were less attractive for OA when presented in a more complex format. Furthermore, on choices between two equally complex risky gains—a measure not confounded by complexity—YA and OA showed similar levels of risk aversion. Hence, previously reported increases in risk aversion in OA may be largely due to confounded stimulus material. Controlling for age differences in complexity attitude eliminates these apparent age differences in risk attitude. Using cognitive modelling with drift diffusion models, we further explore the underlying cognitive processes.

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12:00-1:30 PM (4042)

Predicting Context: Priming for Decision Contingencies Facilitates Self-Control. PAUL F. HILL, KATHARINE C. HARRIS and RACHEL A. DIANA, *Virginia Tech* (Sponsored by Rachel Diana) — Episodic future thinking is known to reduce impulsivity in intertemporal decisions but the mechanism by which it operates is unknown. We investigated whether atemporal priming for upcoming decision contingencies also promotes intertemporal self-control. Forty undergraduate participants completed a context-dependent decision making task that probabilistically alternated between delay discounting (DD) and response inhibition (RI) trials. DD and RI trials were associated with unique border designs that cued task context. Latencies between context cue and task stimuli onsets were evenly split between 1s and 0s. Participants also completed a sequential reward-learning task that dissociated between model-free reinforcement learning from more deliberative model-based decision making strategies. Priming for an upcoming decision context, in the absence of a future focus, significantly improved rates of intertemporal self-control. This effect was observed among participants regardless of whether they adopted deliberative- or reinforcement-based decision making strategies. These results suggest that selective attention serves a vital role in the functional link between episodic foresight and self-control.

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12:00-1:30 PM (4043)

Psychophysiological Links to Uncertainty in Decision-Making. MEGAN CAPODANNO, ANTONIO SALAMANCA, HEATHER KLEIDER-OFFUTT and DAVID



WASHBURN, *Georgia State University* (Sponsored by Heather Kleider-Offutt) — The capacity to monitor and respond to the experience of doubt is among the most sophisticated abilities of the human mind. Large individual differences in responsiveness to uncertainty have been observed in previous research wherein participants perform a discrimination task and their uncertainty is objectively demonstrable (participant accuracy falls to chance). Psychophysical measures have been previously implemented in myriad of psychological studies as a way to examine implicit responses to stimuli. The present study used the measurement of facial electromyography of the corrugator muscle, electrodermal response and electrocardio response in order to observe implicit physical response to uncertainty. These psychophysiological responses were examined as they are related to various negative stimuli such as stress or negative imagery in previous research. Preliminary results suggest that the uncertainty response is associated with changes in psychophysiological response in a psychophysical categorization task. These findings have possible implications in adaptive decision-making

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12:00-1:30 PM (4044)

The Volitionality of Evidence Accumulation. TIMOTHY BALLARD, DAVID SEWELL and ANDREW NEAL, *The University of Queensland* — Evidence accumulation models of response time typically attribute differences in the rate of evidence accumulation to one of two sources. The first source is factors external to the decision maker, such as the quality of the stimulus. The second is individual differences in the ability of decision makers to process information. However, theories of information processing recognize that capacity also depends on the amount of attentional resources allocated to the task, suggesting that the rate of evidence accumulation may be partially under the control of the decision maker, and adjusted based on factors such as task importance. We tested this prediction using a random dot motion detection task in which participants viewed clouds of moving dots and had to determine whether the dots were moving mostly left or mostly right. For each block, the participants were given the goal of being more accurate and faster than the average participant in a pilot study. We varied the quality of the stimulus (i.e., the proportion of dots moving coherently in one direction) and the incentive that could be obtained for achieving the goal. We predict that drift rate will be higher when a larger incentive can be obtained. The results are pending.

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12:00-1:30 PM (4045)

The Influence of Reward Magnitude on Categorization Decisions. RENÉ SCHLEGELMILCH and BETTINA VON HELVERSEN, *University of Zurich* (Sponsored by Bettina von Helversen) — Differences in reward have been shown to affect memory and attention processes, but whether they change learning and generalization in categorization is still unclear. To study this, participants first underwent a category learning phase where rewards for the correct categorization of different exemplars were manipulated (high vs. low). Then they

performed a test phase including novel items without feedback. In the training phase categorization accuracy was higher for items associated with high rewards. Interestingly, this seems to be due to a decline in accuracy for low reward items, instead of a gain for high reward items. In the test phase about a third of participants were best described by a model assuming that reward changes the representations of the exemplars, but overall, reward did not influence responses to novel items. A second study addresses how reward magnitude during category learning might affect category generalization in more detail.

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12:00-1:30 PM (4046)

Winning Isn't Everything: Differential Effects of Gain and Loss Experiences on Risk Taking. ANDREA Y. RANIERI and SANDRA L. SCHNEIDER, *University of South Florida* (Sponsored by Doug Rohrer) — How information is presented and experienced can be just as influential to judgment as its content. Using a series of two-outcome lottery pairs we examine the effects of a steady accumulation of wealth versus a less predictable accumulation of wealth on risk-taking behaviors. Although both conditions yielded the same net earnings, participants experiencing steady gains with less predictable large losses were risk averse, and participants experiencing steady loss with less predictable large gains were risk seeking. We suggest that the contextual valence of experience, specifically the preponderance of good or bad options, is an important driver of risk taking propensities.

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EMBODIED COGNITION

12:00-1:30 PM (4047)

Grasp Affordances Enhance Target Detection Near the Hands. ROBERT MCMANUS and LAURA E. THOMAS, *North Dakota State University* — Observers show biases in visual processing when viewing objects within versus outside of their hands' grasping space. For example, people are faster to detect targets presented near a single hand than targets presented far from the hand. While the hands' proximity to stimuli plays a key role in these effects, recent evidence suggests an observer's affordances for actions also shape visual processing in peripersonal space. The current study examined the relative contributions of hand proximity and grasp affordances to visual biases near the hands. Participants placed a single hand on a visual display and detected validly and invalidly cued targets appearing near or far from the hand. Across conditions, the hand was either free, creating an affordance for a grasping action, or immobilized, eliminating the potential to grasp. While participants were faster to detect invalidly cued targets near the hand in both the hands-free and hands-immobilized conditions, on valid trials, there was only an advantage for detecting targets appearing near a free hand. These results suggest that grasp affordances make a contribution to near-hand visual biases which supplements the effects of hand proximity.

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12:00-1:30 PM (4048)

Embodied Valuation: Directional Action is Associated With Item Values. DANIELLE J. GREEN, *Claremont Graduate University*, ALISON HARRIS, ALEENA YOUNG and CATHERINE L. REED, *Claremont McKenna College* — Although many economic theories represent valuation as a cognitive process independent of the sensorimotor system, embodied theory suggests that our memories for items' value should be linked to actions used to obtain them. We investigated whether the value of real items was associated with specific directional movements toward/away from the body. Participants priced food items to determine their values; then they used directional actions to classify items as high- or low-value. To determine if value is linked to specific action mappings, movements were referenced either with respect to the object or self. Regardless of being assigned to or choosing an object-referenced mapping, participants were faster than those using a self-referenced mapping. A control experiment using left/right movements found no difference when action mappings were not toward/away from the body. Results indicate directional actions towards items are associated with the representation of their value, suggesting an embodied component to economic choice.

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12:00-1:30 PM (4049)

Cell Phone Use Distorts Spatial Distance Estimates. TRI NGUYEN, ERIC AMAZEEN and ARTHUR GLENBERG, *Arizona State University* — Using a tool to interact with a distant object leads to a compressed perception of distance to the object. However, it is not known whether this effect extends beyond simple tools (e.g., stick, hand rake, etc.) used in existing research. In the current study, we examined whether the same spatial distortion effect occurs when participants use a cell phone to make a call. Participants in one group used the cell phone to call someone standing at another location and engaged in a partially scripted conversation about the locations. The control participants used the same script for a face-to-face conversation. Participants who used the cell phone judged the distance between the two locations to be shorter than those who had a face-to-face conversation. This finding a) demonstrates that complex tool use can distort spatial perception as do simple tools, and b) has implications for an embodied/extended cognition perspective.

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12:00-1:30 PM (4050)

The Interference Effect in Moral Spatial Metaphor: The Influence of Implicit Vertical Spatial Sentence Processing on the Categorization of Moral Words. ZHONGYI LU and NING JIA, *Hebei Normal University* — In the current study, 4 experiments tested for the interference effect in moral spatial metaphor by using sentence priming paradigm. In Experiment 1, after reading the sentences with vertical spatial information, participants were asked to categorize the (im)moral words Immediately. In the following two experiments, the starting positions (Experiment 2) or termination positions (Experiment 3) need to focus on. In Experiment 4, there was a 4s interval

between reading task and categorization task. The results show a mismatch interference effect in Experiment 1, 2 and 3: when the position is UP, immoral word can be categorized faster; when the position is Down, moral word is faster. But in Experiment 4, the result was reversed. It can be inferred that the spatial information in sentence does activate the moral metaphor. But, the sentence processing need more time. If participants categorize the words Immediately, the two tasks will compete for the same cognitive resources. Then, a mismatch interference effect arises. If participants have enough time to finish the reading task to activate the moral metaphor, then an interference effect arises. In summary, the competition or activation of resources affects the interference effect.

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12:00-1:30 PM (4051)

Does Thinking About a Turtle Slow You Down? Semantic-Features Dealing With Motion Influence Word Identification Times. STEVE BUENO, ALIX SEIGNEURIC and HAKIMA MEGHERBI, *Université Paris 13 Sorbonne Paris Cité* — The influence of a linguistic material on the speed of a subsequent motor or cognitive process has been tested through different procedures since the initial (but controversial) Bargh et al. (1996) demonstration. The reading of a linguistic material can lead to an acceleration (in text comprehension for instance, Fecica & O'Neill, 2010) or on the contrary to a slowing-down (in a motor behavior as demonstrated by Bargh et al. for instance). We have shown in a previous work that participants performing a LDT elicited slower RTs when the list they were performing started with a block of words containing semantic-features dealing with slowness. By contrast, no effect of acceleration was observed with semantic-features dealing with speed. Results were interpreted in the framework of the embodied cognition theories of language. Supplemental experiments using a task known for better activating semantic-features (the Semantic Categorization Task) are presented and discussed.

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12:00-1:30 PM (4052)

Getting a Grip on Embodiment: What Drives Motor Effects in Lexical-Semantic Processing? ALISON HEARD, *University of Calgary*, CHRISTOPHER R. MADAN, *Boston College*, PENNY M. PEXMAN, *University of Calgary* — Words rated higher in body-object interaction (BOI) are typically processed faster than words rated lower in BOI in lexical and semantic tasks. This BOI effect has been taken as support for theories of embodied cognition. High BOI words vary widely, however, on a number of sensorimotor dimensions. We investigated whether BOI might be comprised of several subdimensions. We collected ratings for 7 candidate semantic dimensions and investigated the relationships of those dimensions to BOI and to lexical-semantic processing. Results showed that high BOI words tended to be more animate, easier to grasp and to pantomime, and associated with more actions. In an analysis of semantic decision task responses we found that latencies and errors were best predicted by words' graspability and that BOI,



ease of pantomime, and size were also significant predictors. The results support the inference that multiple semantic dimensions drive BOI effects in lexical-semantic processing.
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12:00-1:30 PM (4053)

Movement-Induced Self-Reference Effect: Evidence for Disembodied Self-Referential Processing. MARK A. OAKES and SERGE ONYPER, *St. Lawrence University* — Incidental movement toward one's body while categorizing stimuli increases memory for those items relative to items pushed away. In the current set of studies, we demonstrate that neither a particular muscle movement (i.e., flexion) nor the physical self are necessary to generate this movement-induced self-reference effect (MISRE). The findings of Experiment 1 revealed that movement toward one's cell phone, but not the researcher's phone, positioned across from the participant increased memory for words presented during the movement. In Experiment 2, a participant's selfie was projected at the top, bottom, or left/right of the computer screen. Participants were asked to either move a word toward their selfie or a selfie of an unfamiliar individual. Memory was elevated for movement toward one's own selfie compared to an unfamiliar selfie regardless of its position. These findings suggest that (1) self-referential processing can be induced by movement incidental to the memory task, and (2) the critical aspect of the MISRE is movement *toward* a representation of self, regardless of embodiment or position of the self.

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12:00-1:30 PM (4054)

Does Meditation Alter Awareness of Body Space? NATHAN HOULE, JESSICA LALONE, EMILY K. BLOESCH and CHRISTOPHER C. DAVOLI, *Central Michigan University* — Awareness of body space can be defined as knowing where we are with respect to the physical world, achieved through the coordinated integration of information from both outside and inside the body. Prior research has found that body space can be altered through the use of mental imagery and imagination; meditation, which draws on mental imagery and awareness of physical states, may have a similar ability to affect body space. Here, we assessed participants' body space awareness through verbal behavior, specifically through their use of spatial demonstratives ("this" vs. "that") when describing objects in the physical environment that were at varying distances from their bodies. Participants were undergraduates and primarily novice meditators. We present initial results showing how meditation affects body space awareness compared to control conditions (progressive muscle relaxation, mind-wandering, and a sham meditation). We discuss implications for psychological disorders that are marked by disturbances in spatial judgment relative to oneself (e.g., social anxiety, PTSD) as well as body space changes that occur in healthy aging.

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12:00-1:30 PM (4055)

Becoming a Martian Archeologist: Investigating Cortical Representations of Novel Tools. HEATH E. MATHESON, ARIANA M. FAMILIAR and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* — Theories of grounded cognition propose that we recognize tools in part by reactivating the sensorimotor representations that are active during tool use. If sensorimotor information plays a role in tool recognition, then we should be able to predict tool-identity from the patterns of neural activity in sensorimotor areas. We sought to test this hypothesis by directly manipulating participants' sensorimotor experience during tool learning. We trained one group of participants to use a set of novel, 3-D printed tools under the pretense that they were preparing for an archeological expedition to Mars; we trained a second group to report declarative information about how the tools must be stored. In the scanner, participants made conceptual judgments about images of these tools. Using multivariate pattern analyses and whole brain searchlight methods, tool identity was predicted by patterns within the posterior parietal cortex, but only in the group that had sensorimotor experience with the tools. These results are the first to show that manipulation experience during learning differentially modulates pattern representations of the identity of tools, suggesting that grounded representations contribute to conceptual judgments.

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12:00-1:30 PM (4056)

The Dynamics of Discovery: Finding Solutions to the Soma Cube. ASHLEY DHAIM, SHIREENA MCGEE, TEHRAN DAVIS and ADAM SHEYA, *University of Connecticut* — Everyday we demonstrate a profound ability to organize our activity over time and to task: we find our way to locations, we carry on conversations and we compose papers. All these tasks have clear goals but not necessarily clear plans of action. Rather it is in participating in these activities that the path to the goal is discovered. This open online coordination appears to be a characteristic of goal-directed behavior at all levels from individual motor acts to navigating to problem solving to communication, and thus, the dynamics of discovery is a fundamental aspect of cognition. In the current research, we use a model task to explore the dynamics of discovery. The task involves solving a spatial puzzle, the Soma Cube. What is important is that there are many solutions to the puzzle but none of the solutions are obvious and every solution requires multiple steps to complete. Eye, hand and head movements were tracked as participants made multiple attempts to solve the puzzle. The result supports the hypothesis that the participant's activity might be itself driving re-organization of the perceiving-action system in such a way to make the discovery more likely.

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12:00-1:30 PM (4057)

Detecting Spatial Orientation Demand During Virtual Navigation Using EEG Brain Sensing. THINH NGUYEN-VO and BERNHARD E. RIECKE, *Simon Fraser University - Surrey* (Sponsored by Bernhard Riecke) — The current study shows how brain sensing can offer insight to the evaluation of human



spatial orientation in virtual reality (VR) and establish a role for electroencephalography (EEG) in virtual navigation. Research suggests that the evaluation of spatial orientation in VR benefits by going beyond performance measures or questionnaires to measurements of the user's cognitive and neurophysiological state. While EEG has emerged as a practical brain sensing technology in cognition research, spatial orientation tasks often rely on which reference frame participants used, their ability to update head rotation, and/or left-right confusion which may be inaccessible to this measurement. EEG has been shown to correlate with human spatial orientation in previous research. In this paper, we use convolutional neural network (CNN), an advanced technique in machine learning, to train a detection model that can identify moments in which VR users gain some increase in spatial orientation demands. Our results demonstrate that we can indeed use machine learning to detect such cognitive states as spatial orientation demanding in virtual reality research with 96% accuracy on average.

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12:00-1:30 PM (4058)

Cold Hands and a Warm Heart: Attention Grabbing?

AYLIN GANN and CONNIE SHEARS, *Chapman University* — Embodied cognition suggests that people will adjust their social attitude based on the temperature that they experience (Bargh and Shalev, 2011). Will we be more likely to engage in our environment after holding a hot or cold item? This study investigated the connection between thermal change via tactile versus environmental manipulations in association with a person's level of attention. Participants are randomized to experience either a warmer, colder, or neutral temperature either through the temperature of the room or through a handheld hot/cold pack. While the temperature change takes effect, participants watch a neutral video for 15 minutes and afterward complete an open-ended quiz about the video. Preliminary data imply that when participants experience temperatures through tactile sensation, they attend more to the video with a higher rate of accuracy and more verbose responses, compared to participants who experience environmental temperature change. These findings suggest temperature changes to the hands effect attentional processes.

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12:00-1:30 PM (4059)

Compression of Environmental Representations Following Interaction With Objects. ANDREW CLEMENT, GABRIEL A. RADVANSKY and JAMES R. BROCKMOLE, *University of Notre Dame* (Sponsored by James Brockmole) — Interacting with all objects in an environment leads observers to underestimate the distances between objects and the overall size of the environment. We investigated whether interacting with only a subset of objects compresses spatial memory for the entire environment. Participants inspected ten objects in a room by either passively viewing all the objects, picking them all up, or picking up half of the objects and passively viewing the other half. Afterward, participants estimated the distance between each pair of objects from memory. Participants who picked up objects recalled shorter object-pair distances for all objects in

the room, regardless of whether they picked up all objects or just half of them. Thus, interacting with a local subset of objects led to global compression of the environment in memory. This suggests that objects are not stored independently in memory, and that acting on an environment influences memory for all objects within it.

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12:00-1:30 PM (4060)

Language-Induced Action-Compatibility Effects: Simulations or Stereotypes? MORGAN TESKEY, DANIEL N. BUB and MICHAEL E.J. MASSON, *University of Victoria* (Sponsored by Michael Masson) — Embodied accounts of language processing propose that meaning is constructed with the assistance of relevant sensory-motor representations. In support of this view, understanding a sentence describing a movement in a clockwise or counterclockwise direction is more efficient when simultaneously viewing a stimulus moving in a compatible direction. This action-compatibility effect is ascribed to the simulation of a specific motor program developed through one's physical experiences with a particular object. We present evidence that these effects can also be generated by generic motor stereotypes rather than actions linked to specific objects. Motor stereotypes are typically consistent with the action implied by the meaning of a sentence, making it difficult to disentangle the individual contributions made by each factor. We will demonstrate a case in which a motor stereotype is not compatible with everyday experiences, and establish that motor stereotypes make a substantial contribution to language-induced action-compatibility effects.

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12:00-1:30 PM (4061)

Is the Motor Activity Elicited by Reading Time Shifts Affected by Linguistic Factors? JULIE E. CARRANZA and MICHAEL P. KASCHAK, *Florida State University* (Sponsored by Michael Kaschak) — Previous research has demonstrated a motor compatibility effect in the comprehension of language about shifts in time: motor responses away from the body are faster when discussing shifts to the future, and motor responses toward the body are faster when discussing shifts to the past. Here, we explore the generality of these effects by manipulating the manner in which the time shift is presented to readers. In some cases, the time shift information was placed at the beginning of the critical sentences, and in other cases the information was presented at the end of the sentence. Our results suggest that the motor compatibility effect is more robust when the temporal information is presented in the sentence final position. The implications of these results for explanations of the temporal motor compatibility effect are discussed.

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12:00-1:30 PM (4062)

Emotion Recognition With Mouse Cursor Motions: Affective Computing Approach. TAKASHI YAMAUCHI, *Texas A&M University*, KUNCHEN XIAO, *University of Nevada - Reno* — As the face conveys information about a person's emotions, do movements of the computer cursor inform her emotions? This



study integrates mouse cursor motion analysis into affective computing and investigates the extent to which movements of the computer cursor can provide information about emotion of the computer user. We extracted 16~26 trajectory features during a choice-reaching task, and examined the link between emotion and cursor motions. Participants were induced positive or negative emotions by music, film clips, or emotional pictures, and indicated their emotions with questionnaires in three experiments. Our 10-fold cross validation analysis shows that statistical models formed from “known” participants (training data) could *predict* nearly 10-20% of the variance of positive affect and attentiveness ratings of “unknown” participants, suggesting that cursor movement patterns such as the area under curve (AUC) and direction change provide information about emotion.

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12:00-1:30 PM (4063)

Effects of Stimulus Color on Body Analogy in Mental Rotation. SHIIKA MAKINAE and TETSUKO KASAI, *Hokkaido University* (Sponsored by Tetsuko Kasai) — Mental-rotation performance can improve when adding a face at the top of cube arrays or making them possible posture imitations (body analogy). However, previous studies that showed such effects used only pink cubes (Amorim et al., 2006; Voyer & Jansen, 2016). In this study, we tested whether body analogy is useful for mental rotation regardless of cubes' color (pink, blue). The task was to judge whether a pair of cube arrays was the same or not, and face addition and imitation possibility were orthogonally manipulated. The results showed that both face and imitable postures were useful for mental-rotation performance in the pink and blue conditions. However, the imitation-possibility effect when face was not added was greater for pink rather than blue cubes. This suggests that stimulus color is a facilitating factor for body analogy in spatial operation.

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12:00-1:30 PM (4064)

Grab That Face and Hammer: The Near-Hands Effect and Visual Memory. TOMER SAHAR and TAL MAKOVSKI, *The Open University of Israel* (Sponsored by Tal Makovski) — The embodied cognition framework postulates that body states and action influence cognition. Accordingly, numerous studies have shown that hands position affects visual perception and attention. However, much less is known about the effects of hands position on memory. Thus, five experiments using high- and low-spatially-filtered faces, graspable objects and simple lines, rigorously examined the consequences of hands position on visual memory. The data of over 18 conditions and more than 220 subjects failed to show any impact of hands position on visual memory. This conclusion was further corroborated by Bayesian analyses that showed strong support in favor of the null hypothesis that the hands position does not enhance memory. We therefore argue that items presented near the hands have no advantage in memory and contrary to previous

reports; the impact of hands position on performance is limited and short-lived. These observations challenge existing accounts of the near-hands effect.

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12:00-1:30 PM (4065)

Conceptual Priming of Openness Via Lexical and Embodiment Primes in Investigative Interviews. RACHEL E. DIANISKA and CHRISTIAN A. MEISSNER, *Iowa State University* (Sponsored by Christian Meissner) — Recent work has shown that contextual priming of openness during an interview can facilitate disclosure (Dawson, Hartwig, Brimbal, & Denisenkov, 2017). However, the efficacy of these primes in conjunction with interview tactics that improve recall from memory has not been explored. The current research tested whether activation of the concept of openness via lexical primes (Experiment 1) and embodiment primes (Experiment 2) would influence disclosure differentially based on interview tactic. Participants were interviewed about prior misdeeds using a direct request for information or a context reinstatement instruction. Prior to being interviewed, participants completed an unscrambling task (Experiment 1) or sat in a fixed body position (Experiment 2) to prime the concepts “open” or “closed”. Participants provided written or verbal narratives about the most serious offense they indicated having committed, which were coded for quantity and precision of critical details. Context reinstatement led to robust effects on the amount of information disclosed, while priming produced small effects that failed to obtain significance. The applied implications for investigative interviews will be discussed.

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12:00-1:30 PM (4066)

Better Looking Left: The Effect of Handedness on Visual Aesthetic Preference. SEYMA ONDER, *Koc University*, SUMEYRA TOSUN, *University of Pretoria* — In this study we examined whether the handedness and the mode of interaction with an object would influence aesthetic preference and directional bias. It was hypothesized that right handed participants would find an object more pleasing on the left side of the scene and looking left. The left handed participants would demonstrate the reverse effect. Total of 31 participants (16 left handers) were asked to look at some objects on the computer screen, and to modify their location and rotation until to catch the most aesthetically pleasing position. Total of 15 objects were presented. Participants decided the most pleasing position and rotation of each object. The result demonstrated that left handers located the baseball bat more right side of the screen and the glass and mug more left side of the screen than right handers. Further, right handed participants found the objects more pleasing when they were looking left than left handed participants. Our hypothesis was supported. The results were consistent with the lateralization claim. Right handed participants preferred left looking objects on the left visual field aesthetically more pleasing. Left handed participants preferred the reversed direction.

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SPATIAL COGNITION I

12:00-1:30 PM (4067)

Visual Dominance in Long-Term Memory for Naturalistic Scenes: Evidence From Study-Test Congruency Experiments.

HAUKE S. MEYERHOFF, *Leibniz-Institut für Wissensmedien*, FRANK PAPANMEIER and MARKUS HUFF, *University of Tübingen* — Memory performance is more accurate for audio-visual rather than purely visual scenes. In previous work, we have observed evidence for the integration of audio-visual information into a common memory representation. In the present project, we explore the nature of this memory representation by manipulating study-test congruency. Our participants memorized a large set of brief excerpts from Hollywood movies that were presented either audio-visually or purely visual. One day later, they performed an old/new recognition task. One half of all targets were presented as during study whereas the other half switched the presentation condition thus violating study-test congruency. Although targets that were presented audio-visually during study and test elicited the most accurate memory performance, there was no benefit of targets that were presented visually during study and test relative to the conditions that violated study-test congruency (e.g., visual during study and audiovisual during test). However, we were able to obtain a full study-test congruency effect with our paradigm when we tested audio-visual vs. purely auditory scenes. Therefore, our pattern of results indicates visual dominance in human long-term memory representations.

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12:00-1:30 PM (4068)

Can Children Access Working Memory Representations Outside Immediate Focus?

JOHN N. TOWSE, *Lancaster University* — Unsworth and Engle (2007) proposed active maintenance in primary memory (PM) and contextual cue-dependent search and retrieval from secondary memory (SM), independently contribute to working memory capacity (WMC). The developmental time course of both mechanisms is unknown, but children's ability to use SM seems to emerge later in childhood than PM (Roome et al., 2014). This experiment used cued recall paradigms (conceptual span, delayed cued recall, and listening span tasks) to capture cognitive characteristics of SM in children (7-10 years). A chronometric perspective demonstrated children's developing efficiency to recall target memoranda. Additionally, regression models revealed that whilst conceptual and listening span tasks uniquely predicted individual differences in WMC, the conceptual span task was the only, unique contributor of reading comprehension. We argue the predictive power of the conceptual span task is driven by children's propensity, and ability to *selectively* retrieve target memoranda, intrinsic to an efficient working memory system.

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12:00-1:30 PM (4069)

The Effect of Navigation Voice-Over on Wayfinding Performance.

QI WANG and ZHIYUAN SHU, *Sun Yat-Sen University* — While navigation aids could provide various kinds of guide voices, navigators' route selections may be affected by

the non-spatial cues conveyed by the synthesized pre-recorded voices. Three types of navigation voices were used in the present study, varying from the real human voice to the voice with least human characteristics. Participants freely navigated through a virtual environment to reach a specified destination by choosing to follow the guide of verbal instructions or the direction of road sign at intersections. Participants took longest to make the decision with the real human voice, although they trusted the real voice more than other synthesized voices or even road signs. The post-event test showed that navigators also memorized the experienced routes better in the real voice condition. The findings suggest that using the real human voice may increase the trust towards the navigation aids, although it may have a negative effect on way-finding efficiency or forming accurate spatial representations.

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12:00-1:30 PM (4070)

Understanding Visualizations of Uncertainty: Explicit vs. Actionable Knowledge.

MARY HEGARTY, ALEXANDER P. BOONE and PERI GUNALP, *University of California, Santa Barbara* — Visualizations of uncertainty in data are often misunderstood by non-experts. The "cone of uncertainty" used to visualize hurricane forecasts is a case in point. Here, we examine individual differences in interpretation of the cone of uncertainty and how these are affected by providing users with verbal explanations of the graphical conventions of the display. Verbal explanations reduced misconceptions about the cone of uncertainty as expressed in explicit judgments, but had little effect on participants' estimates of damage from the hurricane over time and space. Moreover misconceptions expressed in explicit judgements were dissociated from those evident in damage estimates. Optimistically, misconceptions were evident in only a minority of participants' damage ratings. This research suggests that interpretation of uncertainty visualizations draw on heuristics grounded in visual analogies. Using natural mappings between graphical forms and their meanings may be more important than providing information about the conventions of the graphic form.

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12:00-1:30 PM (4071)

Augmented Reality Reveals Cognitive Strategies in Mental Rotation.

AARON L. GARDONY and TAD T. BRUNYÉ, *U.S. Army Natick Soldier RDEC*, HOLLY A. TAYLOR, *Tufts University* — Mental rotation (MR) refers to the ability to rotate mental images "in the mind's eye." MR has been studied for decades using 3-D stimuli presented in static two-dimensional tasks (computer and paper & pencil tasks). Yet, in the real world, ambulatory individuals typically apply MR to manipulable 3-D stimuli in 3-D spaces. Given that much insight into MR can be gained from physical rotation (Gardony, Taylor, & Brunyé, 2014), in the present study we explored MR behavior in the classic mental rotation task (MRT) using interactive 3-D augmented reality. Participants completed an immersive 3-D MRT, administered with the Microsoft HoloLens, in which they could walk around 3-D block figure stimuli located in their real world space and physically rotate them using hand



gestures. In addition to classic behavioral measures (RT, Error Rates) we tracked continuous metrics of physical rotation, locomotion, and gaze. Replicating previous work we observed a linear relationship between RT and Angular Disparity. Further, combining metrics of movement, manipulation, and individual differences revealed subtle strategy differences across levels of angular disparity and individuals.

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12:00-1:30 PM (4072)

Move to Improve: Using Tangible and Virtual Technologies to Enhance Spatial Perspective Taking Ability. JACK SHEN-KUEN CHANG, GEORGINA YEBOAH and ALISON DOUCETTE, *Ryerson University*, PAUL CLIFTON and MICHAEL NITSCHKE, *Georgia Institute of Technology*, TIMOTHY WELSH, *University of Toronto*, ALI MAZALEK, *Ryerson University* — There is a positive relationship between spatial abilities and success in STEM (Science, Technology, Engineering, Mathematics) learning and careers. The present study was conducted to determine if the spatial ability of perspective taking can be engaged and improved via interactions with tangible and virtual technologies. Participants took perspective taking tests before and after completing one of three protocols (n=10 per group). Participants in the 2 experimental groups played a digital game that required them to switch between two perspectives to solve spatial puzzles. The Tangible group used VR headsets, hand tracking sensors, and wooden blocks to play the game in an immersive virtual interaction environment. The Conventional group played the game using a LCD monitor, keyboard, and mouse. The Control group completed non-spatial, non-graphical tasks (typing and math). It was found that only the Tangible group showed a statistically significant improvement on the perspective-taking test (medium-to-large effect size). These data are consistent with previous work showing advantages to improving students' spatial ability by incorporating movement and physical interactions in a training protocol.

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12:00-1:30 PM (4073)

Spatial Category Adjustment Bias in a Virtual Reality Environment. ALEX ENGELBERTSON and CRISTINA SAMPAIO, *Western Washington University* (Sponsored by Cristina Sampaio) — Previous research reveals a spatial category adjustment (CA) wherein memories of target locations are biased toward their prototypical locations upon recall. Most data on CA are collected using dot-localization tasks (Huttenlocher, Hedges, & Duncan, 1991) in 2D geometric spaces. A criticism of this task is that it may lack ecological validity. However, tests of this effect in real life may forfeit some experimental control. To test this effect with higher ecological validity and experimental control, we investigated CA in a realistic 3D virtual environment with neutral objects using a virtual reality (VR) head mounted device. As VR simulation becomes a more common tool to train operators for sensitive or potentially life-threatening work, an understanding of how CA manifests in VR

may be critical for trainee safety. Examining spatial cognition in VR the wake of its surging popularity remains of high interest in order to understand its value and potential dangers.

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12:00-1:30 PM (4074)

Sort or Start? Understanding Biases in Search Strategies Using Lego Building Blocks. MONA J.H. ZHU, KIMBERLEY YUEN and *EVAN F. RISKO, *University of Waterloo* (Sponsored by Evan Risko) — Spatial organization is widely thought to improve performance by allowing individuals to navigate a given task environment more effectively (Kirsh, 1995; 1996). However, it remains unclear the extent to which individuals actually utilize such organizational strategies when carrying out cognitive tasks in the real world. The current project aims to examine people's preference for spatial organization in the context of a search task. To do this, participants searched for objects among a pile of Lego building blocks. Prior to search, they were asked their preferred strategy for this task (i.e., organizing vs. not organizing the Lego pile prior to search) and estimated how much time and effort each strategy would take for task completion. Participants showed a strong preference against organization, even though objective task completion time did not differ between strategies. This bias is partially driven by participants' perceived time cost across strategies.

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12:00-1:30 PM (4075)

Exploring Decision Biases With Ensemble Display Visualizations. IAN T. RUGINSKI and SARAH H. CREEM-REGEHR, *University of Utah*, LE LIU and DONALD H. HOUSE, *Clemson University*, WILLIAM B. THOMPSON, *University of Utah* (Sponsored by William Thompson) — Ensemble displays are a common visualization method used by scientists, which plot multiple data points on a Cartesian coordinate plane (e.g. scatterplots). A mounting body of research demonstrates numerous scenarios where ensemble displays elicit fast, accurate, and intuitive decisions from novice viewers. However, fewer studies have examined potential drawbacks to ensemble displays that can negatively impact decisions. The aim of this work is to test one such case, where viewers may overvalue individual ensemble members in a real-world decision task. In the context of ensemble hurricane forecast tracks, we tested if viewers overestimate the influence of a single hurricane track that intersects with a point of interest. In a series of experiments, we found that participants indicate that locations that are touching an individual ensemble hurricane track will receive more damage than other locations, which is a misinterpretation. Further, we examined how the number of ensemble members influences this overweighting.

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12:00-1:30 PM (4076)

Examining the Impact of Dance Training on Spatial Abilities in 9-10 Year Olds. ERICA M. BARHORST-CATES, CHERYL WRIGHT, SARAH H. CREEM-REGEHR, JEANINE K. STEFANUCCI and ELIZABETH A. CASHDAN, *University of Utah* (Sponsored by Sarah Creem-Regehr) — Spatial abilities



are malleable and can be improved via training of different types. The current study tests whether dance training serves as an effective means of improving spatial thinking skills in 9-10-year-old children from two elementary schools, with and without required dance classes. Sixty-four participants completed two tests of mental rotation, water level, real-world triangle completion, two versions of Corsi block-tapping, and filled out a spatial activities questionnaire. Preliminary results show few between-school differences, but significant relationships between the mental rotation tasks and water level as well as between one of the Corsi tasks and triangle completion. Surprisingly we did not see a sex difference on any task, suggesting that known sex differences in spatial abilities may not emerge until after middle childhood. Results from this ongoing work have implications for understanding the impact of arts training on spatial thinking as well as indexing general spatial abilities in middle childhood.

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12:00-1:30 PM (4077)

Spatial Knowledge, Gender, and Predicting Successful Navigation. BENJAMIN D. NELLIGAN, *University of Notre Dame*, AMY LYNNE SHELTON, *Johns Hopkins University* (Sponsored by Amy Shelton) — Everyone navigates through their environment, but we are not all equally successful when we navigate. Previous research has emphasized how ability and preference for learning and using the structure of an environment is predictive of accuracy at judging distances and object locations, and is therefore indirectly predictive of successful navigation. We examined whether these factors directly predict how successfully individuals navigate by using success rates on a virtual navigation task. We found that ability for environmental structure learning was related to navigational success for males, but dissociable for females. For females, aptitude and bias for using familiar, previously traveled paths were the best predictors of success. These results demonstrate that successful navigation is not reducible to one's knowledge of the structure of the environment. Overall, this work elucidates the factors contributing to successful navigation, including factors that interact with gender, and emphasizes that multiple approaches can support successful at navigation.

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12:00-1:30 PM (4078)

Route Choice in Virtual Environments: The Effect of Environment Size, Destination Visibility, and Regional Boundaries. EN FU and BEVERLY ROSKOS-EWOLDSEN, *University of Alabama* (Sponsored by Beverly Roskos-Ewoldsen) — Imagine you are sitting in your office and you want to stop by a grocery store before heading home, which route would you use to reach the grocery store? Existing studies show that, when walking to two or three destinations in an indoor space, the route that participants walked to reach the first destination depended on the locations of the second and third destinations. This *later-destination attractor bias* was further investigated in the current study using virtual environments. Size of the environment and visibility of later destinations were factorially

manipulated between participants; the locations of the second and third destinations were manipulated within participants. Results showed that both second destination location and environment size influenced the route they took to the first destination, but not destination visibility. However, the results were in the opposite direction compared to the original study; functional movement through the environment seems to be the key.

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12:00-1:30 PM (4079)

Sex Differences in Spatial Context Memory Performance Across the Adult Lifespan. SIVANIYA SUBRAMANIPILLAI and DEBRA TITONE, *McGill University*, STAMATOULA PASVANIS, *Douglas Mental Health University Institute*, ELIZABETH ANKUDOWICH, *McGill University*, SRICHARANA RAJAGOPAL, *Douglas Mental Health University Institute*, MARIA NATASHA RAJAH, *McGill University* (Sponsored by Debra Titone) — Healthy aging is typically associated with a decline in context memory (i.e., our ability to encode, store and retrieve events that we have personally experienced, in rich spatial and temporal detail). However, little is known about sex differences in age-related context memory decline. Thus, we investigated how men and women differ in age-related functional changes, specifically in spatial context memory across the adult lifespan. We conducted a multivariate behaviour partial least squares analysis (B-PLS) of fMRI data during successful encoding and retrieval of a spatial context memory task in a cohort of young, middle-aged, and older adults. Our behavioural results indicate a robust effect of age on context memory performance, and a marginally significant interaction between age and sex on spatial task performance. We also observed a differential pattern of brain-behaviour correlations in men compared to women at encoding vs. retrieval. This study highlights the importance of considering sex differences in healthy aging, even if such differences are not necessarily observed at a behavioural level.

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JUDGMENT

12:00-1:30 PM (4080)

Answering "Why" to Questions About Moral Judgments. CATHERINE ANN CAMERON, SAMAN FOULADIRAD, CLAIRE MARIE SHRESTHA and JESSE LO, *University of British Columbia*, ELIZABETH LYNN GERHARDT, *University of New Brunswick* — Studies of moral judgment have established that when values collide between veracity and friendship versus patriotism, participants depending upon cultural backgrounds, differentially prioritize their evaluations of kind and harsh truths and lies (Cameron et al., 2017). Questions emerging regarding moral evaluations can best be understood by inspecting participants' rationales as to why they made the judgements they did. Cameron et al. (2013) assert that inspecting the justifications of participants' judgments is a critical step in this understanding. Moral judgments of 203 Canadian adolescents (X age=16.1years) of scenario characters' harsh, truthful statements against compatriots differed from



similar truths against best friends ($F(1, 201) = 13.57, p < .001$). There were more coded justifications for *Consideration of Responsibility for Friends* than for *Veracity* in the truth against friends condition, and a greater appeal to *Veracity/Honesty* than *Consideration for Country* in the truth against country condition $\chi^2(11, N=131) = 46.45; p < .00$.

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12:00-1:30 PM (4081)

Tracing the Development of Moral Reasoning With a Mini-Ultimatum Game (Mug): The Effect of Age on Intention-Sensitivity. AGNIESZKA J. JAROSLAWSKA, *The University of Edinburgh*, PATRICK BURNS and AINE FITZPATRICK, *Queen's University Belfast*, EUGENE M. CARUSO, *The University Of Chicago*, TERESA MCCORMACK, *Queen's University Belfast* — The notion of what constitutes fairness changes during childhood and while the marked shift from outcome-based to intention-based moral reasoning is well established, its precise developmental profile is still subject to debate. This study sought to determine the age at which the perceived intentions of others begin to influence judgments of fairness in 6- to 11-year-olds using the mini-ultimatum game (MUG). The MUG has a forced-choice design whereby a proposer has to select one of two pre-determined offers which a responder can either accept or reject. Due to these constraints the procedure measures sensitivity to unfair intentions in addition to unfair outcomes. Contrary to previous published reports, we found that even the youngest children employed a sophisticated notion of fairness that took into account the alternatives the proposer had available to them. This understanding that fair does not always mean equal reflects a core aspect of moral judgment among primary-schoolers.

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12:00-1:30 PM (4082)

Your Left Hand Makes You (a Little More) Paranoid and Delusional. CLAUDIO MULATTI, *University of Padova*, BARBARA TRECCANI, *University of Sassari* — A relative over-attention to the left side of space has been related to schizotypy and magical ideation. For example, individuals high in magical ideation show a more pronounced leftward bias in number line bisection compared with individuals low in magical ideation (Brugger et al., 2010, *Cog. Behav. Neurol.*). Those findings suggest a prominent role of the right hemisphere in magical ideation. In two experiments, we primed either the right or the left hemisphere by having participants clenching their left or right hand for 1.5 minutes. Clenching the left hand compared to the right hand made participants more keen to interpret chance events in terms of conspiracy (Experiment 1) and to see real objects in random noise pictures (Experiment 2). We suggest that priming the right hemisphere increases confidence in intuitive processing.

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12:00-1:30 PM (4083)

Signal Detection and Response Bias With Incomplete Knowledge of Results. MATTHEW J. DAVIS, *CDO Technologies, Inc.* — In signal detection tasks, feedback is often

utilized to offset boredom, stabilize performance, and optimize response bias (Green & Swets, 1966; Macmillan & Creelman, 2005; McNicol, 1972). Such patterns of complete feedback rarely occur in the real world; instead, feedback may be presented for incomplete sets of possible responses. *Incomplete knowledge of results* (IKR) describes scenarios where feedback is presented for some combination of hits, misses, false alarms, and/or correct rejections. A single-interval auditory detection task was conducted to examine IKR *singularity, symmetry, implicitness, and quantity* on the likelihood of human observers to respond optimally for the task. The conditions consisting of feedback for one or two responses (singularity and symmetry) were shown to be highly biased and highly individualized. Responses became more optimal in conditions with implicit feedback and higher quantities of feedback. These results suggest that IKR can reduce an observer's ability to respond with optimal bias.

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12:00-1:30 PM (4084)

When is a Cognate not a Cognate? ERICA B. MICHAEL, ALISON M. TSENG, EWA GOLONKA, NICK B. PANDŽA and JARED A. LINCK, *University of Maryland* — Hundreds of studies have documented the robust finding that cognates (defined here as words that share form and meaning across languages) are processed more quickly and more accurately than noncognates, and learned more easily. Studies vary in how cognate status is determined, however, with methods including expert judgments, objective measures and subjective ratings of form similarity, and translation-guessing paradigms. In several studies we conducted spanning more than 10 language pairs, findings revealed important and striking inconsistencies in the cognate status resulting from these different methods. We explore factors that may contribute to these differences, such as task demands, modality, and language expertise (e.g., familiarity with one vs. both languages in the pair, relative language proficiency, and knowledge of related languages). Drawing on results from several of our recent language-learning studies, we discuss methodological concerns for stimulus development and theoretical implications for models of multilingual language processing and lexical representation.

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12:00-1:30 PM (4085)

What Students Learn From Instructional Video: Applications of the Cognitive Theory of Multimedia Learning. EMMA H. GELLER, *University of California San Diego*, JAMES W. STIGLER, *University of California Los Angeles* — In recent years, video instruction has exploded online, in venues ranging from online courses for college credit to popular YouTube channels created for "edutainment". The ubiquity of instructional video online has provided an important tool for studying the effects of instruction on cognition and learning. One fruitful source for thinking about what students learn from video is the cognitive theory of multimedia learning (Mayer, 2008). In a series of studies, we explore applications of Mayer's principles of multimedia instruction to popular online video lessons from Khan Academy and Crash Course, and discuss the challenges of applying principles of a cognitive theory to



real-world instructional materials. Our findings provide mixed results for the applicability of Mayer's principles, highlighting the importance of (1) the specific instructional materials, (2) students' engagement with the lesson, (3) their prior knowledge about the lesson topic, and (4) the tests we use to measure learning.

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12:00-1:30 PM (4086)

Mood Regulation Through the Eye of the Beholder: An Eye-Tracking Approach. ERIC YANN LAURENT, NICOLAS NOIRET, MALLORY POECKER and ALINE CLAUDON, *Bourgogne Franche-Comté University* — Little is known about the role that eye behaviors play in the cognitive regulation of mood. In the present study, happy, sad and "neutral" moods were experimentally induced in young healthy adults. Following the induction, participants freely viewed a series of emotional and non-emotional (positive, negative, neutral) faces while their right eye's behaviors were recorded. Data analysis revealed that (i) participants under happy mood and participants under sad mood had higher fixation density inside emotional areas of interest (*i.e.*, EAOI: the eyes and the mouth), longer mean fixation duration per fixation, and larger pupil sizes, than participants neutral mood; (ii) sad mood increased total fixation duration inside faces' EAOI; (iii) all participants had a higher fixation density on EAOI of positive portraits than on EAOI of negative or neutral portraits. Eyes are employed as a cognitive tool to regulate internal mood.

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12:00-1:30 PM (4087)

Need for Cognition and Judging Truth: A Preference for Thinking Protects People From Truthiness. ERYN J. NEWMAN and NORBERT SCHWARZ, *University of Southern California* — A given claim is more likely to be accepted as true when it appears with a photo, even when that photo has no probative value—a *truthiness* effect (*e.g.*, Newman et al., 2012; 2016). We examined whether a tendency to "think more," being high on Need for Cognition, protects people from the biasing effects of photographs. Subjects saw trivia claims, presented either with or without a decorative photograph and judged whether each claim was true or false. As a final task, subjects also completed the Need for Cognition Scale (Cacioppo & Petty, 1982). Although photographs biased people to think associated claims were true, this pattern only held for people who were low in Need for Cognition. Those subjects who were high in Need for Cognition were protected from *truthiness*, a finding that fits with the broader literature on Need for Cognition, Lie Detection and Persuasion.

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12:00-1:30 PM (4088)

Language Dynamics in Supreme Court Oral Arguments. EYAL SAGI, *University of St. Francis* — During conversations, it is not uncommon to notice that interlocutors start using similar words and grammatical structures. This alignment of language use is thought to help comprehension, as well as indicate an alignment in underlying representations. It has also

been shown that, in the context of negotiations, the degree to which parties exhibit such an alignment is an indication of the likelihood of reaching an agreement. The present study expands this notion to the courts and uses corpus statistics to examine the relationship between the alignment of semantic content during oral arguments and the decision reached by the justices. The analysis demonstrates that lawyers that align their language with that of the justices are more likely to have a decision in their favor. Additionally, as befits the power dynamic between justices and lawyers, lawyers are more likely to align their language with the justices than the justices are to align their language to correspond to that of the lawyers.

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12:00-1:30 PM (4089)

Hide and Seek in the Temporal Domain. MOTOHIRO ITO, KENJI YAMAUCHI and JUN I. KAWAHARA, *Hokkaido University* (Sponsored by Jun Kawahara) — Visual search studies focus on "search" behavior, but "concealment" behavior is also important. The present study examines whether participants indicated where they would *hide* or *find* an item embedded within a sequence of displays. We manipulated three factors; task type (hide vs. seek), partner type (friend vs. foe), and oddball (present vs. absent). The results showed that participants in both hide and seek tasks most frequently selected the oddball for friends but not for foes, which is consistent with Anderson, Foulsham, Nasiopoulos, Chapman, and Kingston's (2014) principles of search and concealment in spatial domains. Essentially, the present study reveals a unique principle specific to the temporal domain, considering that participants in both task types frequently selected the first (or last) item of the sequence for foes (or for friends) when an oddball was absent. The results suggest different mechanisms for search and concealment behavior in the temporal versus spatial domains.

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12:00-1:30 PM (4090)

Low Dimensional Representations in Multi-Cue Judgment. JOYCE WENJIA ZHAO and SUDEEP BHATIA, *University of Pennsylvania*, CLINTIN DAVIS-STOBER, *University of Missouri* (Sponsored by Sudeep Bhatia) — The study of multi-cue judgement investigates how decision makers integrate cues to predict the value of a criterion variable. We consider a multi-cue judgment task in which decision makers have prior knowledge of inter-cue relationships but are ignorant of how cues correlate with the criterion. In this setting, a naive judgment strategy prescribes an equal weight for each cue. However, contrary to the predictions of such a strategy, we find that many participants use a weighting scheme based on a low-dimensional representation of the cue space. This weighting scheme attaches higher weights to cues that map onto the first (largest) eigenvalue of the inter-cue correlation matrix. In specific settings it can resemble judgment strategies such as the lexicographic heuristic. The observed weighting scheme is



also consistent with core insights in semantic memory research and has important optimality properties concerning judgment accuracy.

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12:00-1:30 PM (4091)

Correcting False Beliefs: Anti-Vaxxers' Beliefs About the Cause of Autism. ALEXANDRIA CAPLE and PRITI SHAH, *University of Michigan* (Sponsored by Priti Shah) — Individuals are susceptible to false beliefs, such as the incorrect notion that vaccines cause autism. Despite strong evidence to the contrary, many individuals still believe that childhood vaccinations cause autism (DeStefano et al., 2013; Horne et al., 2015; Jain et al., 2015). Here, we examine the conditions under which this misconception may be eliminated. Experiment 1 replicates Horne et al. (2015), who found that communicating the risk of diseases targeted by vaccines was more effective than correcting misinformation. Experiment 2 tests whether or not a more elaborate misinformation correction might be as effective as disease risk information, and whether a combined intervention is more effective than both. These studies provide insight on the ever-changing views surrounding vaccination as well as methods for correcting misinformation without producing backfire effects.

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12:00-1:30 PM (4092)

Are Sequential Dependencies in Recognition Memory Exaggerated When Confidence and Classification are Combined? MARINA P. GROSS and IAN G. DOBBINS, *Washington University in St. Louis* (Sponsored by Rebecca Treiman) — Recent work indicates that if a current item is recognized as OLD, the next item is more likely to be judged OLD rather than NEW. However, these robust dependencies were found in decision tasks combining confidence and classification into one step (e.g., high-new to high-old scales). In contrast, during an initial study that used a separate recognition classification (old/new) followed by a confidence rating (low to high), we failed to show recognition dependencies (two-step procedure). Puzzled, we tested whether combining classification and confidence amplifies dependencies. Within a series of memory tests, participants either rendered separate or combined judgments during basic recognition testing. While the two-step procedure did not show sequential recognition dependencies, the phenomenon was clearly present when participants indicated confidence and classification simultaneously. Thus, our work provides initial evidence that sequential dependencies in recognition judgment may be a fragile phenomenon that is exaggerated when confidence assessment and memory classification are combined into a single judgment.

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12:00-1:30 PM (4093)

Intuitions About Randomness: Is it About the Process or the Product? LIM M. LEONG, JOHANNES MÜLLER-TREDE and CRAIG R.M. MCKENZIE, *University of California, San Diego* (Sponsored by Craig McKenzie) — Randomness is

ubiquitous, but even scientists have difficulty pinning down the concept. We report a series of experiments exploring laypeople's intuitions about randomness, focusing on the distinction between randomness as a property of a generating process or as a characteristic of the resulting product. Participants in our studies were asked to generate random 10-digit sequences of binary outcomes, and were either provided with a coin or not. We found that while the majority of participants used the coin when it was available, a sizeable minority chose not to. Furthermore, those who used the coin performed closer to statistical norms. Our findings suggest that laypeople construe randomness as both the process and the product. They also speak to why participants in classic laboratory tasks struggle with generating random sequences when explicitly asked to do so, but are successful in more naturalistic tasks in- and outside the laboratory.

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12:00-1:30 PM (4094)

Selective Information Sampling and In-Group Heterogeneity Effect. ELIZAVETA KONOVALOVA and GAEL LE MENS, *Universitat Pompeu Fabra* (Sponsored by Yaakov Kareev) — People often perceive their in-groups as more heterogeneous than their out-groups. We propose an information sampling explanation for this in-group heterogeneity effect. We analyze a model in which an agent forms beliefs and attitudes about social groups from her experience. Consistent with robust evidence from the social sciences, we assume that people are more likely to interact again with in-group members than with outgroup members. This implies that people obtain larger samples of information about in-groups than about out-groups. Because estimators of variability tend to be right-skewed, but less so when sample size is large, sampled in-group variability will tend to be higher than sampled out-group variability. This implies that even agents that process information correctly – even if they are naive intuitive statisticians – will be subject to the in-group heterogeneity effect. Our sampling mechanism complements existing explanations that rely on how information about in-group and out-group is processed.

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12:00-1:30 PM (4095)

People Hold Explicit Beliefs About Distributional Forms of Illness Durations. TALIA ROBBINS and PERNILLE HEMMER, *Rutgers University* (Sponsored by Pernille Hemmer) — People's predictions for real-world events have been shown to be well-calibrated to the true environmental statistics. Previous work, however, has focused on predictions for these events by aggregating across observers making a single estimate for the total duration given a current duration. Here, we focus on assessing predictions for both the mean and form of distributions in the domain of illness duration prediction at the individual level. We assess understanding for both acute illnesses for which people might have experience, as well as chronic conditions for which people are less likely to have knowledge. Our data suggests that for common acute illnesses people can accurately estimate both the mean and form of



the distribution. For less common acute illnesses and chronic illnesses, people have a tendency to overestimate the mean duration, but still accurately predict the distribution form.

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12:00-1:30 PM (4096)

Under-Updaters and Over-Updaters in Belief Updating.

CHRISTOPHER B. ARNOLD and RICHARD B. ANDERSON, *Bowling Green State University* (Sponsored by Richard Anderson) — Bayesian inference involves the ability to update beliefs according to the introduction of diagnostic information. Peterson and Ducharme (1967) found that people tended to be conservative, updating to a lesser degree than what Bayes' theorem prescribes. They also found a primacy effect in which participants displayed higher levels of updating for early diagnostic information. The present study explored individual differences in updating, while also attempting a conceptual replication of central aspects of Peterson and Ducharme (1967). Five-hundred participants were recruited using Amazon's Mechanical Turk to complete a Bayesian subjective likelihood estimation task. The results indicated overall conservativeness, but also revealed two reliably distinct groups: conservative updaters and aggressive updaters. There were no consistent primacy or other order effects, and no association between the degree of conservativeness/aggressiveness and a number of individual-difference trait measures. Implications of the conservative/aggressive distinction are discussed.

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12:00-1:30 PM (4097)

The Outcome Severity Bias and Interpreting Eyewitness Confidence Statements.

CRYSTAL R. SLANE and CHAD S. DODSON, *University of Virginia* (Sponsored by Chad Dodson) — Eyewitnesses are often asked to provide a confidence statement expressing their certainty in an identification of a suspect, and eyewitnesses typically express their confidence with words (e.g., I'm pretty sure it's him) rather than with numbers. However, verbal expressions of confidence are ambiguous (does "pretty sure" mean 80% sure?) and vulnerable to the influence of cognitive biases. One such bias is the Outcome Severity bias whereby an identical verbal probability phrase is interpreted as denoting a higher value when the phrase refers to a more severe rather than a less severe event. We examined whether the Outcome Severity bias influences the understanding of eyewitness confidence statements. Participants saw an eyewitness's identification from a lineup and judged the intended numeric value of the eyewitness's verbal expression of confidence. We show that the severity of the crime that the suspect was accused of committing influences participants' judgments about the eyewitness's confidence statement.

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SEMANTICS

12:00-1:30 PM (4098)

Environmental Sound Priming Beyond Single Words: Does Negation Influence N400-Like Priming Effects?

CAROLIN DUDSCHIG, IAN G. MACKENZIE, JESSICA STROZYK,

HARTMUT LEUTHOLD and BARBARA KAUP, *University of Tuebingen* — In order to survive, humans have to integrate information from various sources and to derive a coherent interpretation. In experimental setups such integration phenomena are often investigated in terms of cross-modal association effects. Interestingly, previous studies have shown that single words can influence the processing of non-linguistic stimuli and vice versa. In the present study, we were interested in how linguistic input beyond single words influences the processing of non-linguistic stimuli, in our case environmental sounds. Participants read sentences either in an affirmative or negated version (e.g., "The dog does (not) bark"). Subsequently they listened to either a matching (woof) or a mismatching sound (meow). In line with previous studies, we found a clear N400-like effect during sound perception following affirmative sentences. Interestingly, this effect was identically present following negated sentences, and the negation operator did not modulate the cross-modal association effect observed between the content words of the sentence and the sound. In summary, these results suggest that negation is not incorporated during information processing in a manner that word-sound association effects would be influenced.

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12:00-1:30 PM (4099)

Hemispheric Processing of High and Low Familiarity Metaphors.

ANDRIANA L. CHRISTOFALOS and GARY E. RANEY, *University of Illinois at Chicago* — We examined processing of high and low familiarity metaphors during a divided visual field lexical decision task. Participants read high or low familiarity metaphors followed by a figurative- or literal-related target word, literal statements followed by an unrelated target word, or filler metaphor or literal sentences followed by a non-word. We predicted negative priming of literal targets presented to the LH, and equal priming of literal and figurative targets presented to the RH following low familiarity metaphor primes. Targets presented to the RH had larger priming overall than LH targets. The most interesting finding is the significant familiarity by hemisphere interaction. This reflects significant RH priming of figurative and literal targets following low familiarity metaphors, and no significant priming of any other targets. The RH activation of both metaphor and literal meanings supports the RH's role in broad semantic activation during language processing as described in the coarse coding hypothesis.

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12:00-1:30 PM (4100)

Semantic Constraints on Corpus Word Frequency Estimates.

GEOFF HOLLIS, *University of Alberta* — The primary way of adjudicating between word frequency estimates is to measure amount of variance accounted for in behavioral measures of lexical processing. It is assumed that word frequencies which account for more variance better estimate the distribution of exposures that humans have with words. However, word frequencies may be getting their predictive validities for reasons that have nothing to do with actual distribution of exposures. For instance, word use on Twitter is highly constrained by word



length such that the most commonly used words are short words. As a consequence, Twitter frequencies derive a large amount of their predictive validities from word length, not word exposure *per se*. We demonstrate that after controlling various factors that might bias word use in a particular register, the current top estimates of word frequency (subtitles, Facebook, Twitter) have comparatively poor to moderate predictive validity of lexical processing times.

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12:00-1:30 PM (4101)

Enhancing Middle School Mathematics Achievement Through Spatial Skills Instruction. KINNARI ATIT, *Northwestern University*, MARTHA CARR, *University of Georgia*, JASON RICHARD POWER, SHERYL SORBY and NORMA VEURINK, *Michigan Technological University*, DAVID UTTAL, *Northwestern University*, VIVIAN WONG, *University of Virginia* — Much of the effort to improve students' educational outcomes has focused on improving their engagement, performance, and retention in science, technology, engineering, and math (STEM) disciplines. One set of skills that has emerged as fundamental for STEM learning is spatial skills. Spatial skills enable us to manipulate, organize, reason about, and make sense of spatial relationships in real and imagined spaces. In this study, we investigate whether improving middle school students' spatial skills affects their achievement in one STEM domain – mathematics. Furthermore, because students' anxiety for completing mathematical tasks and their motivation for succeeding in the domain also influence performance, here we examine the role of math anxiety and motivation in conjunction with spatial skills on students' math achievement. Preliminary results regarding the effectiveness of the intervention designed to improve spatial skills and its effects on students' math anxiety and motivation will be presented.

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12:00-1:30 PM (4102)

A Comparison of Japanese and English Feature Norms Using Translation Equivalent Words. ERIKO MATSUKI, *University of Western Ontario*, YASUSHI HINO, *Waseda University*, KAZUNAGA MATSUKI, *BEworks Inc.*, KEN MCRAE, *University of Western Ontario* — Semantic feature norms (e.g., McRae et al., 2005) have been used widely to study the organization of semantic memory and numerous behavioral phenomena concerning semantic and conceptual representation in normal and neuropsychological populations. While there are an increasing number of published norms available in Indo-European Languages (e.g., Dutch, German, Italian, and Spanish), only one unpublished study has looked at semantic features in Japanese speakers (Tanabe-Ishibashi et al., 2015), and cross-language comparisons of feature norms have rarely been explored. To fill this gap, we collected and directly compared features produced by native Japanese and English speakers for 80 pairs of Japanese and English words that are considered to be translation equivalent. The data provide insights into whether and how semantic knowledge of concepts

might differ between Japanese and English. Furthermore, our data show that verbal descriptions of features are useful tools to identify relatively subtle conceptual differences.

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12:00-1:30 PM (4103)

Processing of Emotion Information of Highly Valenced Words. BAILEY FRASER and BRIAN DUFFELS, *University of Northern British Columbia*, PENNY M. PEXMAN, *University of Calgary*, PAUL D. SIAKALUK, *University of Northern British Columbia* — We examined the effects of three dimensions of emotion information—valence, arousal, and emotional experience—for negative and positive words in lexical processing. In three lexical decision tasks in which participants either responded to only negative words or positive words, or to both types of words, facilitatory effects of emotional experience were observed, such that words with higher emotional experience ratings were associated with faster response latencies. In two semantic categorization tasks in which participants either responded to only the negative words or the positive words, facilitatory effects of valence and arousal were observed, such that more negative, more positive, and more arousing words were associated with faster response latencies. We attempt to delineate how these findings may help inform our understanding of the representational structure of emotion information for words, and how the various dimensions of this information interact with task demands in lexical processing.

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12:00-1:30 PM (4104)

Learning Words From Context: Effects of Type and Variability on the Acquisition of New Word Meaning and Long-Term Retention. MICHAL BALASS, *Towson University* — Most vocabulary words learned by adults in their native language are abstract, complex, and difficult to learn (Nagy & Townsend, 2012). Very little is known about the methods of instruction that facilitate long-term retention of newly learned words. For this study, we examined the effects of word experience on meaning acquisition and long-term retention. Native English speakers (N = 30) trained on rare English words in which the type (definition/sentence) and quantity of context (repeated information/varied information) were manipulated. Overall, results showed greater accuracy for words learned with varied information than repeated information. Performance measured immediately after training indicated more accurate responses to words learned with definitions than sentences. After 1-week delay in testing, the advantage of definitions was diminished; definitions showed a greater amount of information decay than sentences. Sentences may be more facilitatory of the abstraction process from context (Kwantes, 2005), resulting in a more stable meaning representation.

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12:00-1:30 PM (4105)

Non-Face Emojis Disambiguate Text Messages. MONICA A. RIORDAN, *Chatham University* — Emojis have evolved from imitations of facial expressions into pictures of objects, food, and places. While emojis that resemble facial expressions are well-



researched, emojis that resemble objects and items are much less so. The current experiment is an exploration as to whether these non-face emojis play two of the same communicative roles that face emojis do: Disambiguate messages and communicate affect. Participants rated the ambiguity and affective content of text messages with homonyms that were either accompanied or not by a non-face emoji, by additional text, or both additional text and a non-face emoji. Results suggest that non-face emojis can disambiguate messages and transmit affect, and that these roles interact such that the extent to which a non-face emoji communicates affect is related to how much it disambiguates a message; further, non-face emojis have the potential to disambiguate more than additional text. These results suggest that non-face emojis serve a useful purpose for communicators. Email: Monica Riordan, mriordan@chatham.edu

12:00-1:30 PM (4106)

Homograph Processing: Influence of Semantic Similarity. KIMBERLY WEAR, *High Point University*, DAVID S. GORFEIN, *University of Texas, Dallas* — The costs and benefits associated with processing semantically ambiguous words remain debated. Research shows that task, timing, frequency, and perhaps semantic similarity of meanings contribute to the inconsistent results reported. Wear and Gorfein (2003, 2005, 2009, 2013) have repeatedly demonstrated that deciding that **organ** is related to **TRANSPLANT** facilitates the decision that **liver** is related to **kidney**, but has no effect (or small facilitatory effect) on word pairs related to the contrasting meaning (**church-CHOIR**). However, when the homograph is also included in a subsequent pair (i.e., when organ-TRANSPLANT occurs before organ-PIANO) a cost is associated with this change in meaning. These results were found with homonymous ambiguous words (meanings are unrelated e.g., “organ” musical instrument/body parts) at both short intervals (8 intervening trials) and long intervals (40 intervening trials). The current study examined how meaning similarity might influence this pattern of results. Email: Kimberly Wear, kwear@highpoint.edu

12:00-1:30 PM (4107)

Are Semantic Ambiguity Effects Modulated by Response Latency? Insights From Lexical Decision. JOYSE MEDEIROS, *Basque Center on Cognition, Brain and Language*, BLAIR C. ARMSTRONG, *University of Toronto at Scarborough* — Are some of the discrepant semantic ambiguity effects observed in different tasks due to how much semantic processing has taken place in each task? In an extension of previous computational and experimental work by Armstrong & Plaut (2016), we tested whether semantic ambiguity effects shifted as predicted by a neural network model when responses were slowed in a single task—lexical decision. Across five experiments in the visual and/or auditory modality, we significantly slowed response latencies through manipulations of (a) nonword difficulty, (b) the auditory or visual presentation modality, (c) visual noise, (d) auditory noise, and (e) compression/expansion of the auditory signal. The results were partially consistent with the

predictions of the neural network and also point to potential cross-linguistic differences in ambiguity effects in Spanish relative to English.

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12:00-1:30 PM (4108)

Task Specific Concreteness and Reverse Concreteness Effects. SIMRITPAL MALHI and LORI BUCHANAN, *University of Windsor* — Previous research demonstrated a reverse concreteness effect for word pairs presented in a semantic relatedness task (i.e., are these word pairs related) and an iconicity judgment task (i.e., are these word pairs iconic or reverse-iconic), such that abstract stimuli (e.g., joy-sorrow) were processed faster than concrete stimuli (e.g., nose-tongue). It was proposed that the nature of these tasks and the depth of processing involved contributed to the reverse concreteness effect. The present study used a comparatively shallow task, i.e., lexical decision task with non-pronounceable words, to test the hypothesis that the reverse concreteness effect would disappear. Participants (N=25) determined whether word pairs were real word pairs or nonsense word pairs. Results demonstrated not only the absence of a reverse concreteness effect, but also the presence of a concreteness effect, such that the concrete stimuli were processed faster than the abstract stimuli.

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12:00-1:30 PM (4109)

A Case For Neuro-Modulator Support of Cortical Plasticity. STEVEN R. HOLLOWAY, JOSÉ E. NÁÑEZ, SR. and MICHAEL K. MCBEATH, *Arizona State University* — Watanabe, Náñez, and Sasaki (2001) introduced a phenomenon they named “task-irrelevant perceptual learning” in which near-visual-threshold stimuli that are not essential to a given task can be associatively learned when concurrently paired with the focal task. The present study explores the relation between the timing of the pairing of a dim motion stimulus with a recognition target. Near-threshold motion stimuli were presented concurrently with presentation of focal stimuli and offset from the same by ± 350 ms. The concurrent and the 350ms after groups performed significantly better than those who were exposed to the dim motion stimuli 350ms before the focal target. These data are consistent with a model of neuro-modulator induced cortical plasticity. Specifically, for the 350ms after condition, neuro-modulators were likely still present when neurons began responding to the dim motion, and, in the 350ms before condition, it is likely that neurons responding to dim motion were still partially active when the participant recognized the target, eliciting the slight improvements that were observed. This finding supports the notion that concentration-induced neuro-modulator release subserves cortical-plasticity.

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12:00-1:30 PM (4110)

Priming Lexical Retrieval to Definitions in Younger and Older Adults. ABHILASHA A. KUMAR, DAVID A. BALOTA and JULIA HABBERT, *Washington University in St Louis*, MICHELE SCALTRITTI, *Brain and Language Institute Labex*, GEOFFREY B. MADDOX, *Rhodes College* (Sponsored by



Michael Cortese) — Participants attempted to retrieve words (e.g., foliage) to low-frequency word definitions. Retrieval was preceded by a prime that was both semantically and phonologically related (e.g., forest), phonologically related (e.g., folding), semantically related (e.g., vegetation), or unrelated (e.g., kick). Participants consistently benefited from the phonological primes in retrieval accuracy. After the attempted retrieval, participants were also given the target along with the four prime types in a multiple choice test. When the primes were masked, young adults were likely to false alarm to the related and both primes in the multiple choice test, compared to the phonological and unrelated primes. With an extended prime duration and instructions that the prime was not the answer, younger adults decreased their false alarm rate, whereas, older adults could not resist the activation from the primes and continued to false alarm to the both and related alternatives. Results are interpreted within a lexical competition/attentional control framework.

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12:00-1:30 PM (4111)

Processing Noun-Noun Metaphors: How Do Modifiers and Heads Differ? JUANA PARK, FARIA SANA, CHRISTINA GAGNE and THOMAS SPALDING, *University of Alberta* (Sponsored by Thomas Spalding) — We evaluated the processing of noun-noun metaphors (*shark lawyer*) to elucidate the different roles of the head (*lawyer*) and the modifier (*shark*). In Experiment 1, we used a sense/nonsense task; metaphors whose head was used figuratively (*relationship patch*) were processed more slowly than metaphors whose modifier was used figuratively (*bandaid solution*). These results suggest that heads play a critical role in denoting the metaphorical category. This is in accordance with conceptual combination theories that state that the head designates the main category (*lawyers*), whereas the modifier adds information about this category (*shark lawyers* refers specifically to lawyers that are aggressive). In Experiment 2, we used a sense/nonsense task with primes; metaphors (*relationship patch*) were processed more slowly when preceded by a literal prime (*jean patch*) than when preceded by a figurative prime (*soul patch*). These results suggest that there is a cost associated with switching from literal to metaphorical interpretation.

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12:00-1:30 PM (4112)

Effects of Valence and Engagement on Reading Body-Image Words. PEIYUN ZHOU and KIEL CHRISTIANSON, *University of Illinois at Urbana-Champaign* (Sponsored by Kiel Christianson) — Word length, frequency, and predictability are dominant factors affecting lexical access in reading, as seen in early eye-movement measures, e.g. first fixation duration (FFD; Rayner, 1998). Scott et al. (2012) showed valence interacts with frequency to modulate early reading measures of emotion words. We used eye-tracking to examine whether the valence of sentence frames would similarly modulate early reading measures of body-image words not typically considered “emotion words” (e.g., ‘tall’, in (1)). We also examined whether readers (n=60) primed to think about body image by taking

a body image survey before reading would read these words differently from readers who took the survey afterwards. (1) **The basketball player hated (loved) being tall when he wasn’t on the basketball court.** Results showed interactions of sentence frame and order of reading/survey; FFD on target words in positive frames were ~25ms longer before taking the survey than after. Individual differences in self-image affected later (total) reading times on targets: readers with high or low body images spent more time reading targets than readers with neutral images. Sentential valence and attentional engagement have early effects on lexical access.

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12:00-1:30 PM (4113)

How Features of Contextual Events Alter the Interpretations of Before and After. JENNIFER KOLESARI and LAURA CARLSON, *University of Notre Dame* (Sponsored by Laura Carlson) — Various aspects of linguistic context affect how we interpret words within discourse. Adjectives can be interpreted differently depending on the nouns that follow. In addition, spatial prepositions are interpreted differently depending on the objects being related. Such effects make it likely that temporal prepositions could also be interpreted differently depending on the events being related. We systematically assessed the influence of context on the interpretation of temporal prepositions by asking participants to place events on a timeline to indicate an interval that corresponded to *before* or *after* a referent event. In four experiments, we examined how this contextual influence varied as a function of the duration of the events being temporally related, their boundedness (whether they have a clear endpoint in time), their semantic relation, and the clause structure within the sentences.

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12:00-1:30 PM (4114)

Creativity, Context, and the Cognitive Dynamics of Pun Processing. KATHRYN N. GRAVES and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* (Sponsored by Erica Middleton) — Homophone puns provide a window into the process of navigating semantic ambiguity. However, the contribution of individual and contextual differences to the dynamics of this process remains unclear. Previous studies have shown that individual differences in semantic creativity predict differential processing of metaphors, another instantiation of semantic ambiguity, and current models of pun ambiguity resolution provide varying accounts for the influences of frequency and pun context on lexical access to dominant and subordinate homophone meanings. Using a novel compound meaning production task and a pun-primed lexical decision task, the current study seeks to unify these findings under a model that accounts for individual differences as a function of semantic creativity, and clarifies the influence of context on homophone meaning access during pun processing.

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12:00-1:30 PM (4115)

Testing the Limit of the Label-Feedback Hypothesis: The Effect of Shared Verbal Labels on Perceptual Warping. ALEXANDER TAIKH, *University of Western Ontario*, OLESSIA JOURAVLEV, *Massachusetts Institute of Technology*, DEBRA JARED, *University of Western Ontario* (Sponsored by Debra Jared) — Language has been shown to influence cognition and perception. For example, objects that share a verbal label (vs. objects that do not) have greater perceptual similarity as indicated by a smaller mismatch negativity (MMN) response. According to the label-feedback hypothesis (Lupyan, 2012) language modulates perception by activating perceptual features common to the stimuli, pushing their conceptual representations closer together. Consistent with the label-feedback hypothesis, Boutonnet et al. (2013) found a smaller MMN between images of cups and mugs for Spanish speakers, who apply one verbal label “taza” to both objects, compared to English speakers. The current studies test the limit of the label-feedback hypothesis by examining the effect of a shared label on objects with common perceptual features (orange: fruit vs. color), and objects without common perceptual features (bat: animal vs. baseball). Findings suggest that shared labels can reduce MMN between objects that do not share perceptual features.

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12:00-1:30 PM (4116)

Developing a Database of Associative Norms for Common Colors. DYLAN YOUNG and TROY A. SMITH, *University of North Georgia* (Sponsored by David Gorfein) — Because research in cognitive psychology and linguistics often depends on stimuli for which people have pre-existing knowledge, a variety of normative databases have been developed (e.g., ANEW, USF norms); however, these databases currently lack consistent information about associations between colors and various concepts. Such information is essential for controlling for color associations in experimental design (e.g., semantic Stroop) and could place additional constraints on computational models of semantic memory and psycholinguistics. In Study 1, we obtained lists of concepts that are associated with 11 common colors through a free association task and an open-ended survey (n = 139). In Study 2, we used social media to collect direct measurements of associative strength from each of these concepts to each of the 11 colors from a relatively large, diverse sample (n = 500). We compare results from our behavioral studies to estimates from using computational methods such as LSA and WAS.

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ASSOCIATIVE LEARNING

12:00-1:30 PM (4117)

Scenes Facilitate Associative Memory and Inference. JESSICA ROBIN and ROSANNA K. OLSEN, *Rotman Research Institute, Baycrest Health Sciences* — The ability to form associations between items is a key feature of episodic memory, and is related to hippocampal function. Some theories of episodic memory suggest that spatial stimuli, such as scenes or spatial context,

play a supportive role in episodic memory. Thus, associative memory may be enhanced by the inclusion of a scene. We examined the role of scenes in memory using an associative inference paradigm. Participants learned associations between items (AB, BC) and were tested on memory for these directly learned associations, and unseen, inferential associations (AC). When objects were associated with a scene (versus another object), memory was more accurate for these direct associations. Participants responded faster when remembering direct (BC) and indirect (AC) associations involving a scene. Eye-tracking measures indicated that these effects may be mediated by increased fixations to the scenes. These results suggest that scenes facilitate associative memory, possibly mediated by increased attention.

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12:00-1:30 PM (4118)

Facilitated Acquisition of the Conditioned Eyeblink Response and Resistance to Extinction Effects in Active Duty Military Personnel Expressing Post-Traumatic Stress Disorder Symptoms. JUSTIN D. HANDY, *Syracuse Veterans Affairs Medical Center*, PELIN AVCU and NORA KO, *Rutgers Biomedical and Health Sciences*, ALEJANDRO ORTIZ, *Syracuse Veterans Affairs Medical Center*, MICHAEL J. DORIA, *United States Coast Guard*, RICHARD J. SERVATIUS, *Syracuse Veterans Affairs Medical Center* — According to a learning diathesis model of PTSD, perseverative fear and avoidance following trauma reflect inherent learning biases. Enhanced associative learning during eyeblink classical conditioning was previously reported in combat veterans expressing PTSD symptoms. The present study extends this work in an active duty military sample. United States Coast Guard (CG) personnel (N = 83) recruited from small boat stations were assessed for current PTSD symptoms and completed one session of eyeblink conditioning using a 50% partial reinforcement schedule. In partial reinforcement, paired trials (500-ms pure tone conditioned stimulus [CS] co-terminated with a 100-ms air puff unconditional stimulus [US]) were interpolated with 50% CS-alone trials. Consistent with previous work in veterans, CG personnel expressing PTSD symptoms demonstrated faster acquisition of the conditioned eyeblink response. Further, conditioned responding was resistant to extinction during a block of CS-alone trials. These results further support a learning diathesis model of PTSD, suggesting heightened associative learning and impaired extinction of conditioned responses may be one pathway through which posttraumatic dysfunction emerges.

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12:00-1:30 PM (4119)

Environmental Support for Rehearsal in Visuospatial Working Memory: Evidence From Eye Movements. LINDSEY LILIENTHAL, *Penn State Altoona* — Previous research has found that the presence of environmental support (i.e., whether or not the array of possible locations remains visible) during delays in a location memory task has an important effect on memory, presumably because support encourages and/or facilitates visuospatial rehearsal, which can occur through eye



movements made to to-be-remembered locations. However, this hypothesis regarding environmental support previously had not been tested directly, and so the present experiment investigated potential differences in eye movements across conditions of support. The results indicate that when environmental support is present, participants make more fixations to to-be-remembered locations, fixate longer on those locations, and fixate on a larger proportion of those locations compared to when support is absent. In addition, memory performance was found to correlate with fixations, more so when support was present. Overall, the results of this experiment are consistent the hypothesis that environmental support affects memory by influencing visuospatial rehearsal.

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12:00-1:30 PM (4120)

Testing and Attention Differentially Impact New Learning. LEAMARIE T. GORDON, *Assumption College*, AYANNA K. THOMAS, *Tufts University* — Recent studies show increased susceptibility to misinformation after immediate post-event testing, a finding referred to as retrieval enhanced suggestibility (RES). Evidence supports the hypothesis that immediate testing of event memory changes how subsequently presented misinformation is encoded, which then influences how easily it is retrieved from memory. We examined this encoding-based explanation of RES by comparing a group of participants who took an immediate post-event test to a group who performed a secondary task designed to exogenously direct attention to misleading post-event information. Interestingly, the groups demonstrated similar levels of suggestibility. However, this finding was dependent on the temporal relationship between the attention manipulation and the presentation of misleading post-event details. Further, when testing and exogenous manipulations were combined, a reduction in suggestibility was observed compared to the testing-only group. These results suggest that while testing and exogenous attention manipulations can both temporarily enhance suggestibility, they impact learning differently.

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12:00-1:30 PM (4121)

Knowledge of Accuracy Moderates the Benefits of the Testing Effect. XIAONAN L. LIU and MENGTING ZHANG, *Xiamen University*, XI CHEN, *University of Texas at Dallas* — Prior studies of the testing effect suggest people can benefit from successful retrievals without knowing that their answers are correct. However, the majority of these studies used feedback to manipulate such knowledge, but did not measure it directly by asking subjects' confidence rating. In the current study, we asked subjects to rate their confidence after each test and restudy trial and examined whether the benefit of successful retrieval differed when they had different confidence levels. The results revealed that performance on the final test for items had been correctly retrieved differed as a function of subjects' confidence: successful retrieval only facilitated retention for items subjects had more than 56% confidence about their accuracy in initial

test. This finding suggests the importance and necessity of knowing the answer being correct for the effectiveness of the Testing Effect.

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12:00-1:30 PM (4122)

(Withdrawn)

12:00-1:30 PM (4123)

Scheduling System Delays for Optimal User Performance: Don't Predict Time; Let Time Predict! ROLAND THOMASCHKE, LENNART KOCH, MIRIAM RUESS and ANDREA KIESEL, *Albert-Ludwigs-Universität Freiburg* — System delays affect user performance and experience when interacting with computers. We investigated the effects of different prediction relations between delay duration and response requirements on user performance. In one experiment, delay duration predicted, to different degrees (50 % vs. 80 % vs. 100 %), the following system response. Predictability substantially increased users' response speed, while adaptation was highly flexible, between different prediction regimes. In a second experiment, users' responses predicted system delay duration. Compared to the first experiment, users' response speed was moderately increased, while the adaptation was rather inflexible across different prediction regimes. In a third experiment, we directly compared both types of predictability. The results confirmed a stronger and more flexible adaptation effect when time predicted the system response, compared to when users' responses predicted time. These findings have important implications for scheduling data transmission rates across different users in internet-based parallel computing.

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12:00-1:30 PM (4124)

Training, Retention, and Transfer of Data Entry Perceptual and Motoric Processes Over Long Retention Intervals. JAMES A. KOLE, *University of Northern Colorado*, VIVIAN I. SCHNEIDER and ALICE F. HEALY, *University of Colorado Boulder*, IMMANUEL BARSHI, *NASA Ames Research Center* — Subjects trained in a standard data entry task, which involved typing numbers (e.g., 5421) using their right hands. At test (6 months post-training), subjects completed the standard task, followed by a left-hand variant (typing with their left hands) that involved the same perceptual, but different motoric, processes as the standard task. At a second test (8 months post-training), subjects completed the standard task, followed by a code variant (translating letters into digits, then typing the digits with their right hands) that involved different perceptual, but the same motoric, processes as the standard task. For each of the three tasks, half the trials were trained numbers (old) and half were new. Repetition priming (faster response times to old than new numbers) was found for each task. Repetition priming for the standard task reflects retention of trained numbers; for the left-hand variant reflects transfer of perceptual processes; and for the code variant reflects transfer of motoric processes.



There was thus evidence for both specificity and generalizability of training data entry perceptual and motoric processes over very long retention intervals.

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12:00-1:30 PM (4125)

Memory Consolidation in an Implicit Serial Learning Task: An Investigation Using the Hebb Digits Task. GEOFFREY O'SHEA and KYLE MADDEN, *State University of New York-Oneonta*, MICHELLE SPENCER, *Marist College*, STEVEN DOOLITTLE, *Binghamton University* — The Hebb Digits (HD) task, which involves the incidental learning of a repeating nine-digit sequence, has been a useful paradigm for investigating serial learning. In the HD paradigm, learning is demonstrated by enhanced recall of the repeated digit sequence compared to the non-repeated sequences. In the present experiment, memory consolidation was studied using a two part HD task in which each part was separated by a period of 12 hours. Participants returned for part two on the same day (no sleep group) or the next day (sleep group). Results found that sleep facilitated learning and awareness for sequence repetition. Quality of sleep, as measured by scores on the Epworth Sleepiness Scale was also found to play a role in recall and level of explicit knowledge of digit repetition. The results are discussed in terms of the role of memory consolidation in learning and awareness for serially-ordered information.

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12:00-1:30 PM (4126)

Distributional Learning Can Help Shift Attention Away From a Previously Informative Perceptual Dimension. VSEVOLOD KAPATSINSKI, KAORI IDEMARU and ZARA HARMON, *University of Oregon* — We investigated the influence of distributional versus error-driven learning on shifting attention away from VOT, the primary acoustic dimension distinguishing /p/ and /b/, towards a secondary cue, F0. 180 native English speakers were exposed to either a bimodal or unimodal distribution along VOT. F0, was either informative about voicing or constant. Feedback during training indicated that every value of VOT is equally likely to be voiced or voiceless. A unimodal distribution features many trials with ambiguous VOT, which means that 50/50 feedback on those trials is expected prior to training, reducing prediction error resulting from relying on VOT. Despite this, participants downweighted VOT only when it was distributed unimodally. We argue that a unimodal distribution along a dimension provides strong evidence that the dimension is no longer informative by indicating that the speaker has only one production target along the dimension. This result therefore supports a generative account of categorization.

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12:00-1:30 PM (4127)

Shape Sequences are Learned as an Abstract "Chunk" in Visual Statistical Learning. SU HYOUN PARK, LEELAND LOEW ROGERS and TIMOTHY J. VICKERY, *University of Delaware* (Sponsored by Timothy Vickery) — In temporal visual statistical learning (VSL), shape sequences that recur are

learned. How abstract is the knowledge gained – is it entirely due to paired associated learning, or are learned units more abstract? In three experiments, we found evidence of abstract "chunk" learning in VSL. After passively viewing a sequence of novel shapes, in which shapes always appeared as part of triplet (ABC) sequences, subjects completed a forced choice recognition task, choosing between an exposed triplet (e.g. ABC) or embedded pairs (e.g. AB and BC and AC) and foil triplets (e.g., AEI) or foil pairs (e.g., AE). Subjects showed above-chance AC learning in two experiments, despite non-adjacency of A and C items during exposure. In a third experiment, triplets and pairs were recognized above chance even when order was randomized (e.g., CAB and CBA). These demonstrations of flexibility support the proposition that abstract chunks are learned during VSL.

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12:00-1:30 PM (4128)

Greater Discrimination Difficulty During Visual Search Training Leads to Stronger and More Distinct Representations. VENCISLAV POPOV and LYNNE M. REDER, *Carnegie Mellon University* (Sponsored by Lynne Reder) — We found an unexpected positive effect of target-to-distractor similarity (TD) during visual search, despite overwhelming evidence in the literature that TD similarity hurts visual search performance. Participants with no prior knowledge of Chinese performed 12 hour-long sessions over 4 weeks, where they had to find a briefly presented target character among a set of distractors. At the beginning of the experiment, TD similarity hurt performance, but the effect reversed during the first session and remained positive throughout the remaining sessions. In addition, making an error on a trial with a specific character was associated with slower visual search RTs on the subsequent repetition of the character. Finally, in subsequent cued-recall and n-back memory tasks performance was better when the stimuli were characters that had highly similar distractors during the visual search training. These results suggest that greater discrimination difficulty likely induces stronger and more distinct representations of each character.

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12:00-1:30 PM (4129)

Temporal Structure Learning Facilitates Inductive Generalization. ATHULA PUDHIYIDATH (J. Frank Yates Student Travel Award Recipient), *The University of Texas at Austin*, ANNA C. SCHAPIRO, *Harvard Medical School*, ALISON R. PRESTON, *The University of Texas at Austin* (Sponsored by Alison Preston) — Life never stops moving forward, and yet we perceive events as discrete moments in time. We glean relationships among events by coding temporally proximal events similarly and distant events as distinct. To examine how these complex temporal codes can guide reasoning and learning, we created a novel adaptation of a temporal coding paradigm. In our study, adult participants were visually presented with a continuous stream of 21 novel 3D objects. Unbeknownst to participants, there were hidden temporal regularities in the presentation order of the objects—



they were presented in accordance with an underlying temporal community structure that consisted of three groupings. After this exposure phase, participants completed an inductive generalization test in which they made judgments about which pairs of objects from the exposure phase lived in the same habitat; these corresponded to one of the three groupings in the temporal structure. Results revealed that participants' implicit knowledge of the objects' temporal structure was correlated with how well they could reason about the objects' shared habitats. These results suggest that that knowledge about temporal $\xi_{SEP}^{[1]}$ statistics may guide the ability to reason about the world.

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12:00-1:30 PM (4130)

Retrieval Errors aid Learning, but Errors may not Mediate Later Recall. JACK MITCHELL INGRAM LEGGETT and JENNIFER S. BURT, *University of Queensland* (Sponsored by Jennifer Burt) — Retrieval practice improves memory for information more than other revision techniques, such as rereading, and this advantage is reliable across a wide range of materials and populations. Retrieval practice is often superior to reading even when retrieval attempts fail, as long as corrective feedback is given. Across several experiments, we manipulated the severity of retrieval errors, the duration of corrective feedback during practice, and the accessibility of practice errors during final tests. When errors were less severe, the benefits of retrieval attempts before reading were smaller and were only apparent when feedback was of a long duration. Further, performance on final test trials did not improve when participants were reminded of their corresponding errors from practice. These results suggest that failed retrieval attempts aid learning by evoking curiosity about or surprise at the correct answer, rather than by partially activating correct information or establishing mediators which aid future recall attempts.

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12:00-1:30 PM (4131)

Fewer Generation Constraints Enhance the Generation Effect via Cue-Target Associative Strengthening. MATTHEW P. MCCURDY, RYAN C. LEACH and ERIC D. LESHIKAR, *University of Illinois at Chicago* (Sponsored by Eric Leshikar) — Our prior work has shown that fewer generation constraints can improve the item and context memory benefits from self-generation, however, the mechanism behind this enhancement is still unknown. Studies on the generation effect have hypothesized a two-factor theory for why self-generation leads to improved memory: 1) by increasing item distinctiveness; 2) by strengthening the cue-target association. Across two experiments we aim to examine how fewer constraints enhance the generation effect through the two-factor theory by using a recognition test (examining the item distinctiveness factor) and cued recall (examining the cue-target strengthening factor). In both experiments, word pairs were studied in three conditions (lower-constraint generation, higher-constraint generation, read control). In Experiment 1, we found that lower-constraint and higher-constraint provided similar performance over read controls when using a recognition test. However, for Experiment

2, we found that lower-constraint led to enhanced performance compared to a higher-constraint task on a cued recall test. These findings suggest fewer constraints may enhance the generation effect via the cue-target associative strengthening factor of the two-factor theory.

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12:00-1:30 PM (4132)

Aversive Auditory Conditioning Affects Explicit Attitudes Toward Conditioned Faces. IONA D. SCULLY, DOMINIC J. PACKER and ALMUT HUPBACH, *Lehigh University* (Sponsored by Almut Hupbach) — Attitudes can be formed through evaluative conditioning: when objects are repeatedly paired with positively or negatively valenced stimuli, the objects become more liked or disliked (e.g., Jones, Olsen, & Fazio, 2010). The current work examines explicit and implicit attitude formation towards faces in an aversive conditioning paradigm. Participants repeatedly viewed photographs of four faces. Half of the faces were paired with a white-noise burst 50% of the time. Following acquisition, participants completed an implicit evaluative priming task, in which they were primed with one of the four faces before determining the valence of a positive or negative word. Participants were then asked to rate each face on measures of prosociality and agency (explicit measure). Participants rated conditioned faces as less trustworthy, likable, warm, and competent than unconditioned faces. No differences were found for ratings of intelligence or dominance. In contrast to explicit attitudes, the conditioning procedure did not significantly affect implicit attitudes.

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12:00-1:30 PM (4133)

Distinctiveness and Configuration of Stimuli Modify Associative Memory. JOHN M. HUHN III, JORDAN T. GOODMAN, HOLLY RICHARDSON and HARINI BABU, *The Pennsylvania State University*, AMY A. OVERMAN, *Elon University*, NANCY A. DENNIS, *The Pennsylvania State University* (Sponsored by Amy Overman) — Remembering associations is a ubiquitous part of life. Research suggests that different types of associations (such as item-item vs item-context pairs), are mediated by differing neural mechanisms (Diana, et al. 2012). Additionally, when testing for context, past studies often use only a few sources, which is unlike real world memory where we must discriminate amongst wide ranges of sources. The current study sought to evaluate how distinctiveness of source type influenced memory for different types of associations. Specifically, while all scenes were unique, we manipulated the category set such that in one testing group scenes were pulled from only 4 categories and in a second they were pulled from many distinct categories. Enhanced memory was observed for distinct versus categorical associations as well as for face-pair associations encoded as item-context pairs. The findings have implications for scientific theories of associative memory and unitization.

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12:00-1:30 PM (4134)

What Causes a Reminding: Familiarity and Detection of Change. NICHOLAS GRAY and COLLEEN KELLEY, *Florida State University* (Sponsored by Colleen Kelley) — Are rare events more likely to remind us of the past? Reminders have exhibited beneficial effects for avoiding interference between similar memories, and even creating memory facilitation (Wahlhiem & Jacoby, 2013). These benefits make it important to determine when reminders are likely to occur. Recognition memory is often better for low frequency words, and so low frequency cues may be more likely to trigger a reminding than high frequency cues. Results of the present experiments show that, in an A-B, A-D paradigm, lower frequency cues created more reminding of changed word pairs in a second list. We argue that in order to be reminded, it is essential for one to recognize the similarities between the past and present, which is easier when shared retrieval cues have low familiarity. Email: Nicholas Gray, ndgray00@gmail.com

12:00-1:30 PM (4135)

Item-to-Item Associations in Typing: Evidence From Spin-List Sequence Learning. DAKOTA R.B. LINDSEY and GORDON D. LOGAN, *Vanderbilt University* (Sponsored by Gordon Logan) — Research in serial recall and serial learning often denies any role of item-to-item associations in memory for serial order. We questioned whether this conclusion extends to the motor skill domain. In four experiments, participants typed non-word letter strings as they were presented on a computer screen. Participants typed each string several times (spaced practice), and we analyzed sequence-specific learning over practice. Half of the strings were spin-list sequences (SLS; same relative order of items but with different starting points; e.g., “abcdef” and “bcdefa”), and the other half were control sequences (CS; letter order scrambled using a Latin square). In all four experiments learning was faster for SLS than CS, attributable to the consistent relative order of items in SLS. In addition, training on some of the SLS produced positive transfer to untrained SLS that was insensitive to spin distance (and thus unaffected by overall sequence similarity). Our experiments suggest that participants learned item-to-item associations and used them to retrieve the proper sequence of keystrokes. Unlike memory for serial order, item-to-item associations do play a role in typing and likely other motor skills that require serial order. Email: Dakota Lindsey, dakota.r.lindsey@vanderbilt.edu

12:00-1:30 PM (4136)

The Influence of Associative Learning on Moral Decision-Making. ROSE MARTIN and PETKO KUSEV, *Huddersfield Business School* (Sponsored by Petko Kusev) — Moral decision-making involving a trade-off between the lives of humans in hypothetical moral dilemmas is a widely-researched topic in psychology. Much research has focused on influences on utilitarian moral decision-making such as personal involvement (Greene et al., 2001), uncertainty (Kusev et al. 2016), and the numbers of people’s lives involved (Nakamura, 2012). However, despite the vast amount of literature claiming that moral behaviour is learned (Mikhail, 2007), no experimental research

has investigated how moral decision-making is influenced by associative learning. Therefore, the present research implemented moral rules within an associative learning task, and revealed that moral rules (i) can be learned (ii), are transferred and used in moral decision-making tasks without feedback. The results also revealed that learning accuracy, but not transfer accuracy is influenced by the moral decision-making frame (save/not-save). Based on these findings, future research should investigate whether learned rules or normative utilitarian rules dominate the decision-making process. Email: Rose Martin, rosekmartin@live.com

EYEWITNESS IDENTIFICATION

12:00-1:30 PM (4137)

Does Corrective Feedback on an Initial Lineup aid Subsequent Lineup Decisions? CHARLES A. GOODSSELL, *Canisius College*, ROBERT F. LOCKAMYER and CURT A. CARLSON, *Texas A&M University - Commerce*, DAWN K. WEATHERFORD, *Texas A&M University - San Antonio* — We investigated if providing corrective feedback to eyewitnesses making a decision from an initial perpetrator-absent lineup could improve subsequent lineup decisions. Participants viewed a mock crime and after a short distractor task some were asked to make an identification from a perpetrator absent lineup (the rest were dismissed). Half of these witnesses received feedback about their decision. For lineup choosers, the feedback informed them that they had chosen an innocent filler and that suggested that the police did not have the correct suspect and that the investigation would continue. For non-choosers, they were told that their lineup rejection indicated the same thing. Two days later all witnesses returned to view either a perpetrator-present or absent lineup. Consistent with prior research on mugshot exposure (e.g., Goodsell, Gronlund, & Neushatz, 2015) being exposed to a prior identification procedure harmed subsequent lineup performance. For initial lineup choosers who received corrective feedback, performance was equivalent to those who did not view an initial lineup. Email: Charles Goodsell, goodselc@canisius.edu

12:00-1:30 PM (4138)

Identification Experience Increases Skepticism of Eyewitness Testimony. J. TRENT TERRELL, *University of Mary-Hardin Baylor*, BRITTANY N. NESBITT, COURTNEY A. KURINEC, KARENNA F. MALAVANTI and CHARLES A. WEAVER, III, *Baylor University* — We investigated a new method for increasing juror awareness of factors affecting eyewitness memory by allowing mock jurors to experience eyewitness identification firsthand. Mock jurors read a summary of an armed robbery court case with eyewitness testimony. Then, they were randomly assigned to one of three conditions: jury instructions, expert testimony, or eyewitness experience. Subjects in the eyewitness experience condition watched a 20 second video of a crime to simulate an eyewitness situation and completed a distraction task before being presented with a target-present lineup. Afterwards, jurors rendered a verdict on the armed robbery case. All jurors reported increased skepticism of eyewitness testimony. Jurors who experienced



eyewitness identification were the most likely to vote not guilty, particularly those who reported that the experience made them regard eyewitnesses as less credible.

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12:00-1:30 PM (4139)

Breaking the Code: Analyses of Mistaken Identification Cases in the Innocence Project. MICHAEL P. TOGLIA, *University of North Florida*, DANIELLE M. RUMSCHIK, KRISTINA TODOROVIC and GARRETT L. BERMAN, *Roger Williams University*, CELESTE A. GLOBER, *University of Texas-Austin* — The Innocence Project, since 1992, exonerates the wrongfully convicted through DNA testing and helps identify and reform aspects of the criminal justice system that contribute to erroneous conviction. Mistaken identification is by far the leading cause of erroneous convictions. The present study used the Innocence Project case index to focus on specific cases involving eyewitness error by establishing a system of coding variables to better understand what factors precipitated the wrongful convictions. Best practice recommendations, system variables, estimator variables, legal safeguards designed to protect innocent people from erroneous conviction, and defendant characteristics were included in the coding and the case analyses. We report some data in these areas, however in particular, lineup presentation (simultaneous vs. sequential vs. show-ups) and estimator variables (e.g., lighting, disguise, weapon focus, and cross-race) are examined and presented in the contexts of empirical findings from the eyewitness literature and theoretical approaches such as fuzzy trace theory.

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12:00-1:30 PM (4140)

The Accuracy of Witness Crime Duration Estimates can be Improved. HOLLY GASPER and MICHAEL M. ROY, *Elizabethtown College*, HEATHER FLOWE, *Loughborough University* — We examined the effects of unpacking, breaking an event into its component parts, and anchoring, supplying participants a reference duration, on estimation of duration for a crime. Participants ($n = 66$) viewed a video of a theft from a parked car and then estimated the duration of crime with intervention type - 2 (unpacking vs. no unpacking) X 2 (anchor vs. no anchor) - randomly determined. There was no effect of anchoring. Bias and error were less when utilizing the sum of the estimates for the individual parts of the crime (casing the car, unlocking the door, etc.) than when utilizing the overall estimation. Further, the sum of participants' estimates for the individual components of the crime did not equal their overall estimate. Average estimation for the overall duration was 14 sec, while the sum of the component parts of the crime was 18 sec (actual duration of 23 sec).

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12:00-1:30 PM (4141)

Increasing Diagnostic Value of Eyewitness Identifications With Speed. TRAVIS M. SEALE-CARLISLE, RANA BANAI TIZKAR, NIALL DONNELLY, JULIA R. TOMS, MIRELA VELIKOVA and DAVID P. MORGAN, *Royal Holloway, University of London*, STACY A. WETMORE, *Butler University*,

LAURA MICKES, *Royal Holloway, University of London* — The longstanding belief that an eyewitness's confidence in an identification of the suspect from a lineup and the accuracy of that identification were unrelated has only recently been reversed. Lab-based and field studies alike show that identifications made with high confidence are highly accurate whereas identifications made with low confidence are much less so. Confidence therefore provides diagnostic value, but can it be further increased? We investigated if imposing a response time deadline would improve accuracy or simply affect response bias. In a forensically relevant experiment, participants watch a video of a mock crime, and later try to identify the perpetrator from a sequential photo lineup. For each lineup member, participants respond on a confidence rating scale (from "certain was not the perpetrator" to "certain was the perpetrator") either at their own pace or under 3000 ms. Our findings shed light on ways to improve diagnostic value of eyewitness identifications.

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12:00-1:30 PM (4142)

The New Theory of Disuse Predicts Rates of Retrieval Enhanced Suggestibility (RES). VICTORIA A. BARTEK, *Seton Hall University*, LEAMARIE T. GORDON, *Assumption College*, MARIANNE E. LLOYD, *Seton Hall University* — Retrieval enhanced suggestibility (RES) is an effect where initial testing of an event leads to greater misinformation reporting on subsequent tests. The present experiment tested whether the New Theory of Disuse (Bjork & Bjork, 1992) effectively supplements the retrieval fluency account of RES (Thomas et al., 2010). The New Theory of Disuse posits that new learning decreases the retrievability of old items, with greater detriments for weakly stored items. An interference manipulation was added to the standard RES paradigm to investigate how new learning affected the retrieval strength for the original and misinforming events. The results suggested that learning interfering information decreased RES. Further, success in initial test performance (i.e., higher storage strength) predicted greater reductions in RES with interference. This is in line with the New Theory of Disuse's predictions and suggests that this model may be beneficial for understanding suggestibility to misinformation in RES.

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12:00-1:30 PM (4143)

Comprehensive Narrative Elaboration Technique (CNET): Comparing Recall Between Older and Younger Adults. SARAH KELLER, JENNIFER BRIERE and TAMMY MARCHE, *University of Saskatchewan* (Sponsored by Jennifer Briere) — Accuracy of younger ($Mage = 20.56$, $SD = 1.75$) and older ($Mage = 81.34$, $SD = 11.02$) adults' event recall was examined across 3 eyewitness interviewing protocols to evaluate the efficacy of the *Comprehensive Narrative Elaboration Technique* (CNET; Marche, Briere, & von Baeyer, 2015) in comparison to the *Narrative Elaboration Technique* (NET; Saywitz & Snyder, 1996) and free recall. Approximately 1 week after witnessing a staged argument, participants took part in 1 of the 3 interviewing protocols. The number of details reported from each of 6 autobiographical memory components (sensory/



somatosensory, affective/emotional, behavioral, cognitive, contextual, & procedural) were analyzed. Older adults recalled significantly fewer details about the scene than did younger adults. The CNET also elicited significantly more details from both age groups for all autobiographical memory components, except affective/emotional, than both the NET and free recall. Further, the CNET did not compromise the accuracy of details given. The CNET appears to be a useful tool in eliciting accurate, detailed accounts of both younger and older adults' witnessed experiences.

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12:00-1:30 PM (4144)

Are Hands Weapons? A Weapon Focus Effect Exploration.

KAITLIN M. ENSOR and NANCY FRANKIN, *Stony Brook University* (Sponsored by Nancy Franklin) — Although hands can be used as weapons to inflict bodily harm in the real world, no research has investigated whether hands produce impairments to eyewitness memory similar to those produced by typical, inanimate weapons. The current study examined this possibility by measuring both description accuracy and ID performance. We manipulated expectation of threat using a preliminary narrative describing two characters interacting, where one character became very happy or very angry. Following the narrative, participants briefly viewed a scene in which a man was holding his hand in a fist or a standard weapon focus effect pose (e.g., holding a knife in the angry context). Narrative valence affected accuracy of face description, with the angry narrative impairing performance. Neither narrative valence nor the contents of the character's hand produced differences among conditions with regard to identification accuracy. The results indicate that hands can be perceived as weapons in the right context.

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12:00-1:30 PM (4145)

The Effects of Retention Interval and Repeated Lineups on Choosing and the Confidence-Accuracy Relationship in Eyewitness Identification. WENBO LIN and HENRY L. ROEDIGER, *Washington University in St. Louis* (Sponsored by Leonard Green) — In eyewitness identification experiments, the effects of retention interval and repeated testing are often studied separately, but both factors can easily occur together in the real world. We examined whether the effects of repeated identifications interact with the length of the delay between the witnessed event and the first lineup. After participants saw the event, they responded to an initial (target-present or target-absent) lineup after either 10-min or 3-days. They responded to the same lineup a second time 3-days after the initial lineup. For target-present lineups, choosing rate decreased as retention interval increased. For target-absent lineups, choosing rate increased as retention interval increased. However, choosing rate increased with repeated testing for both target-present and target-absent lineups regardless of the length of delay. Despite the effects of retention interval and repeated lineups on choosing rate, confidence remained predictive of accuracy in identifying the suspect.

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12:00-1:30 PM (4146)

The P300-Based GKT Applied to Eyewitness Identification.

MARIO J. BALDASSARI, RYANN TANSEY and D. STEPHEN LINDSAY, *University of Victoria* (Sponsored by D. Stephen Lindsay) — Witnesses sometimes refuse to identify a culprit to police (due to fear or allegiance). Lefebvre et al. (2007, 2009) applied the P300-based Guilty Knowledge Test to eyewitness identification. We tested a replication of Lefebvre and colleagues' findings with our own materials and built on their findings by using Meixner and Rosenfeld's (2014) bootstrapping method to assess individual participants' responses more precisely. Participants were shown a crime video twice to maximize exposure. Then, they studied a new face to a critical recognition performance. These two faces were later repeatedly presented intermixed with ten new faces in an oddball paradigm. We instructed half of participants to "lie" by not identifying the culprit overtly. Bootstrapped P300 amplitudes to the criminal were compared to amplitudes to the studied face and to the new faces to classify amplitudes to the criminal's face as identifications or rejections at the level of individual subject/witnesses.

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12:00-1:30 PM (4147)

Metamnemonic Predictions of Lineup Identification Performance.

GEOFF MCKINLEY and AARON BENJAMIN, *University of Illinois at Urbana-Champaign*, SCOTT GRONLUND, *University of Oklahoma* (Sponsored by Aaron Benjamin) — After witnessing a crime, an investigator may ask whether a witness will be able to identify the perpetrator in a lineup. In Experiment 1 (N = 212), subjects were shown a mock crime video and, after a delay, viewed a lineup that either contained the perpetrator or did not. Critically, subjects were asked to make predictions of their later performance on the lineup either immediately after watching the video or after a delay. Predictions of performance were higher in the immediate condition, but were not related to accuracy in either condition. However, we unexpectedly found that subjects in the immediate condition exhibited better memory on the later lineup task. Because of concerns over differential attrition between conditions in this online experiment, we replicated the task in the lab (Experiment 2; N = 254). The results replicated almost completely, including the fact that memory performance was higher in the immediate condition. This result parallels recent findings in the metamemory literature indicating that making judgments can change performance in memory tasks. Although predictions of lineup performance may not be useful in pre-selecting accurate eyewitnesses, they may be useful in enhancing memory for the crime.

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12:00-1:30 PM (4148)

Why are People Less Accurate When Answering Follow-Up Questions Than When Freely Recalling a Criminal Event?

ROBIN F. HOPKINS, MADOLYN PINKSTON and KEITH B. LYLE, *University of Louisville* (Sponsored by Keith Lyle) — In police interviews, witnesses typically provide free recall (FR) of an event and then answer open-ended follow-up questions



(FQs). Details provided in FQs are often less accurate than in free recall (FR). We examined whether this was due to FQs following FR in time and response output. Subjects watched a video depicting a criminal event and were then interviewed in one of three ways. Some subjects provided FR and then either answered FQs or provided a second FR. Other subjects only answered FQs. Details were as accurate in a second FR as in an initial FR, but details elicited by FQs were less accurate than details elicited by FR, regardless of whether FQs were preceded by FR. These results suggest the oft-observed decline in accuracy from FR to FQ is not an effect of order.

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12:00-1:30 PM (4149)

Reducing False Identifications Without Reducing Discriminability. BRENT M. WILSON and JOHN T. WIXTED, *University of California, San Diego* (Sponsored by John Wixted) — A National Academy of Sciences committee recently recommended “a rigorous exploration of methods that can lead to more conservative responding (such as witness instructions) but do not compromise discriminability” (p. 118, National Research Council, 2014). Previous research has shown that instructing individuals not to make an identification unless they are 100% certain induces conservative responding but also impairs discriminability by introducing criterion variability. In our study, we examined instructions that are frequently advocated in eyewitness identification research to induce conservative responding. These instructions inform eyewitnesses that the perpetrator may not be in the lineup, that the police will continue investigating regardless of their selection, that removing suspicion from an innocent suspect is also important, and that an identification is not required. We found that these instructions had the effect of inducing more conservative responding (i.e., lowering the false ID and correct ID rates) without compromising discriminability.

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12:00-1:30 PM (4150)

The Impact of Sleep on Eyewitness Identifications. DAVID PHILIP MORGAN, JAKKE TAMMINEN and LAURA MICKES, *Royal Holloway, University of London* (Sponsored by Laura Mickes) — Sleep is known to benefit performance on recognition memory tasks relative to an equivalent period of wake. Yet, the impact of sleep on eyewitness identifications is unknown. Eyewitnesses to crimes are often presented with a lineup (a recognition memory test) that contains the suspect (i.e., innocent or guilty) and fillers (who are innocent). Sleep may enhance the ability to identify the guilty suspect and not identify the innocent suspect (i.e., discriminability). Sleep may also impact the likelihood that the identified suspect is guilty (i.e., reliability). Here, we manipulated the presence or absence of sleep in a forensically relevant memory task. Participants witnessed a mock-crime, made a lineup decision, and rated their confidence. Participants slept or remained awake between witnessing the crime and making a lineup decision. We

compare discriminability and reliability between sleep and wake conditions to reveal the impact of sleep on eyewitness identifications.

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12:00-1:30 PM (4151)

Survival Processing and Face Recognition Memory. MEHMET GÜNAL, GOWTHAM GANESAN, HERVÉ ABDI and JAMES C. BARTLETT, *University of Texas at Dallas* (Sponsored by James Bartlett) — The mnemonic benefits of survival processing are well established (Nairne, Thompson, & Pandeirada, 2007). However, one study reports they do not generalize to face recognition (Savine, Scrullin, & Roediger, 2011). Gunal, Abdi, and Bartlett (Psychonomics, 2016) conducted two experiments to determine whether survival processing improves face recognition when the recognition task requires participants to recollect the context in which they saw faces previously. We found a positive survival processing effect, but a subsequent experiment suggested it may not extend to conditions of retroactive interference. In work in progress, we question whether procedures that entail choosing one face over another – instead of simply rating faces for survival value – can strengthen survival processing effects in face recognition memory.

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12:00-1:30 PM (4152)

Can We Improve Mock Jurors' Memory for Witness Confidence? RACHEL M. DEFRANCO and MARIA S. ZARAGOZA, *Kent State University* (Sponsored by Maria Zaragoza) — Prior studies conducted in our lab have shown that mock jurors' memories for the confidence with which a witness testified is highly susceptible to forgetting: Although mock jurors had highly accurate memory for testimonial certainty and uncertainty when memory was assessed immediately, after a retention interval of one week, mock jurors' memory for this confidence was at chance (DeFranco, Rich & Zaragoza, 2017). Given that the confidence with which testimony is initially provided can be an important cue to its accuracy, the present study sought to assess whether it is possible to improve mock jurors' memory for testimonial confidence through an instruction. Both the timing (immediately before vs. after the testimony) and the nature of the instruction (remember because you will be tested vs. remember because confidence is an important cue to accuracy) were manipulated.

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TEST EFFECTS II

12:00-1:30 PM (4153)

Remembering What Was Said and Done: The Influence of Retrieval on Memory for Gesture. ACACIA L. OVEROYE and *BENJAMIN C. STORM, *University of California, Santa Cruz* — The gestures people produce while speaking are not meaningless hand movements but help listeners to interpret what is being said. Beyond comprehension, gestures have also been shown to influence a listener's memory for speech. The current research investigated the representation of speech



and gesture in memory by examining how retrieval of speech modifies memory for gesture. Using a retrieval-practice paradigm with videotaped statements that included speech alone or speech with gesture, we found that retrieving the speech of statements led to better memory for gestures when compared to non-retrieved statements. This retrieval-enhanced memory effect was only observed, however, when the gestures were meaningful (i.e., the gestures provided additional information that was not redundant with the speech). The findings suggest that the co-activation of gesture information during retrieval, as well as the consequences of such retrieval, depend critically on how speech and gesture are integrated at the time of encoding. Email: Acacia Overoye, aoveroye@ucsc.edu

12:00-1:30 PM (4154)

Retrieval Practice Enhances Learning Regardless of Material Complexity. JOSEPH P. BEDWELL and JEFFREY D. KARPICKE, *Purdue University* — van Gog and Sweller (2015) claimed that the testing effect disappears when the complexity of materials increases. They defined complexity as “element interactivity.” Materials high in element interactivity are treated as sets of related and connected ideas, whereas materials low in element interactivity are treated as a series of isolated facts. The current project manipulated element interactivity by presenting texts either intact or in a scrambled sentence order. According to the element interactivity hypothesis, when texts are presented in a scrambled order and ideas are treated as isolated facts, there should be large retrieval practice effects. In contrast, when texts are presented intact and ideas are treated as related and connected (higher element interactivity), retrieval practice effects should be absent. Results showed benefits of repeated retrieval regardless of text organization and complexity, challenging the assertion that the testing effect is eliminated for materials that are high in element interactivity. Email: Joseph Bedwell, jbedwell@purdue.edu

12:00-1:30 PM (4155)

Only Temporary Amnesia Results When Relearning Follows Retrieval. GREG HUGHES and AYANNA K. THOMAS, *Tufts University*, LEAMARIE GORDON, *Assumption College*, JOHN BULEVICH, *Stockton University* — Research suggests that retrieval may destabilize episodic memory, rendering it susceptible to amnesia when followed by relearning (e.g., Chan & LaPaglia, 2013). The present study investigated whether this amnesic pattern is profound, or can be circumvented through retrieval monitoring. In three experiments, participants first watched a short film depicting a burglary during the original learning phase. Our first manipulation was whether participants recalled specific details from the original learning episode before encountering new information that replaced the original information. Second we manipulated whether participants were generally or specifically encouraged to avoid reporting the new information on the final test. Both general warnings prior to the final test, and specific warnings during the final test reduced, but did not eliminate retrieval-relearning amnesia. Pairing the general and specific warning eliminated retrieval-relearning

amnesia and standard misinformation effects. The results have implications for reconsolidation disruption effects in episodic memory.

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12:00-1:30 PM (4156)

Development of the Animacy Memory Effect: 2nd and 5th Graders Replicate Adult Performance. KARIN MACHLUF, *The Pennsylvania State University*, JAMES NAIRNE, *Purdue University*, DAVID F. BJORKLUND, *Florida Atlantic University* — Early hominids surely faced selection pressures for remembering survival relevant information. Animate beings are a major source of traditional selection pressures (food, safety, and reproduction); thus, we would expect to find advantages for animate processing in many areas of cognition, particularly memory. Unexpected animate images are detected more frequently than unexpected inanimate images in an attentional blindness task (Calvillo & Jackson, 2013). Furthermore, Bonin, Gelin, and Bugaiski (2014) replicated the Nairne et al. (2013) animacy memory advantage finding with images corresponding to the original word lists. Thus, numerous lines of inquiry support the animacy hypothesis in adults. However, the developmental course of an adaptation is an important source of information. The animacy recall advantage was tested in adults, 5th, and 2nd graders. Across all participants, animate words were recalled more frequently than inanimate words, $F=52.74$, $p<.01$, $\eta_p^2 = .534$. The animacy advantage persists in 2nd graders, $t(42) = 19.9$, $p<.001$, and 5th graders, $t(30) = 4.22$, $p<.001$. Thus, the animacy memory advantage demonstrates a robust effect at all ages, suggesting it is a critical characteristic of human memory systems.

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12:00-1:30 PM (4157)

Enhancing the Pretesting Effect: The Benefit of Open-Ended Questions. KYLE J. ST. HILAIRE, *Iowa State University*, JANINE M. JENNINGS, *Wake Forest University* — Answering test questions prior to study has been shown to improve learning (the pretesting effect). However, these benefits only occur when the *same* questions are asked at both pretest and posttest (old questions); there are no learning benefits when *new* questions are asked at posttest (Richland et al., 2009). We previously hypothesized that this lack of transfer was characteristic of closed-ended pretest questions (fill-in-the-blank) but answering open-ended, short-answer-style questions may prove more effective (St. Hilaire et al., 2016). The current study explores this hypothesis further using more complex study materials. Participants first either took a pretest consisting of closed-ended or open-ended questions then studied a demanding prose passage, or simply studied the passage, after which a posttest was administered. Whereas closed-ended pretest questions only showed learning benefits for old questions, open-ended pretest questions produced transfer, enhancing performance on *both* old and new questions at posttest relative to the no-pretest condition.

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12:00-1:30 PM (4158)

Two Routes to the Same Place: Faster Closed-Book Essays are as Useful for Learning as Higher Quality Open-Book Essays.

KATHLEEN M. ARNOLD and EMMALINE E. DREW, *Duke University*, MARK A. MCDANIEL, *Washington University in St. Louis*, ELIZABETH J. MARSH, *Duke University* — Research on the effects of learning through writing has mixed results, likely due to the variety of writing assignments, which each encourage different types of cognitive processing (Arnold et al., 2017). Even within one type of writing assignment, e.g., short essays, the particular instructions can affect the processes engaged while writing. In this study, we examined two types of short essays – open-book and closed-book – and compared their effects on learning. Open-book essays took longer to write, included more content, and were of a higher quality than closed-book essays. However, learning outcomes were equivalent. We explored how the cognitive processes of retrieval, organization, and elaboration were differentially engaged when writing each essay type. We further investigated how individual differences modified both the engagement of these processes and the effect of each essay type on learning. Although there was no overall difference in learning, the processes underlying learning differed across essay types.

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12:00-1:30 PM (4159)

Less Talking, More Quizzing: How Does Lecture Quizzing Affect Memory and Retention? KENNETH J. BARIDEAUX JR, *The University of South Carolina Upstate*, PHILIP I. PAVLIK JR, *The University of Memphis* — Critics sometimes argue that lecturing leads to passive learning. Prior research suggests that intermittent lecture quizzing may support attention and task-relevant behaviors such as note-taking (e.g., Szpunar, Khan, & Schacter, 2013). While intermittent lecture quizzing seems promising to promote more active learning, it is unclear how other types of quiz placements affect learning. In the current study, a pre-recorded lecture was divided into three segments of equal lengths. Participants were quizzed after each segment (i.e., interspersed), quizzed only after the first segment, quizzed only after the third segment, or received no quiz during the lecture. After a one-week retention interval, participants completed a final cumulative test. The results indicated that the interspersed condition significantly outperformed the beginning, end, and no quizzing conditions on the final test. This was especially the case among those with high test anxiety. Results also indicated that the interspersed condition reported significantly less episodes of mind wandering relative to the other conditions, and participants in the interspersed conditions recorded significantly more notes.

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12:00-1:30 PM (4160)

How Low Can You Go? Categorization and Recognition of Low Resolution Images. MATTHEW B. THOMPSON, *Murdoch University*, JASON M. TANGEN, YINNAM CHAN and LUKE FRENCH, *The University of Queensland*, RACHEL M. SEARSTON, *The University of Melbourne* — People have a remarkable ability to categorize and recognize scenes even

when the amount of visual information is heavily reduced (Torralba, 2009; Wolfe & Kuzmova, 2011). Here we test whether this ability holds for three very different categorization domains (birds, paintings, and faces), and for two different cognitive tasks (categorization and recognition). In two experiments, we manipulate visual structure by systematically reducing the resolution of images in eight conditions ranging from 1 pixel to 128x128 pixels. We found that people's sensitivity increased as image resolution increased, and that the pattern of results was similar for the categorization task and the recognition task. Critically, we found that people could accurately discriminate within domain categories at resolutions as low as 16x16 pixels, and that people could accurately recognize images at resolutions as low as 2x2 pixels. These findings will be described in the context of a broader program of research aimed at revealing the covariance structure of images in order to optimize performance in real-world categorization tasks.

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12:00-1:30 PM (4161)

Comparing the Effects of Retrieval-Based and Elaboration-Based Learning in Primary Schools: Influences of Final Tests and Scaffolding. RYO SAITO and KEIYU NIIKUNI, *Tohoku University*, KOICHI SUGAWARA, *Rokugo Elementary School*, KAZUNORI SATO, TATSUYA HORITA and TOSHIKI MURAMOTO, *Tohoku University* (Sponsored by Kazuhiro Ikeda) — Effects of retrieval-based learning (RBL), compared with elaboration-based learning (EBL), are controversial in meaningful learning (e.g., text learning) for primary school children. The effects of RBL would be highly vulnerable with a variety of final tests and the presence of scaffolding (e.g., keywords and hints for retrieving). The effects should appear in verbatim questions but do not appear in applied questions. Also, the effects should be lessened by the absence of scaffolding. This study compared three methods (“RBL with scaffolding (RBL-S)”, “RBL without scaffolding (RBL-NS)”, and “EBL (written explanation)”). Participants (11-12 years) conducted one of them in text learning and took a final test one week later. The results showed that RBL-S produced more learning than EBL in verbatim questions ($d=0.64$), but no effects were found in applied questions. These results confirmed that the effects of retrieval practice should be vulnerable with final tests. Also, the absence of scaffolding can weaken the effects. Consideration of tests also sometimes made students less motivated to learn (e.g., test anxiety), teachers should control the timing and the frequency of testing, and should provide scaffolding for the students.

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12:00-1:30 PM (4162)

Why Does Retrieval Practice Benefit Memory? An Examination of the Episodic Context Account. MIN KYUNG HONG, SEAN M. POLYN and LISA K. FAZIO, *Vanderbilt University* (Sponsored by Sean Polyn) — The episodic context account is a recent theory of why retrieval practice improves memory. The theory states that the act of retrieval enhances memory through reinstating a prior learning context. However, few studies have directly tested predictions derived from



the account. We directly tested the account by examining participants' memory for the initial studied context. Across two experiments, participants encoded cue-target pairs presented in different colors and either practiced retrieving the targets or restudied them. If retrieval practice benefits memory by reinstating the context information of the encoding phase, as predicted by the episodic context account, participants who practiced retrieving the items should show enhanced memory for that context (i.e. font color) compared to participants who restudied the pairs. Contrary to our prediction, source memory was marginally better in the restudy condition than the retrieval practice condition. Our results suggest the benefits of retrieval practice do not stem from the context reinstatement during the process of item recall.

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12:00-1:30 PM (4163)

“None-of-the-Above” (Nota) Can Lead to a Negative Testing Effect, But it Does Not Hurt all Test-Induced Learning. MARY F. BLENDERMANN and JERI L. LITTLE, *Hillsdale College* (Sponsored by Jeri Little) — Taking a test usually improves the retention of the tested information, but answering multiple-choice questions having “none-of-the-above” (NOTA) as a correct answer leads to a negative testing effect (Odegard & Koen, 2007). In the present study, the primary question of interest was whether multiple-choice questions with NOTA as a choice—as compared to cued-recall questions—would improve recall of related information pertaining to an incorrect alternative. A final cued-recall test followed an initial test in which participants answered trivia-based cued-recall questions and multiple-choice questions with NOTA as an alternative. For related information, having an initial multiple-choice test was better than an initial cued-recall test, regardless of whether NOTA was the correct answer. Replicating previous work, a negative testing effect emerged when NOTA was the correct answer, but a positive testing effect emerged when NOTA was an incorrect alternative. These results have implications for when NOTA should be included in multiple-choice questions. Email: Mary Blendermann, mblendermann@hillsdale.edu

12:00-1:30 PM (4164)

Recollection, Familiarity, and the Testing Effect Over Time. RUTH A. SHAFFER, *Washington University in St. Louis*, ADRIAN W. GILMORE, *National Institute of Mental Health*, KURT ANDREW DESOTO, *Association for Psychological Science*, KATHLEEN B. MCDERMOTT, *Washington University in St. Louis* (Sponsored by Kathleen McDermott) — Research has revealed that the benefits of prior testing are supported by enhanced recollection—but not familiarity—on an immediate final test (Chan & McDermott, 2007). However, little is known about the effect of prior testing on recollection and familiarity use after a delay. As the efficacy of prior testing has been shown to change over time, a more complete understanding of the processes underlying the testing effect must likewise consider delay. To address this question, subjects studied words, took cued-recall tests on half of the words, and completed a final recognition test on all words either immediately, one day, or four days following initial testing. Separate receiver-operating

characteristic and remember-know analyses revealed that prior testing enhanced both recollection and familiarity use at each time point. Although recollection is reliably found to contribute to the testing effect, changes in familiarity can play a significant role as well.

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12:00-1:30 PM (4165)

Implementing Adaptive Retrieval Practice With Flexible Cues: A Powerful Technique for Generalizing the Benefits of Testing. JOSHUA FIECHTER (Graduate Travel Award Recipient) and AARON BENJAMIN, *University of Illinois at Urbana-Champaign* (Sponsored by Aaron Benjamin) — Testing is a powerful enhancer of memory. However, if initial encoding is poor, and subsequent retrieval is therefore more likely to fail, then the benefits are diminished or even eliminated. To generalize the benefits of testing to situations in which it is normally ineffective, we previously evaluated the benefits of diminishing-cues retrieval practice (DCRP; Fiechter & Benjamin, 2017)—a scaffolded technique that requires learners to self-test under progressively increasing retrieval demands—and found that DCRP is beneficial to memory even under conditions in which testing is not. Here we evaluate a new technique: adaptive-cue retrieval practice (ACRP). Like DCRP, ACRP also scaffolds retrieval demands, but unlike DCRP, ACRP adapts to an individual's moment-to-moment ability such that retrieval demands are higher for better-learned items. Across eight experiments, we compare ACRP to DCRP, to standard retrieval practice, and to restudy. Like DCRP, ACRP is beneficial when testing is not, and is even more effective than DCRP in situations where DCRP is more beneficial than standard retrieval practice.

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12:00-1:30 PM (4166)

Beyond Pretesting: What Happens to the Information That Isn't Pretested? KELSEY K. JAMES, SEAN M. STONE and *BENJAMIN C. STORM, *University of California, Santa Cruz* (Sponsored by Travis Seymour) — Taking a test before learning information can enhance the long-term retention of that information, a phenomenon sometimes referred to as the pretesting effect. In the present research, we explore the consequences of pretesting on memory for non-pretested information. In the first study, we investigate whether the number of pretesting questions affects the fate of non-pretested information. Neither minimal pretesting (i.e., 2 questions related to a passage), nor extensive pretesting (i.e., 8 questions related to a passage), was found to have any effect on the learning and remembering of non-pretested information. In a second study, which is currently underway, we are investigating whether non-pretested information might benefit from pretesting when it is well-integrated with the information being pretested. It is possible, for example, that pretesting has the power to enhance the learning of non-pretested information, but only when the non-pretested information is directly related to the information being pretested.

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**12:00-1:30 PM (4167)**

Long-Term Inference and Memory Following Retrieval Practice. JESSICA SILER (Graduate Travel Award Recipient) and AARON BENJAMIN, *University of Illinois at Urbana-Champaign* (Sponsored by Brian Ross) — Two experiments evaluated how testing can support natural concept learning. We used the procedure of Jacoby et al. (2010) to examine how testing can influence generalization of knowledge, and how that knowledge is retained over time. In two experiments, subjects learned to classify birds from different families and were then tested on the birds they learned plus additional birds from the same families. Memory and generalization were tested after the study phase and again after varying delays. Results from both experiments indicate that testing does indeed enhance generalization in addition to memory, and that the benefits are maintained over the duration of our experiments—up to 25 days. These results indicate that testing is a potent means of enhancing inference, and that the benefits are long-lasting. Email: Jessica Siler, siler3@illinois.edu

12:00-1:30 PM (4168)

The Benefits of Testing: Individual Differences Based on Student Factors. ALISON ROBEY, *University of Maryland, College Park* (Sponsored by Michael Dougherty) — The testing effect is one of the most robust findings in cognitive science, however, not all learners experience a benefit from retrieval practice. Many manipulations that influence the benefits of the testing effect have been explored, however, there is still much to learn about potential individual differences in the benefits of retrieval practice over restudy. In the present study, I explore how students' cognitive abilities, specifically, episodic memory, general fluid intelligence, and strategy use, relate to the benefit of retrieval practice. Converging evidence from multiple analyses suggests variation in *how* learners use strategies was the only individual difference to influence the benefit learners receive from retrieval practice. More specifically, learners who are less adaptive and flexible in their strategy use show a greater benefit than more skilled strategy users. These findings have implications both for theory and for determining how to best incorporate retrieval practice into classroom settings. Email: Alison Robey, alisonrobey@gmail.com

RECALL II**12:00-1:30 PM (4169)**

Evaluation of and Determination of Noise Sources in a Three-Phase Cued Recall Framework. JACK H. WILSON and AMY H. CRISS, *Syracuse University* — In a cued recall task, participants must generate one target word given a probe. This, logically, must involve identifying the memory suggested by the probe, then identifying the targeted memory by considering the relationship between the probe and the target memory. Finally, the target memory must be recovered and output. We evaluated this general framework and measured the error associated with each stage of the retrieval process. We used 3 different types of cued recall: standard paired associate recall, extra-list cued recall, and a hybrid where the retrieval is like paired associate recall but the cue is extra-list and the task is to recall the word

that was studied with the word like the cue. In Experiment 1, we manipulate cue strength, target strength, and associative strength. In Experiment 2, we manipulate the similarity of the cue and the target to the other studied words. Implications for theories of memory will be discussed. Email: Jack Wilson, jhwilson@g.syr.edu

12:00-1:30 PM (4170)

Binge-Watching vs. Distributed Viewing: A Test of the Spacing Effect. KETHERA A.J. FOGLER, SAMANTHA CHUSID, JOSEPH GIORDANO, CLINT ROBERTS and DAVID DANIEL, *James Madison University* — Compared to massed learning, spaced learning has been found to enhance long-term memory recall. This study looks to identify if and to what degree the well-established 'Spacing Effect' applies to the social phenomenon of binge-watching. Streaming content providers such as Netflix, Hulu, and Amazon have increased the potential for binge-watching by releasing entire seasons of television shows at the same time. Our research examines whether or not this behavior facilitates or impairs memory for the content of the shows by manipulating whether or not participants see several shows at once or distributed over several weeks, followed by a test of content material. Memory differences between the two groups will be discussed. Email: Kethera Fogler, foglerka@jmu.edu

12:00-1:30 PM (4171)

Not all Part-Set Cues are Created Equally. MAGDALEN KROEGER, NICOLE HUENG, SAMUEL CURRY and MATTHEW KELLEY, *Lake Forest College* — The present study manipulated the memorability (high vs. low) of the part-set cues provided to participants after they read a series of three short paragraphs, as well as whether cues were present or absent at test and whether the test required free or ordered recall. The paragraphs, idea units, and memorability data were drawn from Reysen et al. (2009)—the high memorability cues comprised the seven most memorable idea units for each paragraph, whereas the low memorability cues were the seven least memorable idea units. When the free and ordered data were scored using a lenient (free recall) criterion, part-set cueing inhibition only occurred when high memorability cues were presented; providing low memorability cues at test eliminated part-set cueing inhibition. With a relative order scoring criterion, the same pattern emerged, which was surprising because part-set cues tend to enhance order memory. Email: Matthew Kelley, kelley@lakeforest.edu

12:00-1:30 PM (4172)

When Does Memory Conformity Have Positive Consequences? The Role of Confidence Judgment and Critical Evaluation of Partner's Statement in Increasing Accuracy After Discussion. ALEKSANDRA KROGULSKA and AGNIESZKA NIEDŹWIENSKA, *Jagiellonian University* (Sponsored by Maciej Hanczakowski) — Sharing information in a social context may have both positive and negative consequences for subsequent memory reports. Since a significant part of research into memory conformity has been concentrated on incorrect information, in my two experiments



I investigated also the influence of presenting correct pieces of information during a discussion on interlocutors' subsequent memory report. The aim of my two experiments was to investigate the conditions that increase people's tendency to conform to correct pieces of information provided by another person and to ignore the false ones. First, I examined whether availability of information concerning the level of another person's confidence about information provided by her helps to evaluate her statements more correctly. Second, I investigated whether encouraging people to evaluate statements made by their partners more critically increases a tendency to conform to correct pieces of information obtained from that person.

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12:00-1:30 PM (4173)

How Changing Perspective Influences Memory: Benefits of a Mindfulness Meditation Exercise. JUSTIN A. PATON and LINDA A. HENKEL, *Fairfield University* — Thinking about events from a different perspective when trying to remember can increase how much is remembered. The present study examined the impact of mindfulness meditation on this. Subjects ($n=124$) adopted one of two perspectives (robber or realtor) while reading a story containing details relevant to both perspectives (e.g., diamond ring; view of lake). Half of them did a 5-minute mindfulness meditation exercise in between two recall tests. On the 2nd recall test, they either recalled from the original perspective or switched to the other perspective. Results showed that people who switched perspectives recalled significantly more details relevant to the new perspective than details that were not relevant to the new perspective, whereas people who retained their original perspective did not differ in the amount of encoding-relevant or encoding-irrelevant details recalled. Results also showed that meditation prompted people to remember more details from the story regardless of whether they initially focused on them or not. Brief exposure to meditation altered the ratio of relevant to irrelevant information recalled by reducing the "filter" imposed by one's perspective, and thus allowing for greater recall of the full scene.

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12:00-1:30 PM (4174)

Retrieval-Induced Forgetting in a Social Context: Do the Same Mechanisms Cause Forgetting in Speakers and Listeners? MAGDALENA ABEL and KARL-HEINZ T. BÄUML, *University of Regensburg* — Selective retrieval of some details from memory can cause forgetting of related details, a finding termed retrieval-induced forgetting (RIF). RIF occurs for single individuals, but can also emerge for listeners who are merely exposed to a speaker's selective retrieval. Because individual RIF has been suggested to be (partly) mediated by inhibition, we examined whether inhibition may also contribute to socially-shared RIF. In 3 experiments, pairs of subjects studied and recalled items individually. In an intermediate phase, however, one of the subjects acted as speaker, whereas the other subject acted as listener and monitored the speaker's overt retrieval practice for accuracy. Initial-letter cued recall (Experiment 1) and item recognition (Experiments 2 and 3) were employed on

the final test to reduce blocking and output interference effects. In each single experiment, intact RIF emerged for both speakers and listeners, indicating that inhibition may contribute to both within-individual and socially-shared RIF.

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12:00-1:30 PM (4175)

Deep Convolutional Networks Do Not Make Classifications Based on Object Shape. NICHOLAS BAKER, *University of California, Los Angeles*, GENNADY ERLIKHMAN, *University of Nevada, Reno*, HONGJING LU and PHILIP J. KELLMAN, *University of California, Los Angeles* — Deep convolutional networks are achieving previously unseen performance in object classification (e.g. He et al, 2015), raising questions about whether CNNs share similar representations with the human visual system. In biological vision, shape is arguably the most important cue for recognition. Objects that differ from their normal appearance in surface texture, high frequency contour information, or context continue to be recognizable by human observers, provided that the object's shape is preserved. We present several simulations showing that CNNs do not make classifications based on object shape. When shape is preserved, but texture information and context are changed, the network fails to correctly classify the object. Conversely, when shape information is perturbed by scrambling, network performance is unaffected, while human recognition suffers. Our results suggest that deep networks trained on natural images use texture information of both the target and background for classification but have little representation of object shape information.

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12:00-1:30 PM (4176)

Investigating Cognitive Offloading as a Mechanism for Forgetting After Taking Photos. JULIA S. SOARES and *BENJAMIN C. STORM, *University of California, Santa Cruz* (Sponsored by Ralph Miller) — Henkel (2013) found that taking photos of objects can cause participants to remember those objects less accurately than objects only observed. According to the cognitive offloading hypothesis, when participants photograph an object, they offload organic memory for that object onto the camera's prosthetic memory, which they can rely on to "remember" for them. Two experiments tested this hypothesis by investigating whether the amount of forgetting differed depending on whether participants believed the photos were being saved. In Experiment 1, participants used the ephemeral photo application, Snapchat. In Experiment 2, participants were asked to manually delete a subset of photos after taking them. In both experiments, participants exhibited a photo-taking-induced forgetting effect even when the photos were deleted. These results suggest that cognitive offloading may not be the whole explanation for why taking photos causes forgetting.

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12:00-1:30 PM (4177)

Are Encoding/Retrieval Interactions Driven by Remembering, Knowing, or Both? OYKU UNER and HENRY L. ROEDIGER III, *Washington University in St. Louis*



(Sponsored by Henry L. Roediger) — Matching encoding and retrieval conditions typically enhances recall and recognition, but are remembering and knowing equally responsible? In the current experiment, participants learned a list of words with associate or rhyme orienting questions and were tested for recall with associate or rhyme cues, resulting in four within-subject conditions: associate at study-associate cue at test, associate at study-rhyme cue at test, rhyme at study-associate cue at test, rhyme at study-rhyme cue at test. Participants were asked to give a remember, know or guess response after each recalled word. As expected, recall was greater when study and test conditions matched, creating an interaction. This interaction was driven by remember responses and did not occur for know responses. Encoding/retrieval interactions thus appear to be driven by recollection (as indexed by remember responses), but not familiarity (assuming this is indexed by know responses).
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12:00-1:30 PM (4178)

Boundary Conditions of Wakeful Rest for Memory Consolidation. PETER R. MILLAR and DAVID A. BALOTA, *Washington University in St. Louis* (Sponsored by David Balota) — Wakeful rest is a brief (e.g., 10 minutes), quiet period of minimal stimulation. Engaging in wakeful rest after encoding target materials results in stronger memory performance, compared to a distractor task. This benefit might be driven by automatic consolidation or controlled rehearsal processes, either of which may be more likely to occur during the wakeful rest period. In a series of experiments, we manipulated parameters of a standard wakeful rest paradigm, including the type of target materials, intentionality of encoding, retrieval test type, and retrieval delay. These manipulations were selected to test the degree to which rehearsal processes might contribute to wakeful rest benefits and whether these effects are generalizable. The expected wakeful rest memory benefit was observed in some, but not all, of these manipulations. These results place constraints on the generalizability of wakeful rest memory benefits and suggest that some of the effect may be due to rehearsal.
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12:00-1:30 PM (4179)

Studying Skill Acquisition in Online Video Game Data. TOM STAFFORD, *University of Sheffield* — The study of skill acquisition presents a dilemma: On the one hand, you can conduct lab studies of participants learning a novel skill, but practicalities prevent you training participants for more than several hours, well short of the practice required for developing advanced skill. On the other hand, you can investigate performance by experts with profound skill, the result of thousands of hours of practice. However, their practice history cannot be known with certainty, so you are prevented from connecting how they practiced with their later skill development. I argue that computer games represent a domain where the natural history of decisions taken during practice can be connected with subsequent performance. In addition, computer games afford data on thousands, or millions, of individuals. I present studies of an online computer game that

allow findings from experimental studies of skill acquisition to be confirmed in situ, deepened, and—in some cases—qualified (Stafford & Haasnoot, 2017).

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12:00-1:30 PM (4180)

Facilitating Voluntary Self-Testing Through an Automated Question-Generation Educational Application. ADAM P. YOUNG, ALICE F. HEALY, MATT JONES and TIM CURRAN, *University of Colorado Boulder* — The research in cognitive and educational psychology is clear: Self-testing improves learning and memory in both the laboratory and the classroom. Unfortunately, there exists a chasm between the learning strategies that psychological literature recommends and those that students actively put into practice. Voluntary use of self-testing remains uncommon. Following 3 experiments and a review of the relevant literature, we identified several factors most likely to elicit appreciation and voluntary use of self-testing. We summarize these factors and describe their implementation within an online educational intervention designed to expose students to the benefits of self-testing and introduce them to an online tool to facilitate self-testing on uploaded coursework. We report the results of a preliminary laboratory study in which subjects were exposed to a textbook section and the online tool and were then asked to evaluate the quality of the automated quizzes generated by the tool for use in self-testing upon the textbook material. These results allow us to demonstrate the potential educational benefits of adopting this intervention as a means of promoting self-testing behavior.
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METACOGNITION

12:00-1:30 PM (4181)

Fitts' Law and Metacognition of Agency. CORY A. POTTS and RICHARD A. CARLSON, *Pennsylvania State University* — Although studies of agency frequently involve physical action, little is known about the relation between movement-related variables and subjective feelings of control. Here we manipulated a Fitts' law parameter, target width, to examine how metacognitions of agency are related to movement variables. We asked participants to move a mouse cursor to targets of different sizes on a computer display, and then to provide judgments of agency. We found a strong relation between metacognitions of agency and Fitts' Index of Difficulty, with participants reporting greater degrees of control with easier movements. Moreover, we found complementary results when we asked participants to report the percent of their total control they used instead of how much in control they felt. We discuss the promise of using lawfully-related movement parameters in studies of agency, including in the future how individuals represent their actions in hierarchically-structured tasks.

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12:00-1:30 PM (4182)

Examining the Content of Individuals' Task-Related Interference. MEGAN L. JORDANO and DAYNA R. TOURON, *University of North Carolina - Greensboro* — Mind-



wandering can be about things unrelated to a task (task-unrelated thoughts; TUTs) or about task performance (task-related interference; TRI); both disrupt performance. Mind-wandering methodologies, such as online thought probes, often omit TRI as a response option or otherwise only include one general TRI option. Two exploratory studies were conducted to investigate the specific content of TRI experiences. In Study 1, a small sample of undergraduates completed a task containing open-ended thought probes. In Study 2, 60 undergraduates completed a task containing either standard mind-wandering probes or branching thought probes containing additional thought content questions. The results suggest that, when individuals experience TRI, they primarily evaluate task performance. The results of Study 2 indicate that having participants complete more nuanced probes does not alter baseline rates of mind-wandering. These more nuanced mind-wandering probes may provide a new method of measuring TRI and metacognitive thoughts while participants complete cognitive tasks.
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12:00-1:30 PM (4183)

Examining the Roles of Fluency and Memory Beliefs in Participants' Judgments of Learning, Study Time Allocation, and Memory Performance. LINDA MYERS, JARED GODWIN, MICHAEL ROWSE, HILLARY ERWIN, AMANDA REYER, OLIVIA HENSON and JODI PRICE, *University of Alabama in Huntsville* — We investigated the roles of fluency and memory beliefs in participants' judgments of learning (JOLs) by manipulating block (1, 2), font size (small 18 pt., large 48 pt.), and instructions (small instruction, control, small instruction with strategy reports, control with strategy reports). Study time was collected as an indirect measure of fluency. Biasing instructions were provided to those in the small instruction conditions, suggesting that small font is more memorable than large font. We used study strategy reports between subjects in order to investigate whether study strategy might impact the font size effect. The results of the study indicate that participants provided higher JOLs to large rather than small font items and that participants' JOLs were not influenced by any other factor. We also found that memory performance was not altered by study strategy type. Nor, did we find any difference in study time based on font size.
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12:00-1:30 PM (4184)

Sir, Mix a Lot: Metacognitive Benefits of Interleaved Practice. MARTA K. MIELICKI and JENNIFER WILEY, *University of Illinois at Chicago* — Previous research has demonstrated benefits of interleaved practice over blocked practice for learning and transfer of mathematical concepts (Rohrer & Taylor, 2007; Taylor & Rohrer, 2010). The current studies adapted relative and absolute metacomprehension accuracy paradigms from text-based metacomprehension research (Maki, 1998) to explore how blocked versus interleaved practice impacts students' monitoring of their ability to solve mathematical word problems. Initial results suggest that blocked versus interleaved practice has implications for relative and absolute monitoring accuracy during study. Blocking all problems of one type

together during study may induce a sense of fluency which may alter subjective ratings of understanding but not actual problem-solving performance, thus leading to poor monitoring accuracy. A broader implication is that the established benefits of interleaved practice on learning outcomes may be due in part to improvements in metacognitive monitoring accuracy during study.

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12:00-1:30 PM (4185)

Regulation Affects 7th Graders' Comprehension. KEITH THIEDE, *Boise State University*, JOSHUA REDFORD, *Buffalo University*, JENNIFER WILEY and THOMAS GRIFFIN, *University of Illinois at Chicago* — We compared comprehension across three regulation conditions. The *Test-Based Restudy* condition determined text selection using initial test performance—presenting the text with the lowest initial test performance for restudy; thereby, circumventing potential problems associated with inaccurate monitoring and ineffective regulation. The *Judgment-Based Restudy* condition determined text selection using metacognitive judgments of comprehension—presenting the text with the lowest judgment of comprehension; thereby, circumventing potential problems associated with ineffective regulation. In the *Participant's Choice* condition students were allowed to pick texts for restudy on their own. Gains in comprehension following restudy were larger for the *Test-Based Restudy* condition than for the *Judgment-Based Restudy* condition or the *Participant's Choice* condition. These results suggest 7th graders can systematically use their monitoring to make decisions about what to restudy. However, the results highlight how inaccurate monitoring is one reason why younger students fail to benefit from self-regulated study opportunities.

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12:00-1:30 PM (4186)

Incremental Theorists Invest in Effort, but Only When Sensible. JINHEE BAE, *Ajou University*, LISA K. SON, *Barnard College, Columbia University*, SEONHEE CHOI, JIYEON KIM, SEOKSUNG HONG, SUYOUNG CHO and KYUNGIL KIM, *Ajou University* — Previous studies have suggested that learning choices vary according to naive theories of intelligence (Dweck, 1999). The current study investigated how prior experiences affect later selections. We tested which difficulty level – easy or hard – incremental and entity theorists would choose after having experienced easy or difficult trivia prior. In four experiments, we investigated people's final selections in three domains: Trivia, word analogy (2 conditions), and math problems. Results showed that for the trivia experiment, surprisingly, incremental theorists were more likely to select easier questions after having experienced difficult problems, as compared to entity theorists. This went against our expectations, but it could be that trivia questions require memory retrieval, which may not require substantial effort. In subsequent experiments, where more effort is seemingly required, the data



reversed, as we had expected: Incremental theorists were more likely to select difficult problems – analogies and math – after having experienced difficult trivia questions prior.

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12:00-1:30 PM (4187)

Applying Signal Detection Theory to Understand Boundary Extension. YIJIAO CHEN, KRISTI S. MULTHAUP and MARGARET P. MUNGER, *Davidson College* — Boundary extension (BE) occurs when people “remember” seeing things that might have been beyond the edge of what was actually shown. In typical BE experiments, participants study each picture at a close or wide angle. Later they rate test pictures as closer, wider, or the same camera angle compared with the studied pictures. People’s judgments in BE tasks are a combination of discrimination sensitivity (the ability to differentiate new and old stimuli) and type 1 bias (the tendency to rate the camera position as closer). Confidence ratings are also a combination of metacognitive sensitivity (the ability to distinguish correct from incorrect trials) and type 2 bias (the tendency to report a particular confidence level). Signal detection theory (SDT) analyses were conducted on existing data from Munger and Multhaup’s (2016) six experiments ($N = 223$). As in previous work, discrimination sensitivity (d') was significantly larger in the wide-study condition. In our extension, d' was significantly different from meta- d' in the wide-study condition, indicating a loss of information from angle rating to confidence rating. Thus discrimination sensitivity contributes to BE, and metacognitive efficiency may differ across study conditions.

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12:00-1:30 PM (4188)

Non-Canonical Pictures Create Perceptual Difficulties, but They do not Always Affect Memory Predictions or Actual Memory Performance. MIRI BESKEN and ELIF CEMRE SOLMAZ, *Bilkent University* — Perceptually fluent items typically receive higher judgments of learning (JOLs) than perceptually disfluent items. Recent studies have tried to clarify the extent to which online perceptual difficulties at encoding or beliefs about the effects of a disfluency manipulation may contribute to this finding. In the current set of experiments, participants viewed easy-to-perceive, canonical object pictures and difficult-to-perceive, non-canonical object pictures in a within-subjects design. Participants were asked to identify each object, make JOLs and remember them for a subsequent free-recall test. The identification latencies were consistently slower for non-canonical than canonical object pictures, providing evidence of objective disfluency. Yet, this disfluency was not always reflected in the JOLs. These findings indicate that not all objective online difficulties induce differences in JOLs. Instead, beliefs about the canonicity manipulation might have been more influential in making these memory predictions.

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12:00-1:30 PM (4189)

Despite Beliefs, People Judge Animate Concepts as More Memorable Than Inanimate Concepts. CARLEE M. DEYOUNG and MICHAEL J. SERRA, *Texas Tech University*

— In many situations, people demonstrate better memory for animate/living concepts (tiger; chef) than for inanimate/nonliving concepts (hammer; mountain). We obtained such an effect for word lists with free-recall (Experiment 1) and paired-associates with cued-recall (Experiment 2). In both experiments, participants made judgments of learning (JOLs) during encoding to indicate their confidence that they would recall each item on the memory test. They consistently reported greater confidence in recalling animate words and word pairs compared to inanimate words and word pairs. We also had participants indicate (either before or after the primary procedure) their beliefs as to whether animate concepts were more/less/equally memorable compared to inanimate concepts. The majority of participants indicated that they believed animate and inanimate concepts were equally memorable. These results indicate that some other factor besides beliefs causes participants’ JOLs to be higher for animate words and word pairs compared to inanimate words and word pairs.

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12:00-1:30 PM (4190)

The Influence of Perceptual Decision and Motor Response on Perceptual Awareness. MICHAŁ WIERZCHOŃ and ZUZANNA SKÓRA, *Jagiellonian University*, JUSTYNA HOBOT, BORYSŁAW PAULEWICZ, *University of Social Sciences and Humanities*, BERT TIMMERMANS, *University of Aberdeen*, MARTA SIEDLECKA, *Jagiellonian University* — Our previous studies show that visibility judgments are more strongly related to task accuracy when given after than before stimulus discrimination. It is not clear whether the effect results from perceptual decision, decision-related motor response or both. We present two Gabor patches orientation discrimination studies aiming to answer this question. In E1 participants rated their stimuli awareness either after directional motor response (left or right arrow) or after covert decision (space key when decided). Participants reported higher perceptual awareness after directional motor response. In E2 Ps were asked to execute unrelated motor responses that could be neutral, congruent or incongruent with the correct orientation response. Then, Ps rated stimulus awareness and responded to orientation task. We expect that perceptual awareness of stimuli will be higher when the unrelated motor response is congruent with a decision. The results show that executed directional motor reaction increased the average ratings of visibility, but does not affect metacognitive accuracy. The results will be discussed in the context of consciousness theories and models of metacognition that assign crucial role to decisional processes and action.

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12:00-1:30 PM (4191)

When More is More: The Learning and Monitoring Benefits of Images That Combine Realism and Abstraction. DAVID SARMENTO, THOMAS D. GRIFFIN and JENNIFER WILEY, *University of Illinois at Chicago* — Science textbooks often include graphics to facilitate comprehension, but these graphics can also affect students’ metacomprehension. Previous work shows realistic *decorative* graphics can negatively affect monitoring accuracy (Jaeger & Wiley, 2014), but less is known



about the impact of different types of *instructional* graphics. This line of research explores whether different types of images used to illustrate processes in college biology textbooks might help or hinder comprehension and comprehension monitoring. Image types included highly realistic graphics (e.g. photographs), highly abstract graphics (e.g. causal diagrams), or hybrid graphics combining realistic and abstract elements. In a sample of first-year college students who had not yet taken college-level biology, the presence of instructional graphics did improve understanding of the topics, especially those containing conventional elements. Effects of graphic type were also seen in metacomprehension accuracy. Possible explanations for the differences in metacomprehension accuracy due to graphic type suggest that students need instruction on how to use graphics to assess their own level of understanding for different topics.

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12:00-1:30 PM (4192)

Only Half of What I'll Tell You is True: Common Experimental Procedures Reduce the Impact of Repetition on Truth Judgments. MADELINE JALBERT, ERYN NEWMAN and NORBERT SCHWARZ, *University of Southern California* (Sponsored by Norbert Schwarz) — Ambiguous information is more likely to be judged true when it has been seen or heard repeatedly than when it is new. This “truth effect” has important consequences in the real world, where we are repeatedly exposed to information that may or may not be true as we scroll through social media, read the news, or talk with friends or coworkers. Yet, while false information in the real world rarely comes with a warning label, false information in truth effect experiments does. Commonly used experimental procedures draw attention to the truth value of claims at encoding, which alerts participants to potential falsehoods and limits the impact of repetition. Four experiments show that the size of the truth effect increases by a factor of three to twelve times when such warnings are avoided. This effect persists even after a delay of three to five days. The findings highlight that the most common experimental procedures systematically underestimate the likely size of truth effects in the real world.

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12:00-1:30 PM (4193)

Sticking to What You Know: Evaluating Truth Prompts Later Reliance on Knowledge. NADIA M. BRASHIER, EMMALINE E. DREW and ELIZABETH J. MARSH, *Duke University* (Sponsored by Elizabeth Marsh) — We encounter repeated false claims in political and marketing campaigns that have the potential to influence important decisions. Repeated statements feel easier to process, and thus more truthful, than new ones (i.e., *illusory truth*). Young adults exhibit this illusion even when they know better, but older adults only rely on fluency when they lack knowledge about claims. We demonstrated that requiring young adults to critically evaluate claims (i.e., make truth judgments at exposure) encouraged them to apply their knowledge later (Experiment 1). Initial truth judgments benefited performance by activating knowledge: Fluency affected judgments of unknown, but not known, items, with knowledge defined by performance on a post-experimental

knowledge check (Experiment 2). These data have important implications, given that repetition is one means by which “fake news” and other misinformation become incorporated into our knowledge bases.

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12:00-1:30 PM (4194)

In-Sight, Out-of-Mind: Attention and Learning for Familiar Flags. ADAM B. BLAKE and ALAN D. CASTEL, *University of California, Los Angeles* (Sponsored by Alan Castel) — Research on everyday attention suggests that frequent interaction does not benefit memory or metamemory (e.g. Blake, Nazarian, & Castel, 2015). National flags have strong cultural salience and personal relevance. In two experiments, participants completed 8-alternative forced-choice tests of the US, Canadian, and Mexican flags. Confidence judgments were given before and after the recognition tasks for each flag. In Experiment 1, we examined the effects of environmental availability by testing flags at a saturated timepoint (July 4th) and a neutral timepoint (Aug. 17th). Recognition did not differ across timepoints, yet confidence judgments were inflated for the US flag at the saturated timepoint. In Experiment 2, we utilized a draw-study paradigm to improve memory and metamemory for the US flag. Participants either drew the flag for 30 s then studied it for 30 s, or only studied it for 60 s. The memory task was given after a 20-min filled delay. Those who drew the flag had reliably more accurate recognition and confidence scores. These findings support extant errorful-learning research (e.g. Richland, Kornell, & Kao, 2009) and demonstrate a powerful metacognitive debiasing intervention.

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12:00-1:30 PM (4195)

Language Learning and Metacognition: An Intervention to Improve Second Language Classrooms. REBECCA E. KNOPH, ERIN M. BUCHANAN, ANDREA B. HELLMAN and RUSSELL N. CARNEY, *Missouri State University* (Sponsored by Russell Carney) — Foreign language enrollments have begun to decline since 2009 in the USA (Goldberg et al., 2015), despite the notion that learning multiple languages is an essential tool for effectively communicating with diverse native language backgrounds. This new downward trend may be due in part to inefficient and outdated teaching in foreign language courses. Current studies have surveyed if students are aware of the learning benefits of metacognition, and it appears that they are not (Karpicke, 2009). Further, the motivation to continue in language courses dwindles when students feel they are not learning as much as they expected. Of university students taking a foreign language, 80% are enrolled in the introductory course while only 20% are in advanced courses (Goldberg et al., 2015). The current study examined the effect of metacognition on educational outcomes in hopes to improve the effectiveness of the university classrooms. Participants were presented with metacognitive interventions for language learning. Hierarchical multiple linear regression provided evidence that teaching students about metacognition and effective metacognitive strategies could benefit university language learners.

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**12:00-1:30 PM (4196)**

The Role of Schematic Support in Strategy Choice During Cognitive Skill Learning. JACK M. KUHNS and DAYNA TOURON, *University of North Carolina at Greensboro* (Sponsored by Dayna Touron) — Prior research indicates that strategy choice influences performance in cognitive skill learning tasks that involve a shift from algorithmic to memory-based strategies (Bajic & Rickard, 2009). Schema congruency was manipulated to investigate its effects on strategy choice. Pairings of grocery items and prices were manipulated to be either congruent (market-priced) or incongruent (over-priced) (Castel, 2005). Incongruent prices reduced memory strategy use compared to congruent prices, beyond the observed deficit in grocery-price learning. The incongruent-price group also had lower confidence in using memory to respond. The results indicate that schema congruency can impact performance in cognitive skill learning tasks by affecting the metacognitive factors of memory strategy choice and confidence.
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12:00-1:30 PM (4197)

The Role of Task-Specific Self-Efficacy in Predictions of Exam Performance. MICHELLE L. RIVERS, JOHN DUNLOSKY and ROBIN JOYNES, *Kent State University* (Sponsored by David Riccio) — Prior research has shown that students are typically overconfident in predicting their upcoming exam performance, and these performance judgments are relatively stable across time. One possible explanation for these findings is that classroom judgments are based on general beliefs students hold about their testing or studying ability — which is the hypothesis we evaluated in the present research. Across two studies ($N = 201$), students in an Introductory Psychology course predicted their first exam performance, and then completed a survey about their perceptions of their studying, test-taking ability, and the course material, as well as their specific study behavior leading up to the exam. Judgments were more strongly related to students' general sense of their studying and test-taking ability, rather than their exam preparation. These results suggest predictions of memory performance can be viewed as task-specific self-efficacy judgments, which may help explain why such judgments are so resistant to change.
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12:00-1:30 PM (4198)

Examining Different Types of Pressure in Math Anxiety and Performance. HILLARY ERWIN, LAURA KELLEY, LISA MATSUYAMA, SARA LENAHAN, RAESHAUN JONES, EMMA HUBER and JODI PRICE, *The University of Alabama in Huntsville* (Sponsored by Jodi Price) — We examined how different types of pressure influenced participants' math anxiety and math performance when solving modular arithmetic problems that varied in terms of difficulty and fluency as well as whether they were true or false. Participants ($N = 98$) low/high in math anxiety and working memory capacity were randomly assigned to one of four pressure conditions stressing either speed, accuracy, combination [speed + accuracy], or no goal. Participants were told if they met the goal that they could skip a block of problems (except in the no goal condition). Problem

solving time, accuracy, and confidence judgments all varied by problem difficulty. Only problem solving time differed by condition, with the fastest times in the speed condition and slowest in the accuracy condition (speed < combination < control < accuracy). Anxiety ratings did not differ by condition. Thus, instructions influenced participants' approach, but not anxiety or performance.
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12:00-1:30 PM (4199)

Metacognitive Awareness: The Type of Retrospective Questions Matters. CRISTINA D. ZEPEDA and TIMOTHY J. NOKES-MALACH, *University of Pittsburgh* (Sponsored by Timothy Nokes-Malach) — When students employ metacognition, they can learn more effectively. However, there is uncertainty on how to best assess metacognition in classroom settings. In this study, we examined whether student responses on two different types of self-report measures related to each other and performance across three non-cumulative exams. Prior to each exam, 196 undergraduates responded to an open-ended question that asked how they studied for the exam and to a Likert-scale questionnaire (e.g., I kept track of how well I understood each concept). The open-ended questions were coded as reflecting metacognitive awareness when students described assessing their understanding in their study strategies (e.g., "I checked parts that I wasn't clear on"). Results showed that the two measures did not relate to each other. Further, responses to the questionnaire did not relate to exam performance whereas their responses to the open-ended questions did. Specifically, students who made a metacognitive awareness statement for all three exams had a higher average exam score than students who made one or zero statements. These results suggest that students' responses to different types of metacognitive self-reports are more informative than others.
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WORKING MEMORY III**12:00-1:30 PM (4200)**

Strategic Adaptations to Dual Tasking and Concurrent Articulation in Working Memory. CLÉMENT BELLETIER, *Université de Fribourg*, JASON DOHERTY and AGNIESZKA JAROSLAWSKA, *University of Edinburgh*, STEPHEN RHODES, NELSON COWAN and MOSHE NAVEH-BENJAMIN, *University of Missouri*, ROBERT LOGIE, *University of Edinburgh*, PIERRE BARROUILLET, *Université de Genève*, VALÉRIE CAMOS, *Université de Fribourg* — In experimental studies, whereas working memory is often pushed to the limits of its capacity, recall performance rarely falls to zero, regardless of memory or processing load. A key question is thus to understand the cognitive functions supporting this residual performance. Here, investigators associated with three different theoretical frameworks (Barrouillet & Camos, 2012; Cowan, 2010; Logie, 2011) collaborated to address this question. In four experiments, participants were first assessed on a serial recall of letter sequences and a processing task (arithmetic verification). They then performed the same tasks at their individual span, alone and in combination, with or without a concurrent



articulation. Finally, they reported the strategies they used in each condition. Results revealed that strategy choices were task-dependent. Participants reported using less rehearsal and more meaning-related strategies under concurrent articulation. Moreover, they sometimes gave up on maintaining the letters (in the memory task) and used more intuitive rather than step by step calculations in the arithmetic task under dual tasking. These findings argue for more research on strategic adaptation in working memory.

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12:00-1:30 PM (4201)

How Quickly We Remember: The Rate of Short-Term Consolidation. KRISTINA KRASICH, MYRTHE FABER, JAMES R. BROCKMOLE and GABRIEL A. RADVANSKY, *University of Notre Dame* — Short-term consolidation is a process by which perceptual information in working memory is transformed into durable, albeit transient, representations within short-term memory. The current research estimated the rate of short-term consolidation. Participants encoded a set of simultaneously presented letters or symbols before completing a distractor task. Consolidation opportunity was manipulated by varying the interstimulus interval between encoding and the distractor task. Participants then reported the stimuli they remembered from encoding. With 1 s encoding time, memory performance improved with increasing interstimulus intervals, showing asymptotic performance around 5 s. This pattern was consistent across varying set sizes (3, 5, & 7) and stimulus types (letters & symbols). With reduced encoding time (.5 s), memory improvements plateaued and declined at an interstimulus interval of 3 s. These findings suggest that, with sufficient encoding, short-term consolidation occurs at a fixed rate, although memory traces are susceptible to interference when encoding is reduced.

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12:00-1:30 PM (4202)

A Semantic Mismatch Effect on Serial Recall. JAN PHILIPP RÖER, RAOUL BELL, ULRIKE KÖRNER and AXEL BUCHNER, *Heinrich Heine University Düsseldorf* — Five experiments investigated the extent to which task-irrelevant, to-be-ignored speech is processed semantically by comparing the disruption of serial recall by distractor sentences with semantically expected endings to that of sentences with semantically unexpected endings. Sentences with unexpected endings consistently produced a larger amount of disruption than sentences with expected endings. Phonologically expected, but semantically unexpected endings had the same effect, demonstrating that a semantic mismatch is responsible for the increased disruption rather than a phonological one. There was no evidence of habituation. In all five experiments, the semantic mismatch effect was not reduced after repeated exposure to sentences with unexpected endings. The present results suggest that semantic processing occurs at the interlexical level of irrelevant speech, and challenge the assumption that semantic distractor features do not interfere with the maintenance of information in short-term-memory.

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12:00-1:30 PM (4203)

Dual-Tasks Costs on Storage and Processing in Young Adults: An Adversarial Collaboration. JASON M. DOHERTY, *The University of Edinburgh*, CLÉMENT BELLETIER, *Université de Fribourg*, STEPHEN RHODES, *Missouri University*, AGNIESZKA JAROWSLAWSKA, *The University of Edinburgh*, VALÉRIE CAMOS, *Université de Fribourg*, PIERRE NÖEL BARROUILLET, *Université de Genève*, NELSON COWAN and MOSHE NAVEH-BENJAMIN, *Missouri University*, ROBERT H. LOGIE, *The University of Edinburgh* — Theories of working memory often differ on how they describe the relationships between storage and processing. While some posit separation of resources with minimal interference when maintaining memory items when completing a concurrent attention-demanding task, others argue a greater overlap in the resources involved in memory+processing dual-tasking. Our project, Working Memory Across the Adult Lifespan: An Adversarial Collaboration (WoMAAC), contrasts opposing theories with preregistered predictions and analysis plans, collaborative experimental design, and cross-lab replication. We present data from our first young adults studies where participants performed delayed recall of aurally presented letters, and an arithmetic verification task. Tasks were performed under single- and dual-task conditions, both with and without concurrent articulatory suppression. While the observed pattern of data did not fit perfectly with any one model, a consistent pattern of dual-task effects were observed for both memory and processing tasks, while articulatory suppression only affected the memory task.

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12:00-1:30 PM (4204)

The Perils of Using Probe Recognition for Investigating Working Memory Storage. KIM UITTENHOVE, *University of Geneva*, LINA CHAABI and VALERIE CAMOS, *University of Fribourg*, PIERRE BARROUILLET, *University of Geneva* — Is working memory (WM) storage domain-specific or domain-general? This question is usually answered by looking for the interactions that could result from the simultaneous maintenance of material pertaining to different domains. Using a probe recognition paradigm, Fougny, Zughni, Godwin, and Marois (2015) found no evidence for interaction between verbal and visuospatial maintenance and concluded that WM storage is intrinsically domain-specific. In four experiments, we used the same paradigm to measure interactions when concurrently maintaining items pertaining to the same or different domains. Results showed a consistent absence of interaction effects, even within domain (auditory letters presented alongside visually presented letters). However, a recall paradigm with the same materials and presentation modalities revealed consistent interaction effects. This suggests that probe recognition could provide us with unreliable information about WM storage.

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12:00-1:30 PM (4205)

What Role Does the Spoken Fluency of a List Really Play in the Short-Term Recall of Verbal Items? MARYANN BARRINGTON, LEONIE M. MILLER and STEVEN ROODENRYS, *University of Wollongong* — Measures of



articulation have a history in the development of models describing how short sequences of verbal items are retained and immediately recalled. The first of these is the rate of articulation of single items, a factor underpinning the phonological loop - positing better recall for items with greater articulation rates - a position supported by early correlational and experimental evidence, but subsequently questioned. A second approach has linked the fluency of articulation of a stream of items to recall performance; items that are fluently articulated in a speech stream enjoy a recall advantage over lists containing greater articulatory complexity. This view, supported by correlational evidence, cites linguistic familiarity as the critical determinant that influences the integrity of the speech output plan. The current study performs detailed timing analysis on serial recall data that suggests articulatory fluency of a speech stream is unlikely to influence performance in the proposed manner.
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12:00-1:30 PM (4206)

Concreteness Effects and Reaction Time in Serial Recognition. NATASHA JOSIFOVSKI, LEONIE MILLER and STEVEN ROODENRYS, *University of Wollongong* — Dominant views of verbal short-term memory (VSTM) argue that item and order information of to-be-remembered sequences are managed by distinct processes. This is supported by the minimal influence lexico-semantic variables have on tasks emphasising order information (serial recognition) relative to the serial recall task, where retention and overt reproduction of item information is required. Recently, research has suggested that null effects in serial recognition may be a consequence of stimulus set size. Alternatively, accuracy measures might be insensitive to the detection of differences in order information. The current work addresses these issues. Using an open stimulus set, an advantage for concrete words over abstract words was found in serial recall but not in serial recognition when accuracy was measured. Nonetheless, when reaction time was measured, a concreteness effect was observed. This study proposes a novel measure of order information and challenges existing views of VSTM processes.
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12:00-1:30 PM (4207)

The Long-Term Consequences of Retrieval Instructions During Working Memory Recall. CHARLOTTE DOHERTY and VANESSA M. LOAIZA, *University of Essex* — The McCabe effect (McCabe, 2008) refers to an advantage for words presented during complex span versus simple span during delayed recall. One explanation for this benefit is that complex span affords covert retrieval opportunities that facilitate later retrieval during episodic memory by cumulatively reactivating each successively presented item after attention has been distracted by the secondary task. This experiment examined the possible impact of the immediate retrieval instructions on the McCabe effect by comparing the typical immediate serial recall (ISR) instructions (i.e., recalling the words in their exact order of presentation) to immediate free recall (IFR) instructions. The results demonstrated that the McCabe effect was present in both ISR and IFR conditions, but the size of the effect was

larger for those instructed ISR compared to IFR. These findings suggest that ISR instructions may emphasize the McCabe effect perhaps by more strongly emphasizing cumulative covert retrieval relative to IFR instructions.

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12:00-1:30 PM (4208)

Consolidation or Restoration: Visuospatial Memory. SÉBASTIEN DE SCHRIJVER and PIERRE BARROUILLET, *University of Geneva* (Sponsored by Pierre Barrouillet) — Consolidation is the process by which ephemeral sensory traces are transformed into more stable short-term memory traces. Results of a previous study by De Schrijver and Barrouillet (2017), suggest that consolidation and restorative processes are at least partially substitutable in strengthening verbal memory traces. The present study aimed at comparing consolidation and restoration of visuo-spatial memory items. Participants performed a complex span task and had to retain a series of spatial locations, each of them being followed, after a delay for consolidation of either 500 ms or 3000 ms, by either 2 or 4 distractors to process in 4 seconds for low and high *CL*, respectively. Recall was better for the low than the high cognitive load condition and longer consolidation times improved recall in the latter but not in the former condition. As for verbal information, consolidation and restoration are substitutable in maintaining visuospatial items.
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12:00-1:30 PM (4209)

The Domain-Specific Capacity for Serial Order in Working Memory: An Individual Differences Approach. YINGXUE TIAN, SIMON FISCHER-BAUM and MARGARET BEIER, *Rice University* (Sponsored by Simon Fischer-Baum) — The capacity for remembering serial order information is important to many cognitive functions, including working memory (WM). In both verbal and nonverbal WM, this capacity has been shown to dissociate from item-identity processing. We investigated whether serial order WM system is shared across the verbal and nonverbal domains, using an individual differences approach. Participants had to decide whether two sequences of six items (verbal items: digits and words, nonverbal items: arrows and locations) were identical. Non-identical trials differed either by a single item identity or by a transposition of two within-list items. Domain-general vs. domain-specific serial order WM hypotheses were compared using structural equation modeling analysis and model comparison with nested models. The domain-specific model with dissociated item and serial order latent variables in both verbal and nonverbal domains has the best fit, suggesting separate serial order WM capacities for verbal and nonverbal sequences.
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12:00-1:30 PM (4210)

Characterizing the Visuospatial Sketchpad: Rehearsal and Retrieval in Visual Short-Term Memory. JEFFERY SCOTT DURBIN and DAVID E. HUBER, *University of Massachusetts, Amherst* (Sponsored by David Huber) — The present study examined whether sequential rehearsal and serial exhaustive



search occurs for visuospatial information. We developed a novel visuospatial short-term memory task in which participants saw a sequence of colored dots (500 ms per dot) along a horizontal line and, after a brief delay (500 ms mask), gave a binary “old” / “new” response to a single test item. Across four conditions that varied how similar lures were to study items, neither RTs nor accuracy revealed evidence of serial search in any condition, suggesting no sequential rehearsal. A recency gradient was observed for conditions in which color information was necessary (new color, both old), with negligible set size effects across the gradient. In contrast, the recency gradient was reduced for conditions where location information could serve as the sole dimension of evaluation (new location, both new), and set size effects were seen at each level of recency. This suggests that color information suffers from strong retroactive interference such that previous color representations are “overwritten,” whereas location representations are blurred with each presentation, as if the location information has been “averaged.”

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12:00-1:30 PM (4211)

The Effect of Refreshing and Elaboration on Working and Long-Term Memory. LEA M. BARTSCH and KLAUS OBERAUER, *University of Zurich* (Sponsored by Klaus Oberauer) — Maintenance of information in working memory (WM) is assumed to rely on processes such as attentional refreshing or elaboration of the to-be-remembered material. The benefits of elaboration – for long-term memory (LTM) are well documented and there are hints that refreshing also improves LTM. We are interested in the extent to which elaboration and refreshing are distinct processes in WM, which have different effects on WM and LTM retrieval. We compared memory performance of lists of six words under four processing conditions: read, refreshed, elaborated, or refreshed and elaborated simultaneously. Our results show no effect of elaboration on WM, and a decline in WM performance for refreshed items compared to a read condition. LTM retrieval was highest for elaborated items, whereas refreshing showed no LTM effect. These findings question the assumption that maintenance of verbal WM depends on activation through attentional focussing and question the immediate effect of elaboration on memory.

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12:00-1:30 PM (4212)

What Happens if There is no Test-Phase in Change Detection Tasks? YE-EUN KIM and MIN-SUK KANG, *Sungkyunkwan University* (Sponsored by Min-Suk Kang) — In change detection tasks, participants remember a memory array and determine whether the memory array is the same with or different from a test array presented later. Here, we investigated the influence of the test-phase by eliminating the test-phase in a third of trials. Instead, participants remembered the memory array but were presented with the memory array of the next trial without the test-phase, while the set size (4 & 8) and the inter-trial interval (100 & 1600 ms) being varied. We found that memory performance was higher in the absence of the test-phase in the

previous trials than in its presence. In addition, this pattern of result was even more pronounced when the set size of the previous trials was small and when the time interval between trials increased. These findings suggest that items encoded in working memory compete against encoding of new items even though they become task-irrelevant.

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12:00-1:30 PM (4213)

The Separable Effects of Item Load and Feature Precision in Visual Short-Term Memory. SIMON D. LILBURN and PHILIP L. SMITH, *University of Melbourne*, DAVID K. SEWELL, *University of Queensland* (Sponsored by Philip Smith) — Visual short-term memory (VSTM) is often described in terms of item limits, resource limits, or some hybrid of the two. Many recent continuous report studies demonstrate that increasing the number of items in VSTM leads to increases in the magnitude of errors when participants must reproduce a probed stimulus. This increase in error magnitude has been interpreted as reflecting a loss of precision in the memory representation itself. These data could also be described by a reduction in the signal-to-noise ratio available for decision making as a consequence of a reduction in the number of neurons representing a stimulus. We report the results of a fine orientation 2AFC task in which the best model fit was obtained by representations with invariant precision but a reduction of neural resources as predicted by a sample-size relation. Our results imply that memory strength and feature precision are experimentally dissociable attributes of VSTM.

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12:00-1:30 PM (4214)

Mediators vs. Predictors: Understanding the Relationship Between Working Memory and Reading Comprehension. CHARLES PARKER and KANDI JO TURLEY-AMES, *Idaho State University* (Sponsored by Tina Miyake) — Researchers (e.g., Turley-Ames & Whitfield, 2003) have consistently reported correlations between working memory (WM) span and higher order cognitive function (HCF), such as reading comprehension. However, reasons for why individual differences in WM span occur and manifest across HCF tasks have yet to be explored fully. In the present study, we investigated whether the cognitive processes of resistance to proactive interference, inhibitory control, and metacognition have a mediating role on WM span and its relationship to reading comprehension. Results indicated mediation of the relationship between WM and reading comprehension by inhibitory control, as measured by the STOP-IT task (Verbruggen & Logan, 2007). Further, resistance to proactive interference (Underwood, 1957) and metacognition (Flavell, 1979) were significant predictors of reading comprehension independent of WM capacity. Results are discussed in the context of cognitive processes associated with WM and theoretical accounts of executive function.

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12:00-1:30 PM (4215)

Phonological Short-Term Memory Training and Transfer Effects to New Word Learning. NATALIA BLETSOGIANNI, THRASYVOULOS TSIATSOS and ELVIRA MASOURA, *Aristotle University of Thessaloniki* (Sponsored by Robert Logie) — Empirical evidence shows that a particular system of working memory, namely the phonological loop plays a crucial role in the process of learning new words. At the same time working memory systems appear open to training, with transfer effects evident in nearby cognitive systems. The aim of the present study was to investigate whether the training of the phonological loop subsystem of working memory has potential beneficial effects on the ability to learn new words. We developed a computerized game based on a cognitive training application targeted to strengthen the phonological loop of participants and a laboratory-based paradigm for learning new words. A total of 35 young adults were asked to learn new verbal items before and after a memory training. We noticed significant post-training gains on the phonological short term memory and a clear transfer effect on their ability to learn new verbal items.

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CONCEPTS AND CATEGORIES II

12:00-1:30 PM (4216)

Exploration, Generalization, and the Development of Learning Traps. ALEXANDER S. RICH and TODD M. GURECKIS, *New York University* (Sponsored by Todd Gureckis) — Conventional wisdom is that learning from experience brings us closer to understanding the world around us. However, in some situations learning and decision making interact to create persistent false beliefs called “learning traps.” In this project we describe how selective attention processes can interact with exploratory choice to trap learners with an incorrect belief about the world. We first provide simulation evidence that classic models of category learning (e.g., ALCOVE) are susceptible to this trap, then demonstrate the trap experimentally and explore how different changes to the environment might ameliorate the trap for both models and humans. We ultimately find that the “attentional learning trap” is fairly robust to these interventions with people. Our results highlight how inductive biases for learning simple patterns can trap learners into false beliefs.

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12:00-1:30 PM (4217)

Leveraging Different Types of Comparisons and Representations to Improve Relational Category Learning. DANIEL CORRAL, *Iowa State University*, MATT JONES, *University of Colorado Boulder* (Sponsored by Matt Jones) — Theories of relational learning on structure mapping emphasize compositional representations, based on the concept’s components and their interrelations. However, recent work posits that relational concepts can also be represented unitarily, whereby the concept is a property of the stimulus as a whole. We report a study in which we cross (between-subjects) type of representation (compositional vs. unitary)

with type of comparison (match vs. contrast) during a two-category classification task. Some subjects were encouraged to represent the categories compositionally, whereas others were encouraged to represent them unitarily. On each trial, subjects were shown two items, which were either from the same (match) or different categories (contrast), and were asked to make a classification judgment. Subjects in the compositional/match condition performed worse than subjects in the other three conditions. This result is unexpected (according to structure-mapping theory), as the compositional/match condition should facilitate alignment between co-presented items, leading to the abstraction of their shared structure. This finding suggests that compositional representations and alignment might not always be optimal for relational learning.

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12:00-1:30 PM (4218)

Relations Between Racial Essentialism and Facial Recognition. JESSICA S. LEFFERS, SOPHIE COATS, TORY GOVAN, EMILY KIM, EMMA PITT and JOHN D. COLEY, *Northeastern University* (Sponsored by John Coley) — Psychological essentialism—the intuitive belief that category members share an underlying “essence” that causes observable properties—is a useful heuristic for reducing complexity and guiding inferences. However, essentialist thinking about social categories can lead to unwarranted assumptions of group homogeneity. We investigated relations between the essentialist beliefs about race and recognition memory for faces. Participants completed an encoding task for 60 Black, White, and Asian faces, an essentialism questionnaire, and a surprise recognition memory task. Memory results replicated the “own race bias;” false alarms were higher for outgroups than ingroups. We observed similar effects for essentialist beliefs, which were stronger for outgroups than ingroups. Finally, essentialist beliefs about the category “asian-people” were positively correlated with higher error rates on asian faces in the recognition task ($r=.289, p=.021$). These findings suggest that intuitive beliefs about social categories may mediate encoding and recognition of faces.

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12:00-1:30 PM (4219)

The Influence of Features on Categorization and Explanation Evaluation. LILLIAN ASIALA, JANE NEAL and KATJA WIEMER, *Northern Illinois University* (Sponsored by Michael Wolfe) — When a category is described with a causal chain of features - such as eating fruit resulting in sticky hands - prior research shows that initial causal features are considered more essential to classifying an item in a category than a feature that arises as a consequence (Ahn et al., 2000). The current study replicated this finding in a categorization task, and further investigated this effect of causal status on the evaluations of explanations for category features. Novel categories were described by a causal chain of features: an initial feature, a consequential feature, and a function of that consequential feature. Participants evaluated two explanations for the consequential feature; mechanistic explanations situated the initial feature as a cause, while functional explanations cited



the function as the cause. Results suggest that mechanistic explanations are judged to be more explanatory, however this effect is influenced by the consideration of an alternative functional explanation.

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12:00-1:30 PM (4220)

Relationship Between Extensions and Intensions in Categorization: A Match Made in Heaven? FARAH M. DJALAL, *University of Leuven*, JAMES A. HAMPTON, *City, University of London*, GERT STORMS and TOM HEYMAN, *University of Leuven* (Sponsored by Gert Storms) — The present study investigated the relationship between category extension and intension for eleven different semantic categories. It is often tacitly assumed that there is a (strong) extension-intension link. However, a recent study by Hampton and Passanisi (2016) examining the patterns of stable individual differences in concepts across participants called this hypothesis into question. To conceptually replicate their findings, two studies were conducted. We employed a category judgment task to measure category extensions, whereas a property generation (in Study 1) and property judgment task (Study 2) were used to measure intensions. Using their method, that is, correlating extension and intension similarity matrices, we found non-significant correlations in both studies. However, multi-level logistic regression analyses showed that the properties a person generated (Study 1) or endorsed (Study 2) better predicted her own category judgments compared to other people's category judgments. This result provides evidence in favor of a link between extension and intension at the subject level. The conflicting findings, resulting from two different approaches, and their theoretical repercussions are discussed.

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12:00-1:30 PM (4221)

Sequence and Negative Exposure Effects When Learning Multiple Categories Without Feedback. JOHN P. CLAPPER, ARTURO COVARRUBIAS-PANIAGUA and ROSE DE KOCK, *California State University San Bernardino* — How do people acquire new categories without feedback? Correlation tracking models assume that people track associations among the features of different objects until reliable patterns are learned. Category invention models assume that people create new categories in response to novel or surprising objects. Previous research tested these models by manipulating the order in which examples of two categories were shown in an unsupervised learning task. As predicted by the category invention model, people learned best when a sequence maximized the contrast between two categories, e.g., by showing them in separate blocks, even if fewer examples were shown than in a comparable low-contrast (i.e., interleaved) sequence. The present experiments attempted to reproduce these results in a three-category task. The same sequence and “negative exposure” effects were obtained as in earlier two-category experiments. These results broaden the support for category invention to include situations in which people acquire multiple categories without feedback.

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12:00-1:30 PM (4222)

Cooperation of Explicit and Implicit Learning Processes in Acquisition of Complex Visual Stimuli. KRISZTIAN BORBELY and ANETT RAGO, *Eotvos Lorand University*, MATE VARGA, *Budapest University of Technology and Economics* — During category learning the acquired categorization rule enables is transferable to the new elements. We investigate the possible connection of explicit and implicit category learning mechanisms. We used a supervised category-learning task on naturalistic but arbitrarily created complex visual stimuli. In the learning phase we presented a simple explicit rule next to a hidden information-integration task. In the test phase we measured the acquisition of the implicit rule registering hit rates and reaction times for the new category members lacking the explicit information. 200 adult and 83 eleven year-old children participated in the experiment. Results revealed that while acquiring the explicit rule easily and quickly, participants also learned the implicit rule. Hit rates and reaction times in the test phase followed the family resemblance structure. Increase of reaction times in the test phase reflects the cost of switching to implicit strategy. There was no difference between the two age groups.

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12:00-1:30 PM (4223)

Effect of Practice Testing on Learning to Discriminate Natural Categories. RACHEL A. SEARSTON, *The University of Melbourne*, LIUISSA ZHEN and JASON M. TANGEN, *The University of Queensland*, MATTHEW B. THOMPSON, *Murdoch University* — Practice retrieving instances from memory has been widely demonstrated to benefit later recognition and recall of old facts and words that learners have encountered previously. This testing effect has also been observed in a categorisation task, where the goal was to name old (and new) images of different bird species. Extending this work, we investigated whether the benefits of practice testing for learning natural categories is domain-general, and whether the testing effect persists without naming in a discrimination task. Learners who practiced discriminating images of bird species (e.g., hawks vs. owls) with corrective feedback, were more accurate than study-only learners at distinguishing new instances of those bird species. The same benefits were not found, however, with paintings in different artistic styles (e.g., Cubist vs. Impressionist). Testing effects may be bounded by domain-specific structural or relational information in tasks that rely on generalisation.

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12:00-1:30 PM (4224)

Individual Differences in Categorization Strategy and Working Memory Capacity. LEE-XIENG YANG, *National Chengchi University* — Conaway and Kurtz (2016) showed clear individual differences on learning a partial XOR category structure. One group of participants learned to rely on the proximity to exemplars for categorization; whereas the other group generated a full XOR strategy for categorization. Whether working memory capacity (WMC) has something to do with their finding was the issue to pursue in this study. Two



experiments replicated their findings in the supervised- and observational-learning paradigms. Also, WMC (measured in the MU, OS, SS, and SSTM tasks) was found to be negatively correlated with the tendency of using the XOR strategy for the XOR group but not for the Proximity group. The hierarchical Bayesian modeling results suggest that in addition to the Proximity strategy, the XOR group generates the XOR strategy. Also, it is implied that the high WMC participants can hold both strategies active in WM, hence having difficulty performing the typical XOR strategy.

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12:00-1:30 PM (4225)

Modern Multidimensional Perceptual Modeling. DENNIS L. BARBOUR, *Washington University in St. Louis* — Perceptual models have traditionally focused on unidimensional conditions (i.e., one independent variable), mainly because of the long time required to accumulate sufficient behavioral data from an individual to fit a multidimensional function. Perceptual phenomena are inherently multidimensional, however, and our understanding of these processes would be greatly enhanced by a universal method to construct effective multidimensional models. We have developed a multidimensional perceptual modeling procedure that has the flexibility of nonparametric methods yet the efficiency of parametric methods. Inference is performed on a stochastic process moment function or kernel, which models the interactions among variables. This kernel method has been applied to the pure-tone audiogram and can estimate sigmoidal psychometric curves at every sound frequency in the same time required to estimate a single psychometric curve using conventional methods. Evaluation of this particular two-dimensional estimator provides crucial insights into how kernel methods will generalize to construct higher order perceptual and even cognitive models efficiently for individuals.

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12:00-1:30 PM (4226)

Performance Feedback Reduces the Central Tendency Effect and Improves Memory Accuracy in a Visual Memory Task. JONATHAN C. CORBIN and LAURA ELIZABETH CRAWFORD, *University of Richmond*, DAVID LANDY, *University of Indiana* — Research on the central tendency bias shows that when viewing and then reproducing stimuli that vary along a continuous dimension, estimates bias toward the central value of the set. This bias in responses can be modeled as a process of combining an unbiased but inexact memory trace with prior knowledge about the kind of stimuli shown. Here we examined how providing feedback about performance on each trial would alter participants' relative reliance on trace-level memory and prior knowledge. Participants viewed 14 line lengths nine times, and reproduced them from memory by adjusting a response line. Some participants were given feedback on their distance and direction from the actual length whereas others were given no feedback. Participants in the feedback condition were more accurate in their responses and

showed a smaller central tendency effect, which could be due either to more precise trace memory or a less precise category distribution.

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12:00-1:30 PM (4227)

Can Within-Category Representations be Learned and Generalized in Rule-Based Tasks? DAVID B. SMITH, *University of Maine*, SEBASTIEN HELIE, *Purdue University*, SHAWN ELL, *University of Maine* (Sponsored By: Shawn Ell) — The information that is necessary during the course of learning categories is critical for promoting within-category representations (e.g., correlational structure of the categories). Recent data suggests that for one-dimensional rule-based structures, only inference training promotes the learning of within-category representations, and generalization to novel stimuli is limited. It is unclear if this is a general feature of rule-based structures, or a limitation of one-dimensional rule-based tasks. We report the preliminary results of an experiment investigating this issue using an exclusive-or rule-based structure where successful performance depended upon utilizing two stimulus dimensions. Participants were trained using classification or inference training and tested using inference. For both the classification and inference training conditions, within-category representations were learned and could be generalized at test (i.e., from classification to inference). These data further support the idea that the information that is necessary during categorization is critical for the learning and generalization of categorical knowledge.

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POSTER SESSION V

Saturday Evening

West Ballroom BCD

Viewing 4:00-7:30, Author Present 6:00-7:30 PM

CONSCIOUSNESS

6:00-7:30 PM (5001)

Proactive Control and Episodic Retrieval Orientation. MICHAEL SIENA, *University of Edinburgh*, PETAR RAYKOV, *University of Sussex*, MAXIME KRAUS and ALEXA M. MORCOM, *University of Edinburgh* — The recovery of information from episodic memory can be influenced by goal-directed control applied prior to the point of retrieval. We used event-related potentials (ERPs) to investigate the relations between this goal-directed control and wider and proactive control abilities assumed to operate across multiple cognitive domains. In a recognition memory exclusion task participants studied words, making either an Artist, a Function or a Pleasantness judgement. At test, items studied in only one task at a time were designated as “targets” (other studied items and new items were “non-targets”). In line with earlier studies, ERPs to correctly rejected new items differed according to the retrieval orientation – i.e., which task was currently targeted – from 900 ms post-stimulus. Participants showing greater proactive cognitive control on the AX-Continuous Performance Task (AX-CPT) also performed better on the exclusion task and showed more pronounced ERP retrieval orientation effects. The results suggest that proactive attentional control may contribute to episodic memory control via establishment or maintenance of a retrieval orientation.

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6:00-7:30 PM (5002)

The Stroop Task Measures Conscious Perception: Prime Duration As a Dose-Response Effect. GARY D. FISK, *Georgia Southwestern State University*, STEVEN J. HAASE, *Shippensburg University* — A single task for assessing both the conscious and unconscious components of visual perception would have significant advantages over traditional approaches that compare separate measurements of perception and awareness. Three Stroop-type experiments were conducted with prime color words of varying durations (7, 14, 28, 56, 77, and 98 ms) presented immediately prior to a target color stimulus (XXXXXX). The first experiment with pattern-masked primes produced an overall Stroop effect but only the longest duration prime was significant ($p = .04$). A second experiment with unmasked primes produced robust Stroop effects, especially for the 56, 77, and 98 ms prime stimuli (Cohen's d 's $> .5$). The third experiment with concurrent target and prime identification yielded no significant Stroop effect when prime identification performance was at chance. Altogether, these results suggest that the Stroop effect, by itself, reflects both perceptual processing and (mainly) conscious awareness of the prime stimulus.

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6:00-7:30 PM (5003)

Subliminal Gaze Cues Induce a Liking Effect. TAKASHI MITSUDA, *Ritsumeikan University* — Following another individual's gaze direction is a cognitive process that shifts the observer's attention towards the sender's object of interest. Previous studies have shown that gaze cuing increases the observer's level of preference for the object located by the gaze direction. This study examined this effect when the gaze is presented subliminally over a short period. The results indicated that the preference levels for nonsense figures in the gaze direction were significantly greater than those of the others even when the participants were not able to detect the gaze direction. Both the liking effect and the shift of attention by the subliminal gaze cues were stronger for female observers than male observers. The findings reveal that the liking effect by the gaze cues is an automatic process that does not require conscious awareness, especially for female observers.

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6:00-7:30 PM (5004)

Individual Differences in Mind-Wandering Content and Consistency. MATTHEW S. WELHAF and BRIDGET A. SMEEKENS, *University of North Carolina at Greensboro*, MATT E. MEIER, *Western Carolina University*, PAUL J. SILVIA, *University of North Carolina at Greensboro*, THOMAS R. KWAPIL, *University of Illinois at Urbana-Champaign*, MICHAEL J. KANE, *University of North Carolina at Greensboro* — A large correlational study (Kane et al., 2016) found that normal variation in executive abilities (working memory capacity; attention control) and personality factors predicted propensity for task-unrelated thoughts (TUTs) measured across 5 tasks. The present exploratory analyses of that dataset examined individual differences in TUT content and consistency. We asked whether some forms of mind-wandering, and their within-person variation, are especially linked to cognitive ability or personality. Specifically, for TUT content, we assessed subjects' tendency to report particular TUT categories within and across tasks (e.g., daydreaming; worries; external distractions). For TUT consistency, we scored subjects' thought reports for consecutive switches between content categories, and for the number of content categories endorsed, within each task. These 2 dimensions of TUT consistency were correlated but separable. We report separate confirmatory factor analyses for TUT content and TUT consistency outcomes, assessing whether any are significantly predicted by executive abilities or personality.

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6:00-7:30 PM (5005)

A Model of Reaching Movements as a Continuous Read-Out of Decision Making. CRAIG S. CHAPMAN and NATHAN J. WISPINSKI, *University of Alberta* — The majority of decision-making research looks at decision processing exclusively before



movement initiation (e.g. evidence accumulation models, neural recordings) or exclusively after movement initiation (e.g. reach trajectories). Here we propose a new computational model, fit to recent experimental data from a reach-decision task, that bridges this temporal gap - tying continuous changes in decision making to continuous changes in reaching movements. Reaction times and initial choices are determined by accumulated evidence fed into a drift diffusion process. In parallel, the evidence also feeds into competitive motor accumulators which act as weights for competing motor plans across time. This formalization can explain when people will move, what they choose, and how they move in physical space. In addition, our model generalizes to several other reaching tasks including obstacle avoidance and “go-before-you-know” tasks. Overall, this new model unifies continuous decision making and movement, which has significant implications for phenomena like body language.

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6:00-7:30 PM (5006)

What is a Wandering Mind? Dissociating Dimensions of Thought Through Diurnal Rhythms. CAITLIN S. MILLS, GABRIEL K. SMITH and KALINA CHRISTOFF, *University of British Columbia* — Mind wandering is variously construed as task-unrelated thought, perceptually decoupled thought (i.e. lack of awareness of one’s surroundings), and thoughts that are freely moving. These dimensions of thought may in fact rise and fall together as the mind wanders. However, if task-unrelatedness, perceptual decoupling, and freedom of movement are in fact distinct dimensions of thought, they should display dissociable diurnal patterns. We tested this hypothesis by delivering thought probes to participants’ smartphones for ten days between 8am and 11pm. Growth-curve modelling revealed distinct diurnal patterns across the three dimensions: Freedom of movement was lowest early in the day, peaked at midday, then steadily tapered off. Task-unrelatedness followed a similar pattern, but the degree of change over time was attenuated in comparison to freedom of movement, as evidenced by significantly different quadratic terms, $p = .006$. Finally, perceptually decoupled thought exhibited a different polynomial trend, suggesting its trajectory was distinct from the other dimensions. These findings provide support for dissociation among these dimensions of thought, and provide preliminary evidence for “when the mind wanders” across the day.

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6:00-7:30 PM (5007)

The Awakening of the Attention: Evidence for a Link Between the Monitoring of Mind Wandering and Prospective Goals. PAUL SELI, *Harvard University*, DANIEL SMILEK and BRANDON C.W. RALPH, *University of Waterloo*, DANIEL L. SCHACTER, *Harvard University* — Across two independent samples, we examined the relation between individual differences in rates of self-caught mind wandering and individual differences in temporal monitoring of an unrelated response goal. Rates of self-caught mind wandering were assessed during a commonly used sustained-attention

task, and temporal goal monitoring was indexed during a well-established prospective-memory task. The results from both samples showed a relation between rates of self-caught mind wandering during the sustained-attention task and rates of checking a clock to monitor the amount of time remaining before a response was required in the prospective-memory task. This relation held even when controlling for overall propensity to mind-wander (indexed by intermittent thought probes) and levels of motivation (indexed by subjective reports). These results are consistent with the notion that there is a common monitoring system that monitors the contents of consciousness and the progress of ongoing goals and tasks.

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6:00-7:30 PM (5008)

Individual Traits That Influence the Frequency and Emotional Valence of Involuntary Musical Imagery: An Experience Sampling Study. TAKAHIRO SEKIGUCHI and KAZUMASA NEGISHI, *Tokyo Gakugei University* — We investigated the individual traits that influence the frequency of involuntary musical imagery (INMI) and the emotional valence of this experience using the experience sampling method. One-hundred university students answered questionnaires that assessed their musical experiences (Gold-MSI), Big-Five personality traits, and obsessive-compulsive traits. During the seven-day sampling period, they received notifications on their smartphone six times per day, and answered whether they experienced INMI at that moment and the emotional valence of that experience. The results showed that both the “active engagement” score of musical experiences and the “intrusive thought” score of obsessive-compulsive traits were positively correlated with the frequency of INMI. As for emotional valence, the “emotions” score of musical experience was positively correlated with the positivity of the INMI experience, whereas the “washing compulsion” score was negatively correlated with it. In contrast, no personality trait showed a significant relationship with either the frequency or emotional valence of INMI.

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6:00-7:30 PM (5009)

Prospective Influence of Emotional Valence on the Sense of Agency. ZEYNEP BARLAS and STEFAN KOPP, *CITEC-Bielefeld University* — Previous research have shown that sense of agency (SoA), i.e. the sense that one is in control of their actions and the outcomes of these actions, can be weakened for negative compared to positive action-outcomes. In the current study, we examined whether and how emotional valence during action selection can influence the SoA. Participants performed free and instructed actions while they were presented with either facial expressions (neutral, happy, angry) or a control stimulus. We obtained temporal estimations of action-outcome intervals to quantify the intentional binding effect, i.e. perceived temporal attraction between voluntary actions and their outcomes, and subjective feeling of control (FoC) judgments. Preliminary results showed that neutral and angry expressions reduced binding while happy expressions enhanced FoC judgments compared to when no facial expression was present.



These results suggest that negative emotions prior to actions can reduce the implicit SoA while positive emotions can enhance the explicit SoA.

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6:00-7:30 PM (5010)

Dissociations of Conscious Visual Perception From Discrimination Performance in TMS-Induced Blindsight.

LUA KOENIG and TONY RO, *The Graduate Center, CUNY* (Sponsored by Jeroen Raaijmakers) — TMS over V1 reliably induces blindsight-like behavior, whereby normal observers can correctly discriminate the attributes of visual stimuli despite being unable to detect them. The neural mechanisms of TMS-induced blindsight remain poorly understood. We tested blindsight-like behavior across a range of TMS latencies to assess how the timing of visual cortex disruption affects detection rates and forced-choice discrimination accuracy. At all TMS latencies, discrimination performance was significantly above-chance. Crucially, we observed two windows of maximum visual suppression, likely reflecting feedforward and feedback processing, but a consistent dissociation between detection and discrimination of visual stimuli. At longer SOAs, detection and discrimination covaried, suggesting a dependency when detection rates reach levels of normal vision. Taken together, these results indicate that unconscious discrimination occurs independently of detection at TMS intervals that optimally interfere with conscious visual perception. They further suggest that forced-choice discrimination is less dependent on feedback processes to V1 than visual awareness and that TMS-induced blindsight is not a case of near-threshold vision.

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DIVIDED ATTENTION

6:00-7:30 PM (5011)

Listeners Use Fry As A Cue to Estimate Vocal Effort. JESSICA E.D. ALEXANDER, *Centenary College of Louisiana*, SARAH T. IRONS, *Rice University* — Vocal fry has been well-researched as a clinical phenomenon and much-discussed as a (potentially) relatively recent sociolinguistic phenomenon. Previous findings indicate that vocal fry may also be a property of reduced vocal effort (Huang et al., 1995) and reduced communicative distance (Tranmüller and Eriksson, 2000). In the current study, listeners were presented with sentences (recorded in speaker/listener dyads) that differed in the type of speech (read vs. spontaneous), speaking task, and speaker sex. Half the sentences were high in proportion of vocal fry, and half were low in proportion of vocal fry. Listeners estimated the communicative distance between the speaker and listeners during recording (although all dyads were seated the same distance apart). The estimated distance was lower in speech with more vocal fry, indicating that vocal fry may be used a cue to vocal effort or communicative distance. Distance estimates also differed by type, task, and speaker sex. Email: Jessica Alexander, jalexander@centenary.edu

6:00-7:30 PM (5012)

Tracking of Moving Players in Football. LAURI OKSAMA, *National Defence University*, TEEMU LEINO and JUKKA HYÖNÄ, *University of Turku* — Multiple object tracking has been extensively studied in the laboratory. However, the relevance of this research to performance in the real-life environments (e.g. in sports and traffic) is unknown. Here we examined how well observers are able to track moving players during a realistic dynamic football (soccer) situation and how long it takes to achieve an accurate picture of the situation to be able to make good passing decisions. We devised a new realistic video-based multiple identity tracking task and a dynamic decision making task, where passing accuracy was investigated. Our first results suggest that tracking capacity is surprisingly low in such real-life situation. We observed, however, that tracking performance and decision making improves as a function of time.

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6:00-7:30 PM (5013)

Two Types of Backward Crosstalk: Evidence From Manipulating Dimensional Overlap Within and Between Tasks.

LYNN HUESTEGGE and ALEKS PIECZYKOLAN, *Würzburg University*, MARKUS JANCZYK, *Tübingen University* — In dual-task situations, which often involve some form of sequential task processing, features of Task 2 were shown to affect Task 1 performance, a phenomenon termed “backward crosstalk effect” (BCE). While previous BCE reports are usually based on response compatibility manipulations between tasks, there are also some instances suggesting that Task 2 difficulty can affect Task 1 processing. We manipulated response-response (R-R) relation (compatible, incompatible, arbitrary) and the S-R relation in Task 2 (S2-R2: compatible, incompatible, arbitrary) to study the impact of dimensional overlap and compatibility within and across tasks using an integrated stimulus for Task 1 (vocal) and Task 2 (manual). Results revealed (1) a cross-response BCE and (2) a Task 2 (response selection) difficulty BCE. Despite their distinctiveness, both are in line with the general assumption that anticipated (spatial and temporal) characteristics of Task 2 responses can affect response-related processing in Task 1.

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6:00-7:30 PM (5014)

Vigilant Attention as a Function of Stimulus Characteristics.

EYLÜL TURAN, SEZİN ÖNER and SAMİ GÜLGÖZ, *Koç University* — In the current study, we primarily aimed to investigate how individuals perceive changes in their environment and their success in detection changes as a function of the type of change. Specifically, we measured vigilant attention using a dual-task paradigm in which participants pressed the relevant button to indicate a change in the background stimuli while they simultaneously performed arithmetical operations. The changes in the background stimuli varied in terms of (a) type of change (neutral, negative, threat) and (b) stimuli characteristics (word, picture). Data were collected from 169 participants. Findings demonstrated that, irrespective of the



cognitive load, participants were better in detecting the changes when the stimulus was pictorial and threat-relevant, suggesting for the modality effects in enhanced vigilance.

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6:00-7:30 PM (5015)

Estimation of Internally-Defined Durations: A Comparison of Temporal Tasks. MICHAEL KLEIN, JENNIFER STOLZ, *University of Waterloo* (Sponsored by Jennifer Stolz) — Estimating the duration of an interval generally interferes with performance on concurrent non-temporal tasks. Most work on this topic has focused on what we term ‘externally-defined’ durations – those that are defined by events that are not under the control of the participant (e.g. the appearance and disappearance of a stimulus on a computer screen). We have previously shown that estimation of one’s own response time to a stimulus (i.e. an ‘internally-defined’ duration) does not interfere with commonly used concurrent tasks, suggesting that whereas estimation of externally-defined durations requires effort, the duration of internally-defined intervals can be obtained for ‘free’. However, participants in these studies generally made their estimates by clicking within an analogue scale. This may have made it easier to avoid effortful temporal processing, in that participants may have simply rated something other than duration, such as perceived difficulty. In the current work, we used a range of time estimation procedures including temporal reproduction and a comparison task, finding that the lack of interference between internally-defined duration estimation and concurrent tasks is not specific to analogue scale responses. Email: Michael Klein, mdklein@uwaterloo.ca

6:00-7:30 PM (5016)

Assessing Cognitive Load During Driving With Evidence Accumulation Models of a Detection Response Task. SPENCER C. CASTRO and DAVID L. STRAYER, *University of Utah*, ANDREW HEATHCOTE, *University of Tasmania* (Sponsored by Andrew Heathcote) — Dual task costs are commonly believed to be the result of overloading a person’s limited capacity for attention. In evidence accumulation models, this overload can be thought of as a maximization of information-processing capacity, which results in a decrease in the rate of information processing for each task. In order to determine how the models’ rate parameter varied with cognitive load, we modeled an applied example of driving with cognitive distractors. Twenty participants performed the driving task while counting backwards by threes and responding to an ISO standard or modified choice detection response task (DRT). The response times (RT) predictably varied under cognitive load, and evidence accumulation models account for these variations. RTs were fit to a modified single barrier diffusion race model, which predicted slower estimated rates under a cognitive load compared to a baseline. However, there were also compensatory increases in evidence thresholds and a speed up in non-decision time. For choice DRT responses, we found that the rate parameter for the similar LBA model was also reduced

when participants concurrently counted backward by threes, and demonstrated a similar pattern for thresholds and non-decision time.

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6:00-7:30 PM (5017)

Masking Reveals Lag-1 Sparing and Multiple Bottlenecks in the Attentional Blink. HAYLEY E.P. LAGROIX, VINCENT DI LOLLO and THOMAS M. SPALEK, *Simon Fraser University* (Sponsored by Vincent Di Lollo) — Perception of the second of two sequential targets (T1, T2) is impaired when presented soon after the first (attentional blink; AB). In an exception, known as Lag-1 sparing (L1S), T2 performance is relatively unimpaired when displayed directly after T1. Typically, L1S occurs when the dependent measure is accuracy but not when it is response time (RT). Usually, T2 is backward-masked when the response measure is accuracy but not when it is RT. In a series of experiments, we demonstrate that L1S can indeed be obtained with RT, provided that T2 is followed by a mask. We also show that accuracy and RT measures of L1S are affected in different ways by manipulations of salience and response congruity. These results suggest that, contrary to extant theories, the AB may arise from postponements of T2 processing not at one, but at multiple levels within the system.

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6:00-7:30 PM (5018)

Global Relationships Reduce Cost of Divided Attention on VSWM. RUIZHI DAI, *Tufts University*, IRA E. HYMAN, *Western Washington University*, HOLLY A. TAYLOR, AYANNA K. THOMAS, *Tufts University* (Sponsored by Holly Taylor) — The present study investigated the cost of divided attention in the context of a visuo-spatial working memory task, in which people tracked both the location and identity of objects. Participants completed two concurrent tasks: 1) tracking task: track either a moving dot (“where” processing), or assess a changing word for semantic categorization (“what” processing); 2) grid task: learn object identities and locations in a 5x5 grid wherein objects are either spatially organized or unorganized and are either semantically associated or unassociated. The two tasks were superimposed, and participants were instructed to prioritize the tracking task, but concurrently perform the grid processing task. Accuracy across both tasks was assessed. Results indicated that divided attention disrupts processing identity information to a greater extent than location information. However, the cost of dividing attention was reduced when grids consisted of either spatially organized or semantically related objects.

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6:00-7:30 PM (5019)

Generalizability of Compensatory Tracking Tasks to Driving Simulator Experiments. JONATHAN C. RANN and AMIT ALMOR, *University of South Carolina* (Sponsored by Amit Almor) — Dual-tasking and attention are well-researched topics in the cognitive sciences. Studies in these areas have a multitude of applications for the real world, with one of the most prevalent relating to the world of driving. Studies regarding dual-tasking have been used to measure deficits in



performance of concurrent tasks, and previous research in the area has utilized tracking tasks for studying the simultaneous performance of multiple tasks. A concern about these studies is whether their results apply to real world driving situations. Studies utilizing driving simulator tasks can provide a bridge between those using tracking tasks and actual driving, but research is needed to verify that the results from tracking tasks can generalize to driving simulator tasks. That being said, the aim of this proposed study is to determine whether driving simulator experiments mimicking compensatory tasks yield similar performance measures as a computerized tracking tasks. Results may indicate that dual-tasking studies involving both computer based tracking and driving simulator tasks can be applied to actual driving, and thus pave the way for further studies in the areas of attention, memory, and multi-tasking.
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6:00-7:30 PM (5020)

Modality Matters: The Role of Modality Congruency in Dual-Task Performance. JONATHAN SCHACHERER and ELIOT HAZELTINE, *University of Iowa* (Sponsored by Eliot Hazeltine) — Dual-task and mixing costs are highly dependent on modality pairings. For example, these costs are smaller when visual-manual and auditory-vocal tasks are paired together compared to when the opposite arrangement of pairings is used. However, *why* this occurs remains uncertain. One possibility is the correspondence between the input stimulus and the sensory/perceptual consequences produced by the response (stimulus-response-sensory feedback)—here referred to as *modality congruency*. To address this possibility, we employed a visual-manual/auditory-vocal dual-task paradigm whereby we independently manipulated the sensory feedback associated with the response across three groups: (1) modality-congruent (visual-manual-visual/auditory-vocal-auditory); (2) modality-incongruent (VMA/AVV); and (3) no feedback (VM/AV). Compared to the no feedback condition, we observed smaller dual-task costs when sensory feedback was modality-congruent and larger dual-task costs when feedback was modality-incongruent. These results provide evidence that sensory consequences are integrated into response selection (Hommel et al., 2001).

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VISUAL SEARCH

6:00-7:30 PM (5021)

Statistical Information Encoded in English Spelling. ANASTASIA ULICHEVA, *Royal Holloway University of London*, MARK ARONOFF, *Stony Brook University*, KATHLEEN RASTLE, *Royal Holloway University of London* — Substantial evidence indicates that inconsistency harms learning. If so, then why does inconsistency emerge? To answer this question, we examine English spelling—a dynamic system that has self-organised over centuries. Inconsistent spelling-sound correspondences exist in abundance in English, and while these could have become extinct, this evolution has spared them. We present results of computational linguistic analyses showing that suffix spellings, albeit unpredictable

from sound, carry unique information that is not available in phonology. We show that English speakers pick up these cues in the absence of formal instruction, and use them explicitly and implicitly when dealing with written language. In particular, they draw inferences about meanings of novel words based on their orthography, exploit these cues in their spelling of novel words, and rapidly access these in the context of natural sentence reading. We will also discuss individual differences in people's sensitivity to orthographic cues present in English suffixes.

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6:00-7:30 PM (5022)

Visual Attention Demands Influence the Interplay of Response Selection and Visual Attention. CHRISTINA B. REIMER and TORSTEN SCHUBERT, *Martin-Luther-Universität Halle-Wittenberg* — Response selection and visual attention are limited in capacity. According to the central bottleneck model, the response selection processes of two tasks in a dual-task are performed sequentially. In conjunction search, visual attention is required to select items and to bind item features resulting in a serial search process. Here, we investigated whether response selection and visual attention rely on a common or on distinct capacity limitations. In two experiments, participants completed an auditory two-choice discrimination Task 1 and a conjunction search Task 2 presented at variable Stimulus Onset Asynchronies (SOAs). The items in conjunction search consisted of two features in Experiment 1, but of four in Experiment 2. The locus-of-slack method revealed that response selection and visual attention rely on distinct capacity limitations in Experiment 1, but on a common capacity limitation in Experiment 2. To conclude, visual attention demands influence the interplay of response selection and visual attention.

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6:00-7:30 PM (5023)

An Examination of the Role of Perceptual Load on Distractor Devaluation. EFFY RUAN and ERIN L. AUSTEN, *St. Francis Xavier University* — Affective evaluations of previously viewed distractors are lower than evaluations of novel stimuli. This distractor devaluation effect was investigated under conditions of high or low perceptual load. It was hypothesized that the conscious suppression of distractors in low load conditions would lead to lower ratings than in high load conditions. On all trials, participants had to identify one of two possible target letters within an array of distractors; in the high load task, distractors were letters, while in the low load task, distractors were small o's. A critical stimulus (CS) was presented on the perimeter of the search array on half of the trials. At the end of each trial, participants were asked to report the target letter, report whether a CS was present and, rate the 'cheeriness' of the CS or a novel stimulus. Perceptual load effects were present; the impact of load on distractor devaluation will be discussed.

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**6:00-7:30 PM (5024)**

Interactions Between Implicit Learning and Explicit Knowledge in Visual Search. EVAN J. LIVESEY, ANDREW J. MCALPIN and DOMINIC M.D. TRAN, *University of Sydney* — One controversial hypothesis about the relationship between implicit and explicit learning is that explicit awareness is an emergent property of implicit learning. Inspired by this, we tested whether implicit learning can facilitate later emergence of explicit knowledge. We used contextual cuing, a form of learning in visual search where participants improve if the search display is repeated. Contextual cuing with artificial array-based distractors is associated with very low levels of explicit knowledge whereas much higher levels of awareness accompany contextual cuing with natural scenes (or displays combining scenes and artificial distractors). Participants first completed array-based search, including several repeated distractor patterns. These repeated patterns were then used in a more explicit contextual cuing task with combined array/scene displays. Performance on an explicit generation task was substantially higher when the array-based distractors had been pre-trained, even though this pre-training by itself generated chance-level performance on the generation task.
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6:00-7:30 PM (5025)

Representations in Spatial Memory Following Repeated Search. GRAYDEN J.F. SOLMAN, *University of Hawai'i at Mānoa*, ALAN KINGSTONE, *University of British Columbia* — When searching through repeated displays, observers become progressively faster and more accurate in locating targets, owing to accumulated spatial memory for target locations. In the present experiments we use repeated search and explicit memory tests to explore the nature of the spatial memory representations built up during search, and how these differ as a function of the relative frequency of target representation. We provide evidence that total spatial memory capacity is conserved, but may be differentially distributed across unequally prevalent items, supporting an instance-based encoding model for spatial position.
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6:00-7:30 PM (5026)

Visual Search is More Efficient for Aesthetically Pleasing Stimuli. IRENE REPPA, *Swansea University*, SINE MCDUGALL, *Bournemouth University* — Aesthetically appealing icons are localized faster relative to their unappealing counterparts, especially under duress, i.e., when the target icon is unfamiliar or abstract (e.g., Reppa & McDougall, 2015). In the current study a classic visual search task was used to examine whether visual appeal can cause a target icon to 'pop out' of an array of icons. Eighty participants each completed 480 visual search trials. Participants searched for target icons varying in rated aesthetic appeal (appealing vs. non-appealing). The target icons would appear among randomly varying numbers of distractors (i.e., 3, 6, 9, or 12 distractor icons). Aesthetic appeal of the target icon boosted the efficiency of visual search when set size was large (i.e., when searching for the target among 9 or 12 icons) but had no significant effect of search with small

set sizes (i.e., when searching for the target icon among 3 or 6 icons). These results demonstrate that aesthetic appeal can affect visual search performance: search slopes are shallower when searching for appealing compared to unappealing icons. The findings provide converging evidence to the hypothesis that appeal influences performance under duress.
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6:00-7:30 PM (5027)

The Role of Explicit and Implicit Temporal Learning on Attentional Dynamics in a Rapid Serial Visual Presentation Task. MATTHEW JUNKER, *Indiana State University*, BO YOUN PARK, *Korea University*, JACQUELINE C. SHIN, *Indiana State University*, YANG SEOK CHO, *Korea University* — The goal of this study was to investigate the role of explicit and implicit learning processes in adjusting the temporal distribution of visual attention when stimulus timing is consistent in an RSVP task. Specifically, the uncertainty of the target position in the RSVP series and length of practice were manipulated among experiments, and the degree of explicit learning was assessed using a questionnaire. In Experiments 1 and 2, the target appeared consistently in one of two possible RSVP positions over practice sessions spanning three (Experiment 1) or five (Experiment 2) consecutive days. In Experiment 3, the target was presented in only one possible RSVP position for five days. The results are reported with respect to how explicit learning modulated the effects of practice on measures of the efficacy, delay, and precision of a putative attentional pulse.
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6:00-7:30 PM (5028)

Can Practice Expand the Functional Field of View? MELISSA PRINCE and DANIELE ANTONIOU, *Flinders University*, JASON S. MCCARLEY, *Oregon State University* — Although many tasks require observers to process information from large areas of the visual field, performance is both slower and less accurate for targets in the periphery, and particularly when presented with distractors. The Functional Field of View (FFOV; i.e., area of the visual field from which information can be extracted without head or eye movements) is assessed by asking participants to identify targets presented at varying distances from central fixation. The current study aimed to explore whether practice could expand the FFOV. Participants completed three sessions on consecutive days, and although performance improved overall, practice did not modulate the effect of target eccentricity. To explore the cognitive mechanisms underlying this practice benefit, data were fit using Brown and Heathcote's (2008) Linear Ballistic Accumulator model. Slower rates of evidence accumulation were observed for targets further from fixation, as well as when presented with distractors. Consistent with a perceptual filtering cost, the presence of distractors also resulted in longer non-decision times. The effect of practice was accounted for by a decrease in the decision threshold.
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6:00-7:30 PM (5029)

Contextual Cueing and Memory for Scenes: Eye Movements Dissociate Conscious From Unconscious Memory. MICHELLE M. RAMEY, ANDREW P. YONELINAS and JOHN M. HENDERSON, *University of California, Davis* — There is growing evidence that memory can impact visual attention by altering how our eyes extract information from scenes. However, because memory has previously only been assessed using dichotomous measurement contrasts such as recognized/unrecognized, it is not known whether these memory-based attentional guidance effects reflect conscious forms of memory such as recollection, strength-based familiarity effects, or unconscious forms of memory such as visual implicit memory. To address this issue, we presented participants with photographs of scenes and asked them to search for embedded search targets over repeated presentations. In addition, we assessed memory for each scene using confidence-based receiver operating characteristics methods. We found that eye movements during search were influenced both by conscious recollection and unconscious memory for earlier repetitions. In contrast, we found no evidence for the effects of familiarity-based memory on attentional guidance. The results indicate that eye movements reveal evidence for both conscious and unconscious memories.

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6:00-7:30 PM (5030)

Visual Working Memory Supports Perceptual Stability Across Saccadic Eye Movements. DEBORAH A. CRONIN and DAVID E. IRWIN, *University of Illinois* — To create a stable perception of the visual world we must compensate for changes in visual input caused by eye movements. Some theories propose that perceptual stability relies on object correspondence across saccades, perhaps limited to the saccade target alone. According to these views, the visual system encodes features of the saccade target object into visual working memory (VWM) before a saccade is made. After the saccade, participants attempt to locate those features within a small region near the fovea. If this locating process succeeds, perceptual stability is maintained. The present study investigated directly whether perceptual stability does indeed rely on VWM. If it does, then perceived stability should be impaired when VWM is loaded with other visual information. Participants detected saccade target displacements while simultaneously maintaining a VWM or articulatory working memory load (AWM). In two experiments, a VWM load negatively impacted participants' ability to detect saccade target displacements and the saccade target displacement task negatively impacted memory for VWM task items. Neither of these effects were apparent when AWM was loaded, indicating that perceptual stability relies on VWM resources.

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6:00-7:30 PM (5031)

The Interaction Between Explicitly Cued and Experience-Dependent Distractor Rejection in Visual Attention. BRAD T. STILWELL and SHAUN P. VECERA, *University of Iowa* (Sponsored by Shaun Vecera) — How does visual attention learn to reject nontarget distractors? Does the system do so

using explicitly provided cues? Or, can the system learn to reject distractors through experience? In visual search, attention is initially distracted by a feature that is explicitly instructed to ignore (the “White bear effect”). But, given sufficient practice, attention learns to reject the distracting feature; target identification becomes more efficient when the distracting feature is *present* than when it is absent (Cunningham & Egeth, 2016). Beyond cued distractor rejection, attention also rejects distractors without explicit cues, as in uncued, learned distractor rejection (Cosman & Vecera, 2014; Vatterott & Vecera, 2012). Do explicit cues and uncued learning interact during distractor rejection? In three experiments, we replicate the “White bear effect,” demonstrate uncued, learned distractor rejection, and examine the interaction between explicitly provided cues and uncued learning on distractor rejection.

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6:00-7:30 PM (5032)

Low-Prevalence Target Identification Depletes Attentional Resources. JUAN D. GUEVARA PINTO and MEGAN H. PAPESH, *Louisiana State University* (Sponsored by Michael Hout) — Relative to frequent targets, rare targets are commonly missed in visual search. The Multi-Decision Model (Wolfe & Van Wert, 2010) accounts for miss rates via two dissociable mechanisms: A quitting threshold may be reached before observers view the target, or a conservative shift in the target-identification criterion prevents observers from appreciating the item's status as a target. This study tested the latter prediction, that low-prevalence increases the target-identification criterion, by measuring the magnitude of the attentional blink (AB) following rare versus frequent targets. The AB occurs when sustained processing of one target causes processing interference for a temporally-close second target. If low-prevalence targets have a conservative identification criterion, and require additional resources to be identified as targets, then processing should be prolonged, depleting resources available for subsequent items. Results confirmed this prediction: Low-prevalence targets produced a stronger AB, relative to high-prevalence targets, suggesting that their target-identification criterion had increased.

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6:00-7:30 PM (5033)

Repeated Target Search: Does the Nature of the Target Determine the Rate of Transfer Into Long-Term Memory? LAUREN H. WILLIAMS, TRAFTON DREW and CHRISTOPHER JONES, *University of Utah* (Sponsored by Trafton Drew) — In visual search, attention is directed to target-relevant features through representations of the target held in working memory (WM). Using an electrophysiological correlate of WM, the Contralateral Delay Activity (CDA), Carlisle and colleagues (2011) discovered that these templates are rapidly transferred to long-term memory (LTM) with target repetition. However, it is unclear how the nature of the target influences the rate of transfer into LTM. In our study, we predicted that real world objects would transfer more rapidly into LTM than artificial stimuli (Landolt Cs) because real world objects have existing semantic associations in LTM.



On each trial, a lateralized target was presented. After a delay, participants were asked to indicate if the target was present in the search array of items from the same category. The trials were binned into early (1-2), middle (3-4), and late (5-6) repetitions. Overall, the amplitude of the CDA did not differ between objects and Landolt Cs for early repetitions. However, target repetition led to a greater reduction in CDA and a larger increase in accuracy for real world objects. This suggests that templates for meaningful objects are transferred to LTM more quickly than artificial stimuli.

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6:00-7:30 PM (5034)

Use the Force: Passive Strategies in Hybrid Visual Search Impact Eye Movements and Improve Search Efficiency. JESSICA MADRID and MICHAEL C. HOUT, *New Mexico State University* (Sponsored by Michael Hout) — Hybrid search requires observers to search through visual displays and the contents of memory to find targets hidden among distractors. Although previous research has shown that observers are able to search for many items at once with relative ease, the attentional mechanisms driving hybrid search remain unclear. Our study investigated what types of strategies observers naturally adopt, and what that can tell us about attentional deployment during hybrid search. In Experiment 1, we compared behavioral responses in uninstructed, “passive,” and “active” hybrid search. Results indicated that uninstructed search was naturally active, but adopting a passive strategy led to more efficient performance. In Experiment 2, we found that oculomotor behavior during passive search was characterized by longer saccades, improved attentional guidance, and an improved ability to identify items as targets or distractors. Together, our results indicate that engaging in passive search causes observers to process information in an efficient, global manner.

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6:00-7:30 PM (5035)

Individual Differences Predict Low Prevalence Search Performance. CHAD PELTIER and MARK W. BECKER, *Michigan State University* (Sponsored by Mark Becker) — Critical real-world visual search tasks such as radiology and baggage screening rely on the detection of rare targets. When targets are rare, observers search for a relatively short amount of time and have a high miss rate, a pattern of results known as the low prevalence effect. Experimental attempts to improve the search for rare targets have been relatively unsuccessful. However, an individual differences approach found that those with higher working memory capacity (WMC) were better at finding rare targets. We build on the individual differences approach to predict performance in a realistic baggage screening task. We measured individuals’ high prevalence search performance, WMC, vigilance, attentional control, and big five personality traits to account for 52% of the variance in low prevalence search performance. Our results suggest a small battery of tasks can identify observers who are likely to perform well in low prevalence search tasks.

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6:00-7:30 PM (5036)

Visual Search in Naturalistic Scenes From Foveal to Peripheral Vision: A Comparison of Static and Dynamic Displays. TERESA CANAS-BAJO, *University of Edinburgh*, LESLEY M. DEAS, *York University*, TIM J. SMITH, *Birkbeck, University of London*, ANTJE NUTHMANN, *University of Edinburgh*, (Sponsored by Carlos Gomez-Ariza) — How important foveal, parafoveal, and peripheral vision are, depends on the task. For object search in static images of real-world scenes, peripheral vision is crucial for efficient search guidance, whereas foveal vision is surprisingly unimportant. Extending this research, we investigated search in dynamic scenes (Experiment 1) and directly compared dynamic and static scenes (Experiments 2 and 3). Each scene contained a target that was not contextually relevant and did not move. Given the sensitivity of the visual periphery to motion, we hypothesized that search for a static target should be facilitated for dynamic as compared to static scenes when only peripheral vision was available. This was not the case. More generally, search accuracies and search times did not reliably and consistently differ for dynamic and static scenes in any of the conditions tested. Notably, foveal vision was not necessary to attain normal search performance in either static or dynamic scenes.

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6:00-7:30 PM (5037)

Solving the Complexity of Object Occlusions in Scenes: The Grouping of Adjacent Surfaces and Non-Adjacent but Connected Surfaces. DEBARSHI DATTA and HOWARD HOCK, *Florida Atlantic University* (Sponsored by Reed Hunt) — A recently developed *dynamic grouping* (DG) methodology determines whether pairs of adjacent surfaces are grouped together (Hock & Nichols, 2012). The grouping of adjacent surfaces, which depends on their affinity state, is indicated by the direction of perceived motion across one surface when its luminance is perturbed, a DG also can occur for nonadjacent surfaces, providing they are linked in two-dimensions by a connecting surface. DG motion is created by decreasing the central horizontal surface’s luminance, decreasing its similarity with the flanking horizontal surfaces. The perception of DG motion toward the flanking horizontal surfaces indicated that the central horizontal surface was grouped with the *nonadjacent, but connected* flanking horizontal surfaces. Preliminary evidence indicates that the DG motion is stronger when the nonadjacent but connected horizontal surfaces are aligned, and the connecting surfaces function as occluders, consistent with *amodal completion* requiring the perceptual grouping of nonadjacent surfaces behind an occluding surface.

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CONTROLLED PROCESSING II

6:00-7:30 PM (5038)

Modeling Language Through Multiplex Network Representations. NICOLE M. BECKAGE, *University of Kansas*, MASSIMO STELLA, *University of Southampton* — In human language, relationships among words are known to influence the way individuals retrieve, identify and even learn



words. While this motivates a network representation, current approaches cannot capture multi-relational similarities among words. We overcome this by representing the mental lexicon as a multiplex lexical network, encompassing semantic, taxonomic and phonological similarities. We adopt this framework for quantifying how the lexicon structure influences language and cognition. In toddlers we find that the multiplex topology is capable of capturing emergent lexicon structure as it is fundamentally more powerful than individual layers or word frequency in predicting the ordering with which words are acquired. In adults, the multiplex approach allows to identify a core of words favoring mental navigation and making the lexicon robust to progressive word failure (as in cognitive disorders). These results show that a multiplex representation is useful in capturing psycholinguistic effects of relevance for explaining language learning and use.

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6:00-7:30 PM (5039)

Individual Differences in Cognitive Resources Modulate the Timing of the Second Language Impact on the Native Language. MONA ROXANA BOTEZATU, *University of Missouri, Columbia*, JUDITH F. KROLL, *University of California, Riverside* — We evaluated the impact of second language (L2-Spanish) proficiency on visual word recognition in the first language (L1-English). Classroom English learners of Spanish (N=24) and English monolingual controls (N=24) named 240 English words varying in spelling-sound regularity/consistency: regular-consistent (e.g., DISH) versus irregular-inconsistent (e.g., DEAF) and lexical frequency (high versus low). Participants exhibited the standard inhibitory effects of irregularity/inconsistency and low lexical frequency, but no regularity-by-frequency interaction. Naming latencies and the magnitude of the regularity/consistency effect decreased when learners' L2 proficiency was higher, although the learner and monolingual groups did not differ in overall performance. Critically, the magnitude of the regularity/consistency effect was reduced early in L2 learning in individuals with poorer cognitive resources, but in the later stages of L2 learning in individuals with better cognitive resources. Our results indicate that the timing of the L2 impact on the L1 is modulated by individual differences in cognitive resources.

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6:00-7:30 PM (5040)

Motor Memory: Revealing Conditioned Action Tendencies to Trained Response Cues Using TMS. DOMINIC M.D. TRAN, JUSTIN A. HARRIS, IRINA M. HARRIS and EVAN J. LIVESEY, *University of Sydney* — Action tendencies can be elicited by stimuli with motivational salience or objects that support “utilization behaviours”. We used transcranial magnetic stimulation (TMS) to investigate action tendencies elicited by well-trained response cues. Participants were presented with a continuous letter stream and instructed to respond to two targets using two different response keys. Following this training, the target letters were embedded within a new task and TMS was applied to the motor cortex; motor evoked potentials were

measured in the contralateral hand as an index of corticospinal excitability. We found that action tendencies, in the form of increased corticospinal excitability, were elicited by response cues trained within a single experimental session, and successful control over these tendencies was accompanied by motor suppression. The results provide a model for understanding the relationship between the provocation of action tendencies by well-trained response cues, and the implementation of cognitive control to override such tendencies.

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6:00-7:30 PM (5041)

Process Dissociation in Experimental Paradigms: The Influence of Executive Control in the Implicit Association Test. FRANZISKA MEISSNER, *University of Jena* — Response time based measurement procedures of psychological processes are rarely process-pure. Executive functions, for instance, influence performance in a variety of procedures. In order to prevent false conclusions, contributing processes should be carefully dissociated. One example that illustrates the potential of such an approach is the ReAL Model for the Implicit Association Test (IAT). Although commonly used this way, the IAT is not a process-pure measure of evaluative associations. Studies revealed that IAT scores decrease with increasing levels of task-switching ability. Such confounds distort conclusions about experimental effects on associations, as well the relationship of associations with external criteria. I present two studies revealing that the influence of task-switching ability on IAT scores can be traced back to non-associative processes. By employing the ReAL model, a multinomial model for the IAT, the influence of task-switching ability can be separated from associations. Implications for basic and applied research are discussed.

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6:00-7:30 PM (5042)

Don't Think About It: Examining the Impact of Thought Suppression on Emotionally Valenced Mind Wandering. AUDREY V.B. HOOD, HALEY G. HICKEY, PAUL J. BRANCALEONE and JONATHAN B. BANKS, *Nova Southeastern University* — The emotional valence of mind wandering is a key moderator for its impact on task performance (Banks, Welhaf, Hood, Boals, & Tartar, 2016). The stronger impact of negatively valenced mind wandering on task performance may be due to an increased likelihood to suppress negative thoughts. The current study examined the impact of a writing task designed to induce positive or negative affect and a thought suppression manipulation on sustained attention performance and mind wandering. Sustained attention performance was unaffected by either the affect or suppression manipulations. Regardless of the affect manipulation, participants in the non-suppression conditions reported more probe-caught mind wandering than those in the suppression conditions. Participants in the positive non-suppression condition reported the greatest amount of self-caught mind wandering. Rates of self-caught mind wandering



did not differ between the negative suppression and negative non-suppression conditions. These findings suggest that individuals may naturally suppress negative thoughts.

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6:00-7:30 PM (5043)

Creativity and Differences in Attentional Inhibition vs. Implicit Memory. AUDREY LIU and SHARDA UMANATH, *Claremont McKenna College*, LYNN HASHER, *University of Toronto* — Previous research on creativity and attentional inhibition uses impaired task performance as a measure of distractibility and produce conflicting results. We distinguished between impaired task performance and the amount of distracting information retained, hypothesizing that, while creative individuals demonstrate better implicit memory of distractions, task performance does not decrease. Participants ($N = 82$) read aloud while ignoring distracting words interspersed in passages. The distracting words reappeared as stimuli to be remembered in a subsequent memory task. High-creativity individuals (top 25% Unusual Uses Task scores) demonstrated neither impaired task performance due to distractions compared to low-creativity individuals (bottom 25%) nor better implicit memory for distractions. Instead, creative individuals remembered marginally more words in general, especially among those cued to the connection between the two tasks. This suggests that creativity is associated with general intelligence and cognitive control, while the involvement of a leaky attentional filter should be further investigated.

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6:00-7:30 PM (5044)

Augmented Go/No-Go Task: Cursor Motion Measures for ADHD Diagnosis. ANTON LEONTYEV, STANLEY SUN, MARY WOLFE and TAKASHI YAMAUCHI, *Texas A&M University* — Impulsivity (tendency to act without foresight), a trait affecting many facets of everyday life, is a characteristic of multiple mental disorders such as ADHD. Objective measurement is crucial for accurate diagnosis of impulsivity related disorders. However, cognitive tasks, such as go/No-go or stop-signal tasks, prove to be ineffective in accounting for individual variations in impulsivity-related disorders. We hypothesized that this inability stems from the lack of dynamic assessment of the processes of competing responses. Because impulsivity arises from on-going interactions among motivational (mood and intent), emotional (perceived reward), and cognitive (attention and reasoning) factors, traditional performance measures such as accuracy and response times are infeasible because they record only onset (beginning) and offset (end) points of the dynamic process. To test this hypothesis, we augmented a standard go/No-go test with a dynamic cursor motion measure and compared their predictive utilities. Results revealed that motion features such as maximum acceleration and total distance are highly indicative of individual differences in ADHD measures, while traditional accuracy and response times showed no association.

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6:00-7:30 PM (5045)

Impact of a Working Memory Load on an Established Measure of Attentional Control, the Continuous Performance Task, AX Version. CRISTINA WILSON, JOHN HINSON and PAUL WHITNEY, *Washington State University* (Sponsored by John Hinson) — The ability to maintain goal-relevant information in working memory and use it to allocate resources towards behavior, i.e., top-down attentional control, is essential for many activities. While it has long been recognized that attentional control is subject to motivational influences, only recently have these motivational factors been formally examined. A current perspective holds that operation of attentional control is akin to a series of ongoing decisions. Each of these decisions arises from cost-benefit analysis aimed at maximizing expected utility, where costs are the resources required for control and benefits are the payoffs associated with the behavioral goal. Here we explore this perspective by introducing a working memory load in an established measure of attentional control, the Continuous Performance Task, AX version. Because increased working memory load should reduce available resources and thereby increase costs of top-down control, we expected reduced use of top-down control when load was increased. Instead, we found participants continued to use top-down control under increased working memory load, but the effectiveness of control was reduced.

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6:00-7:30 PM (5046)

Control by Association: Transfer of Implicitly Primed Attentional States Across Linked Stimuli. CHRISTINA BEJJANI and TOBIAS EGNER, *Duke University* (Sponsored by Tobias Egner) — Recent studies show that people can learn to link particular stimuli with specific cognitive control-states (e.g., high attentional selectivity). Here, we tested whether such learned stimulus-control associations can transfer across related stimuli. In study phase 1, specific face or house images repeatedly preceded the presentation of particular scene stimuli, thus creating paired face/house-scene associates in memory. Phase 2 associated these scenes with different control-states by probabilistically biasing specific scenes to mostly precede either congruent or incongruent trials in a Stroop task. Finally, in phase 3, the faces and houses from phase 1 preceded Stroop trials but were not predictive of congruency, thus testing whether stimulus-control associations would transfer from scenes to their associated face/house stimuli. We found that participants implicitly learned to associate stimuli with control-states and that these associations transferred to related stimuli. This work establishes a novel learning mechanism supporting the generalization of cognitive control.

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6:00-7:30 PM (5047)

Idemotor Stimuli Lead to Partial Repetition Costs in Action Planning. JAMES R. MILLER and LISA R. FOURNIER, *Washington State University* (Sponsored by Lisa Fournier) — When carrying out complex actions, it is often necessary to retain one action plan in order to execute another. The conditions in which overlap between a retained and interrupting action



causes a delay (partial repetition costs; PRCs) or facilitation (partial repetition benefits; PRBs) in executing the interrupting action are not understood. We investigated whether PRBs occur for ideomotor compatible stimuli (ICS), and whether PRBs vary with the degree of ideomotor compatibility. Participants viewed two visual stimuli in sequence. They retained an action plan to the first stimulus while executing a speeded response to the second (interruption); afterwards they executed the response to the first stimulus. Results showed PRCs for ICS and non-ICS, with larger PRCs for stimuli with greater ideomotor compatibility. Thus, ICS, assumed to activate responses automatically, do not lead to PRBs. We suggest that ICS may more strongly activate action representations based on stimulus categorization (although not necessarily automatically) vs. non-ICS.

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6:00-7:30 PM (5048)

Modality Compatibility in Voluntary Task Switching. EDINA FINTOR, *RWTH Aachen University*, EDITA POLJAC, *University of Freiburg*, DENISE N. STEPHAN and IRING KOCH, *RWTH Aachen University* (Sponsored by Denise Stephan) — The term modality compatibility refers to the similarity between stimulus modality and the modality of response-related sensory consequences. Previous results showed larger switch costs when participants switched between modality incompatible tasks (auditory-manual; visual-vocal) compared to modality compatible tasks (auditory-vocal; visual-manual). In the present study using a voluntary task switching paradigm, participants chose the response modality (vocal or manual) to indicate the location of either a visual or auditory stimulus. We examined whether participants show not only a modality repetition bias, but also a bias to establish modality compatibility. The choice probability analysis indicated that participants tend to choose the response modality which is compatible to the stimulus modality. More interestingly, even though participants freely chose the response modality, modality compatibility still influenced switch costs. The results that modality compatibility influenced choice behaviour suggest top-down processes on the effect of modality compatibility in switch costs.

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6:00-7:30 PM (5049)

Anticipatory Control Mechanisms in Social Gaze Interaction. EVA RIECHELMANN, ANNE BÖCKLER, TIM RAETTIG and LYNN HUESTEGGE, *University of Würzburg* (Sponsored by Lynn Huestegge) — Social interaction is probably the most powerful domain of investigating environmental effects of gaze behavior. While previous research on social gaze interaction predominantly focused on effects of perceived gaze, the present study examined how we anticipate other people's gaze responses to our own gaze behavior. Using eye-tracking techniques, we investigated the impact of effect anticipation on oculomotor control with social (faces that respond to the participant's gaze with either direct or averted gaze) and non-social effect stimuli. Specifically, we employed congruency manipulations to prime or interfere with any anticipated representation of

the subsequent effect. We observed congruency effects for both social and non-social effects, indicating that anticipations of our gaze behavior's effects generally affected oculomotor control. These results suggest that ideomotor control principles generalize to the oculomotor domain in both social and non-social environments, and emphasize the previously neglected role of anticipatory processes in social gaze interaction.

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6:00-7:30 PM (5050)

How False Alibis Change Dishonest Processing. ANNA FOERSTER, ROBERT WIRTH, OLIVER HERBORT, WILFRIED KUNDE and ROLAND PFISTER, *University of Würzburg* (Sponsored by Oliver Herbolt) — At the heart of dishonest responding lies the inhibition of an automatic tendency to respond truthfully. This effortful inhibition of an initially activated response deteriorates performance even for dishonest responding to simple yes/no questions. Providing a false alibi, however, reverses this picture: Responses in correspondence with false alibi actions are generated spontaneously and efficiently. The current experiments targeted the cognitive basis of this facilitation. Participants secretly performed mock crime actions and learned about other actions that were allegedly performed by most participants. Half of the participants were to pretend that they performed these new actions instead of the ones they actually performed in a subsequent computer-based inquiry. Distractors, i.e., yes and no, appeared alongside each question in the inquiry and were either compatible with the honest or the dishonest yes/no response. Without a false alibi at hand, honest distractors facilitated dishonest responding because they match the initial honest response activation. With a false alibi at hand, by contrast, there was no such facilitation. These findings indicate that explicit false alibis indeed affect automatic retrieval.

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6:00-7:30 PM (5051)

The Effect of Sleep Deprivation on Placekeeping Ability. MICHELLE ELIZABETH STEPAN, KIMBERLY M. FENN and ERIK ALTMANN, *Michigan State University* (Sponsored by Kimberly Fenn) — Placekeeping is the ability to perform a task involving multiple sequential steps without repeating or skipping steps. Cognitive control and attentional focus help maintain task-relevant representations necessary for successful placekeeping. Sleep deprivation reduces attention but the extent to which sleep deprivation affects placekeeping ability remains unclear. We tested the effect of 24-hours of sleep deprivation on a placekeeping task, UNRAVEL, in which participants are periodically interrupted and must continue the sequence post-interruption. In the evening, participants completed UNRAVEL and cognitive ability measures and were then randomly assigned to either stay awake in the laboratory overnight or to sleep at home. In the morning, participants again completed UNRAVEL. Compared to participants who slept, sleep deprived participants were slower and made more errors following an interruption. Cognitive ability predicted performance for



participants who slept but was not predictive of performance following sleep deprivation. Thus, sleep deprivation negatively, but unpredictably, affects placekeeping ability.

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6:00-7:30 PM (5052)

Speed-Accuracy Tradeoff and its Relationship to Higher-Order Cognition. CHRISTOPHER DRAHEIM and RANDALL W. ENGLE, *Georgia Institute of Technology* (Sponsored by Frank Durso) — It is a simple idea that there is an adversarial relationship between how quickly one performs an action and how well that action is performed. This phenomenon, known as the speed-accuracy tradeoff (SAT), has received some attention in the literature, most notably with modeling work dating back to the 1960's. However, individual differences in the ability to adjust speed and accuracy to meet task demands has not been systematically studied. We address this gap by implementing tasks of changing demands within a large-scale correlational study ($N = 351$). Results from this study coupled with data from flanker and task-switching paradigms in our lab's previous studies provide preliminary evidence for the hypothesis that two factors are critical in determining which subjects can, and will, adjust performance to meet task demands. The first is the difficulty level of the task, and the second is the presence or absence of feedback. In the presence of feedback and low-to-moderate difficulty, low ability individuals make similar adjustments to performance than high ability individuals. As the task gets harder and/or feedback is not provided, high ability subjects make adjustments whereas low ability subjects do not.

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REASONING AND JUDGMENT

6:00-7:30 PM (5053)

Connecting Group Dynamics With Individual Socio-Cognitive Function. FRANCESCA CAPOZZI and JELENA RISTIC, *McGill University* — Social dynamics plays an important role in shaping individual social and cognitive styles. Here we present a method for measuring and connecting group dynamics with individual socio-cognitive function. Participants interacted in three-person groups to collectively arrive at the rank of items needed for the group's survival in a dramatic scenario. Their looking behavior was recorded using gaze tracking eyeglasses and a scene-view camera. After the interaction, each participant completed a gaze-cuing procedure, which assessed their gaze following in response to gaze cues displayed by fellow group members. We found that groups interacted cohesively, with members' leadership behaviors modulating the group interaction. This social group dynamic was also found to affect later individual gaze following responses. Together, these methods and data provide one of the first examinations of how group social dynamics affect individual socio-cognitive function.

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6:00-7:30 PM (5054)

Sequentially Increasing, Decreasing, and Low-Fluctuation Prices on Relative Judgments of Value. HIROKI TANABE, *Nagoya University* — This study tested the influence of sequentially increasing, decreasing, and low-fluctuation prices on relative judgments of value. In the experiment, the participants were asked to take part in a game purchasing grains on the computer. In the game, the participants evaluated their satisfaction under a daily sequence of grain prices increasing, decreasing and with low-fluctuation. The results showed a significant effect ($F(1,13) = 228.02, p < .001$), the participants were satisfied more under the decreasing condition compared to the low-fluctuation and increasing conditions ($ps < .001$). This indicated that in the increasing condition, people felt a loss because the reference point was lower than the target price. On the other hand, people felt a gain in the decreasing condition because the reference point was above the target price.

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6:00-7:30 PM (5055)

(Withdrawn)

6:00-7:30 PM (5056)

Revise, Reorder, Restructure: Shared Mechanisms in Language and Creativity. SARAH K. CRAIG and ANDREW F. JAROSZ, *Mississippi State University* — While successful analytic problem solving appears to be characterized by incremental or strategic methods (e.g., heuristics or algorithms), successful creative problem solving is much less predictable and systematic. One task that seems to mirror some of the unique processes underlying creative problem solving (e.g., initial faulty representations, restructuring) is the comprehension of locally ambiguous language, such as garden path sentences (GPS). The present study examined the relationship between comprehending locally ambiguous GPS and solving creative problems. Participants completed multiple creative problem solving tasks, including anagrams and Rebus problems, and a GPS task, during which they made truth-value judgements for ambiguous and unambiguous sentences. Performance on the creative tasks correlated positively with correct interpretations of GPS, but not with unambiguous sentences. Relationships between GPS processing and performance on problems with different restructuring requirements will also be discussed.

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6:00-7:30 PM (5057)

The Description-Experience Gap Persists in Multi-Attribute Choice. GREGORY J. KOOP, *Eastern Mennonite University*, JOSEPH G. JOHNSON, *Miami University*, TYLER D. DENLINGER, *Eastern Mennonite University* — Over the last 15 years, studies have consistently demonstrated that choice behavior changes as a function of how individuals learn about potential outcomes. For example, people tend to be more sensitive to rare outcomes when outcomes and probabilities are described in a standard gamble format than when those same gambles are learned through *experience*. Work exploring this decision-experience gap has centered on simple gamble-based paradigms. The present work compares decisions from



description and experience in a more complex multi-attribute setting. Participants completed a fantasy-football task in which the goal was to select the quarterback that would earn the most points. Points were based on three attributes: passing yardage, number of touchdowns, and number of interceptions. Results suggest that multi-attribute choice consistently differs between description and experience conditions, and that participants are less sensitive to outcome variability in experience conditions. Email: Gregory J. Koop, gregory.koop@emu.edu

6:00-7:30 PM (5058)

Metacognitive Monitoring in Insight Problem Solving. SACHIKO KIYOKAWA, *Nagoya University* — Previous studies have shown that people cannot monitor progress accurately in insight problem solving. Accordingly, some researchers suggest that implicit processes underlie insight problem solving. We investigated the property of metacognitive monitoring in insight problem solving using a geometric puzzle, T puzzle. Thirty-eight undergraduates were asked to solve the T puzzle on a display within 20 minutes and rate how close they were to the goal state (i.e., warmth rating) every minute. Based on the performance of whether they solved the problem within the time limit, the participants were divided into two groups: solved and unsolved. Only the last warmth rating in the solved group was higher than that in the unsolved group. This implies that people only know that they are approaching the goal at the last moment. We interpreted that insight problem solving progresses implicitly and cannot be accessed by metacognition. Email: Sachiko Kiyokawa, kiyokawa.sachiko@b.mbox.nagoya-u.ac.jp

6:00-7:30 PM (5059)

Spatial Representation in Nonverbal Transitive Inference: An Individual Differences Approach. OLGA LAZAREVA, HALEY DIKKERS, NORA BALBOA, COURTNEY KALENDER, RIDDHI SONI, LAURA CLAYDON and ABIGAIL NORDMAN, *Drake University* — Transitive inference (TI) is a form of deductive reasoning which allows one to derive a relation between items. Spatial models suggest that TI is based on mental representation of spatial order among the training stimuli. We therefore hypothesized that the individual differences in TI performance may positively correlate with measures of spatial ability. In two experiments, the participants received a standard 6-item TI task, a postexperimental awareness questionnaire, three tests of spatial ability, a deductive reasoning test, or a general intelligence test. We found modest correlations between training TI performance and some of the measures of spatial ability, as well as a measure of general intelligence. However, none of the measures predicted accuracy to the testing pairs. Our results suggest that the ability to learn the overlapping pairs of training stimuli may be associated with spatial ability; however, other factors are necessary to explain individual variability in TI test performance. Email: Olga Lazareva, olga.lazareva@drake.edu

6:00-7:30 PM (5060)

The Effect of Red on Performance in an Achievement Task: Third Failure to Replicate. KENNETH M. STEELE, NICK SABLAN, JORDAN MITCHELL, AMANDA NOVACHEK, JENNIFER RETARIDES, ALEX STOWE and LIZ KUNKEL, *Appalachian State University* — Elliot et al. (2007, *JEP:G*) hypothesized that exposure to the color red would impair performance in an achievement task. They reported that a brief exposure to the color red reduced the number of correctly-solved anagrams. Steele et al. (2015, 2016) were unable to replicate the result with reds modeled on the Elliot et al. color values. The purpose of the current experiment was to investigate a change in anagrams. Participants ($N = 386$) were asked to solve as many 5-letter anagrams as possible in a 5-min period; briefly exposed to either red, green, or gray; and then asked to solve as many anagrams as possible in a second 5-min period. Switching to new anagrams did not produce the red effect. Pre-color-exposure anagram performance predicted post-color performance but there was no difference among the color conditions on post-color anagram performance. The results suggest the original effect may not be reliable. Email: Kenneth M. Steele, steelek@appstate.edu

6:00-7:30 PM (5061)

Evidence of Tactical Deception in Monkeys. JULIE J. NEIWORTH, *Carleton College*, SIJIN CATHY CHEN, *University of Minnesota* — Tactical deception is an important cognitive and social behavior that seems unique to humans. A stage above biological deception like camouflage, tactical deception requires some level of social consideration and cognition. The study was designed to determine if cotton top tamarins could deceive, either demonstrated as misinforming or withholding information from an opponent in a simple choice task. This study modified the “mean monkey” paradigm (Peskin, 1992) and introduced two social opponents (tamarin cagemate vs. human). Consistent with Schmelz and Call’s proposal (2015), this study integrates competitive and cooperative tasks to uncover behavior toward the opponent and the underlying motive. Tamarins responded more competitively toward human opponents to deceive them than they did toward their cagemates. Tamarins also chose not to participate based on their likelihood of getting rewards. Current studies examine this behavior in toddlers and college students. Email: Julie Neiworth, jneiwort@carleton.edu

6:00-7:30 PM (5062)

The Role of Memory in the Continued Influence of Isolated Information. PATRICK R. RICH, *University of Mary Washington*, ARTHUR CHANG, *Haverford College* — Corrections are any information intended to outdate and update inaccurate prior knowledge. The effectiveness of such corrections depends both on how much they reduce reliance on prior knowledge and how much reliance remains (i.e., *the continued influence effect*). In the current study, we investigated these effects on memory for isolated pieces of information and opinions based on that information. Participants read 12 one-sentence reports describing negative actions of fictitious businesses. They then read a single follow-up report for each



business, some repeated the initial information, some corrected the initial information, and the remaining provided only neutral information. Participants then rated their opinions of each business and reported what they recalled from the original reports. Results supported prior studies indicating that corrections reduce but do not eliminate opinions formed based on misinformation. Furthermore, both accurate and inaccurate memories for the content of these reports predicted opinions about the fictitious businesses.

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6:00-7:30 PM (5063)

Predicting the Unpredictable: The Illusion of Improved Decision-Making Over Time. MEGHAN M. SALOMON-AMEND, *Northwestern University* (Sponsored by Lance Rips) — Outcomes of events like coin flips (50%) and die rolls (17%) are random: Successfully predicting those outcomes could only be at the level of chance. Here, participants engaged in predicting such outcomes. Even after explicit reminders of the uncertainty of the events, however, participants preferred to guess each outcome, rather than choosing a single, constant outcome beforehand ($t(100)=4.52$, $p=.001$) and believed the accuracy of their guesses would exceed both others' guesses ($t(453)=3.155$, $p=.002$) and random chance ($t(754)=28.55$, $p=.001$). Further, they believed their accuracy would improve after engaging in the task over the course of a week ($t(90)=1.974$, $p=.05$). These two notions—a false sense of agency and an illusion of improvement over time—hint that this overconfidence isn't driven by optimism alone, but rather by a biased belief that our predictive abilities (even for random, unpredictable events) are under our control.

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6:00-7:30 PM (5064)

Opt-In for Ignorance: Measuring Avoidance of Health, Finance, and Social Information. DAVID HAGMANN and GEORGE LOEWENSTEIN, *Carnegie Mellon University* (Sponsored by David Budescu) — Traditional models of decision making predict that, absent strategic reasons, people should seek out, and never avoid, valid information. Yet a growing body of literature (see Golman, Hagmann and Loewenstein, 2017, for a review) shows an empirical preference for just the opposite: Avoidance of information is prevalent in a variety of contexts, even when such information is instrumental to better decision-making. We develop a low-cost method of profiling such information avoiders with an 11-question Information Avoidance Scale covering three domains: consumer finance, health, and social interactions. In a series of studies, we show that the scale can reliably elicit information preferences, theoretically distinguish between other relevant psychological phenomena, and predict likelihood of seeking or avoiding domain-specific information. We conclude with the implications to use this tool to predict preferences for highly consequential information such as likelihood of obtaining credit scores or tests for potential genetic disorders.

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6:00-7:30 PM (5065)

(Not) Thinking About Distributions: Review-Rating Distributions Affect People's Product Choices, Independent of the Mean. MARK LACOUR and MICHAEL SERRA, *Texas Tech University* (Sponsored by Michael Serra) — People often consult reviews when making decisions such as whether to purchase a product. In three experiments, we examined how the distribution of such reviews (e.g., a bimodal vs. unimodal distribution of ratings) affects people's preferences for products. To investigate this, we used Amazon.com-inspired displays of user reviews, which allowed us to vary the distribution of star ratings while holding means constant. First, displaying only the distribution, only the mean, or both did not influence people's product preferences. Second, under forced choice, participants preferred skewed distributions for high-mean products but symmetrical distributions for low-mean products. Third, when we included products with risky bimodal distributions of ratings, participants still preferred skewed distributions for high-mean products but preferred bimodal distributions for low-mean products. Finally, information-seeking behaviors indicate that some third variable—perhaps individual differences in numeracy—influences participants' preferences for seeking additional information about high-star reviews relative to low-star reviews.

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6:00-7:30 PM (5066)

How Incommensurability Explains Multi-Attribute Decision Making. ALEX COOKE and PETKO KUSEV, *Huddersfield Business School*, PAUL VAN SCHAİK, *Teesside University* (Sponsored by James Hampton) — Incommensurability implies that items are distinct and separate and cannot be compared without damaging the representation of both items (Sankey, 1991). Incommensurability can affect how decision makers evaluate (Slovic & MacPhillamy, 1974) and compare decision options (Cooke, Kusev & Van Schaik, manuscript draft; Vlaev, 2011). Specifically, it has been argued that decision makers cannot make accurate comparisons between incommensurable attributes (Vlaev, 2011). The study examined the proposal that the commensurability of attributes would affect the degree to which attributes can be compared. This was examined in relation to two contextual effects (decoy effect [Huber, Puto, & Payne, 1982] and compromise effect [Simonson, 1989]). We found that an increase in incommensurability leads to a reduction of attribute comparisons. Accordingly, introducing an incommensurable but comparable decoy option to the set of options produced a decline in the decoy effect. Moreover, an incommensurable but comparable compromise option reduced the compromise effect (Simonson, 1989).

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6:00-7:30 PM (5067)

Cognitive Bias in Criminal Justice: Essentialist Belief Predicts Guilt Judgment and Sentencing Decisions. YIAN XU, DARRELL PENTA, MACKENZIE DOWD and JOHN D. COLEY, *Northeastern University* (Sponsored by Nancy Kim) — The rational application of law is not the only factor that actually informs legal decisions. Much literature has



documented cognitive biases in legal decision-making, such as confirmation bias, anchoring error, representativeness bias and so forth. However, no prior study has examined how psychological essentialism— a cognitive framework that people endorse to intuitively reason about concepts— influences legal decision-making. The current research combines established theories and methods in cognitive psychology with practical concerns in criminal justice. Particularly, it aims to investigate how essentialist beliefs, or the tendency to perceive crimes as naturally defined, caused by an underlying essence, historically invariant and culturally universal, affects guilt judgment and sentencing decisions. Our preliminary data with undergraduate students (N=102) shows that, as we predicted, essentialist belief plays an additional role in affecting guilt judgment ($\beta=.111$, $p=.014$) and sentencing decision ($\beta=.131$, $p=.001$), in a multiple regression model that controls other factors (malicious intention, violence used, and detrimental consequence) across crime vignettes.

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6:00-7:30 PM (5068)

“Better be the Head of a Dog Than the Tail of a Lion”: Is That So? The Case of Chess Tournaments in Israel. URI ZAK, YAAKOV KAREEV and JUDITH AVRAHAMI, *The Hebrew University of Jerusalem* (Sponsored by Judith Avrahami) — People often have a choice between joining a more or less prestigious competition, knowing that their relative position would be lower in the former than in the latter. We examine, empirically, such choices and their implications in an official dataset of 9917 observations from 432 events. We study 2075 decisions made by medium-ranking Israeli chess players who were in a position to choose between a main and a secondary tournament. Regarding determiners of choice, the relatively high-rated players were more likely to choose the main tournament in spite of their reduced chances of winning a prize. Additionally, more players chose the main tournament in a classic than a rapid time control, although their chances of winning are lower in the former due to diminished randomness of results in such time control. Most importantly, after controlling for chess ratings and opponents' level (as well as for age, gender, and experience), we find that players who had chosen the main tournament performed 14% lower than those who had chosen the secondary tournament. The surprising result is in line with the advice: “Better be the head of a dog than the tail of a lion”.

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6:00-7:30 PM (5069)

Aligning the Decisions Made by Forensic Examiners With the Values of Society. WILLA MANNERING, MACGREGOR VOGELSANG and THOMAS A. BUSEY, *Indiana University, Bloomington* (Sponsored by Thomas Busey) — The goal of this study is to determine if society's moral values align with the current bias towards erroneous exclusion decisions over erroneous identification decisions found in latent print examinations. Subjects of this experiment were asked to manipulate a web-based visualization that reflects the tradeoffs between putting guilty people in jail and keeping innocent

people out of jail. According to the results of this study, examiners seem to have a much more liberal exclusion criterion than they actually do in casework, and the public seems willing to tolerate a higher amount of erroneous identifications in exchange for a lower erroneous exclusion rate based on their average criteria placement in the visualization. The results of this study will help examiners align their responses to those of society, and help all citizens understand the tradeoffs that can occur with shifting decision criteria.

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6:00-7:30 PM (5070)

Avoiding the Bias Blind Spot: Skilled Decision Makers are Less Biased and Know it. VINCENT T. YBARRA, MADHURI RAMASUBRAMANIAN, JINAN N. ALLAN and EDWARD T. COKELY, *University of Oklahoma* (Sponsored by Edward Cokely) — Research indicates that many people, including skilled decision makers, tend to judge themselves as less biased than others. While some suggest this reveals rampant overconfidence, skilled decision makers are in fact less biased than others in general and thus should report being less biased (Cokely et al., 2012; Ghazal et al. 2014; see RiskLiteracy.org). In a series of two studies using more comprehensive materials and analyses, we find more evidence of a curvilinear relation between overconfidence and general decision making skill, as measured by Berlin Numeracy Tests and decision task performance. Results indicate that low skilled individuals tend to be very overconfident (e.g., unskilled but unaware) whereas highly-skilled individuals express relatively little overconfidence (e.g. exhibited and reported less bias). In accord with Skilled Decision Theory, results suggest that skilled decision makers are generally less vulnerable to common decision biases including the bias blind spot.

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COGNITIVE PROCESSES

6:00-7:30 PM (5071)

There is More to Mental Paper Folding Than Spatial Visualization. ALEKSANDRA KASZOWSKA and HEATHER BURTE, *Tufts University*, ALLYSON HUTTON, *Think3d!*, HOLLY A. TAYLOR, *Tufts University* — The Paper Folding test (PFT; Ekstrom, French, Harman, & Dermen, 1976) has been used as an assessment of spatial visualization, or the ability to mentally manipulate 2- and 3-dimensional figures. Participants are asked to mentally simulate folding a piece of paper and punching a hole through it, and identify resulting hole arrangement in one of five possible answer choices. However, little is known about the strategies individuals actually use to solve the test problems. We invited 64 participants to complete an abbreviated version of the original PFT while having their eye movements recorded, followed by a retrospective think aloud (participants explained their approaches) and additional spatial skill assessments. We identify both overt and covert problem solving strategies underlying performance on the



PFT, and demonstrate that strategy choice is partially related to problem complexity. As not all strategies relied on spatial ability, we discuss alternative approaches to the PFT.

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6:00-7:30 PM (5072)

Mobility for Spatial Cognition and Navigation: Developing and Validating a Self-Report Scale to Characterize Travel Patterns. IAN T. RUGINSKI, ERICA BARHORST-CATES, ELIZABETH A. CASHDAN, SARAH H. CREEM-REGEHR and JEANINE K. STEFANUCCI, *University of Utah* — Individuals higher in mobility (more frequent travel over farther distances) navigate more effectively (Gagnon et al., 2015; Padilla et al., 2017). Given the relatively simplistic measure of mobility used in these studies and that mobility is often overlooked as a factor in models of individual differences in spatial cognition, there is a need for a more precise scale of mobility to characterize travel patterns. We used exploratory factor analysis to establish a factor structure of motivations for and attitudes about travel that contribute to mobility. This resulted in three factors—navigational skill, wanderlust, and navigation anxiety—validated by a confirmatory factor analysis. Importantly, navigation skill and wanderlust positively correlated with measures of travel frequency. Results are related to established self-report scales and ongoing work with spatial cognition task-performance. This study reflects a first step in establishing construct validity for mobility as a contributing factor to individual differences in spatial abilities.

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6:00-7:30 PM (5073)

Spatial Bias in Representational Drawing of a Symmetrical Figure: Does Reading/Writing Direction Matter? JYOTSNA VAID, OMAR GARCIA and NAFISEH FAGHIHI RENANI, *Texas A&M University* (Sponsored by Jyotsna Vaid) — Object facing biases in representational drawing have been typically attributed to functional hemispheric asymmetries, but may also – or simply – reflect biomechanical factors (e.g., handedness and/or reading/writing direction). A recent study argued for a cerebral hemisphere account of a leftward spatial positioning bias in the drawing of a symmetrical figure (a tree), as both French and Arabic right-handed readers drew a tree with the trunk top centered to the left. The present study used a larger sample of LR and RL readers and varied hand used to draw. We found that although both LR and RL groups showed a left-plane orientation bias when drawing with their dominant hand, there was a significant difference in the degree of leftward displacement, with LR right-handed readers showing the strongest bias. These findings extend the scope of spatial biases in representational drawing attributable to script direction.

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6:00-7:30 PM (5074)

Hierarchical Encoding of Faces may be Accentuated for Opposite-Sex Peers. YURI HATTORI, *Nagoya University*, NOBUYUKI WATANABE, *Kanazawa Institute of Technology*, ATSUNOBU SUZUKI, *Nagoya University* — A person's face is perceived as more attractive when presented together with

others' faces than when presented alone. This phenomenon, so-called the cheerleader effect, is attributed to hierarchical encoding, which occurs when an average is computed from a set of faces and the representation of each face is biased toward the average. Given the well-known sex differences in face processing, this study explored the effects of observers' and faces' sex on the cheerleader effect. Participants (41 males and 30 females) rated physical attractiveness of male and female faces. On each trial, a target face was presented alone or with two other same-sex faces. Results showed that the size of the cheerleader effect tended to be larger when observer's and face's sex were different than when they were the same. This suggests that hierarchical encoding of faces may be accentuated for opposite-sex peers.

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6:00-7:30 PM (5075)

Regulation of the Informativeness-Accuracy Trade-off and Pragmatics: An Eye-Tracking Study. BEATRIZ MARTÍN-LUENGO, *NRU Higher School of Economics*, YURY SHTYROV, *Aarhus University*, ANDRIY MYACHYKOV, *Northumbria University* — When questioned about facts they are uncertain about, people vary the specificity of their answers (number of alternatives in one answer; “plurality option”) and their willingness to answer (“report option”: provide or withdraw the answer) depending on the social context. Yet, the underlying decision making process remains unexplored. In the current study, participants answered difficult questions, placed in different social contexts (formal/informal), and provided answers with varying specificity and report options while their eyes movements were monitored. Analysis of the fixation patterns revealed more fixations for single reported answers in a formal context, while there was no such difference for reported answers in an informal context regardless of the informativeness level. Moreover, there was no difference between the fixation patterns in single-report and plural-withheld answers in the formal context suggesting equal consideration of these choices. Overall, our results offer a new perspective on the informativeness-accuracy trade-off in social communication exchanges.

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6:00-7:30 PM (5076)

Reducing Auditory and Visual Distractors in Neurocognitive Concussion Testing. CHRISTOPHER KOCH and KENNEDY HOBERT, *George Fox University* — ImPACT is a commonly used neurocognitive test for concussion assessment. The four domains measured in the test include memory, visual-motor, impulse control, and reaction time. One benefit of the test is that it can be administered in a group setting. However, group settings can lead to greater distraction and poorer performance. This problem may be particularly evident among younger examinees. In this study, four testing conditions were compared using middle school athletes. There was a total of 193 participants (116 males) with a mean age of 12.13 (SD = 2.73). The ImPACT was administered under normal testing conditions (n=50), while wearing noise cancelling headphones (n=47), with dividers creating cubicles (n=62), and with both headphones



and cubicles ($n=34$). There were significant testing effects for verbal memory ($F(3, 189)=3.41, p<.05$), visual memory ($F(3, 189)=14.52, p<.001$), visual-motor ($F(3, 189)=14.52, p<.001$), and reaction time ($F(3, 189)=7.16, p<.001$). Memory and visual-motor scores were lower and reaction times were longer in the headphone condition. These results suggest that the testing environment may have little influence on ImPACT scores, except when attempting to minimize auditory distractions alone.

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6:00-7:30 PM (5077)

Behavioral and Social Research in the National Institute on Aging. DANA PLUDE, *National Institutes of Health* — The Division of Behavioral and Social Research (BSR) supports research and training on the processes of aging at both the individual and societal level and across disciplinary boundaries. BSR has two interactive branches. The Individual Behavioral Processes Branch supports research on biopsychosocial processes linking health and behavior, emotional and cognitive functioning, human factors, and integrative approaches to the study of social, psychological, genetic, and physiological influences on health and well-being over the life course. Examples include studies of cognition, emotion, social relationships, social cognition, personality, motivation, self-regulation, stress/resilience and cognitive intervention. The Population and Social Processes Branch supports research and research training on the causes and consequences of changes in social, demographic, economic, and health characteristics of the older population. Examples include the effects of public policies, social institutions, and health care settings on health, well-being and functioning. BSR collaborates with the NIA Division of Neuroscience to encourage research at the intersection of behavior and neurocognition as well. Does your research map onto NIA/BSR initiatives?

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6:00-7:30 PM (5078)

The Effect of Different Types of Breaks on Performance. CHANYOUNG KIM and JOOYONG PARK, *Seoul National University* — This study investigated the effect of different types of breaks on performance. Participants in 3 groups took different types of breaks during a problem solving task: namely, resting, web surfing, and playing a game on the cell phone. Participants solved math problems for 10 minutes and then took a 5 minute break. Afterwards, they repeated the procedure solving other math problems. After the second break, participants solved Raven's Progressive Matrices for 10 minutes. The number of completed questions and the accuracy of answers for each problem set solved after the break, were measured as dependent variables of performance. Results showed that the number of completed math problems for the resting condition was significantly higher than those for the other two conditions. However, there was no difference when solving Raven's Progressive Matrices. These findings suggest that taking a "good" break during specific tasks influences performance.

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6:00-7:30 PM (5079)

The Energy Drink Formula: B-Vitamins in Energy Drinks Have Little Effect on Cognition. KELSEY PAGOREK, *Michigan State University*, TRUSHA PATEL, *Central Michigan University*, KIMBERLY M. FENN, *Michigan State University* — Energy drinks are popular across the United States and contain both B-vitamins and caffeine. Moreover, they are sometimes marketed as cognitive enhancers. While caffeine improves cognition, few studies have investigated the effects of B-vitamins in healthy adults, and no known studies have examined the role of B-vitamins and caffeine on cognition and mood. We examined the effects of B-vitamins and caffeine on vigilance, working memory, sleepiness, and mood using a double-blind, placebo-controlled design. Participants were randomly assigned to one of four conditions: placebo, B-vitamins, caffeine, caffeine and B-vitamins. Without caffeine, there was a trend for B-vitamins to slow reaction times on vigilance and working memory tasks, but we found no other significant effects on cognition. Finally, participants who did not consume caffeine showed increased sleepiness and reduced positive affect compared to those who did consume caffeine. Thus, we found little evidence that B-vitamins produced any benefit above that of consuming caffeine alone, and benefits derived from energy drinks are likely due to caffeine without any additive effects of B-vitamins.

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6:00-7:30 PM (5080)

The Relationship Between Creativity, Education, and Wealth on Perceived Attractiveness in a Facebook Profile. JOHN POWELL TAYLOR and CAITLYN ABSHIRE, *Southern Oregon University* — In evolutionary psychology, creativity is often deemed as a signal of intelligence and good genes. Another possibility is that creative individuals may falsely signal greater wealth or financial security than they have. In order to examine the relationship of creativity, intelligence, and wealth on perceived attractiveness, we created Facebook profiles that varied in the gender, education status, creativity, and apparent wealth of the individual they contained. We then recruited more than 700 heterosexual, single individuals through Mechanical Turk, both males and females, assessing all demographics by self report. Participants were randomly assigned to review one Facebook profile of an individual who was the opposite sex and then asked to rate the pictured person on numerous characteristics, including their creativity, perceived wealth, intelligence, and more traits. Our results show that creativity appears to generally signal intelligence, success, and financial security to both men and women but that the relationship appears to be strongest between creativity and intelligence. We discuss the role of creativity in light of evolutionary pressures relevant to mate selection judgements.

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6:00-7:30 PM (5081)

Is Experience Necessary for Belief in Ghosts? WILLIAM LANGSTON, CHRISTOF FEHRMAN, MICAH D'ARCHANGEL and KEVIN ANDERSON, *Middle Tennessee State University*, TYLER HUBBARD, *Vanderbilt University* —



Many models of belief presuppose experience as the starting point, but data suggest that some participants can have high belief with no experience. One possibility is that experience is typically measured in a limited fashion (e.g., personal experience only). The purpose of this research was to measure experience in a comprehensive survey and to evaluate whether participants with no personal experience have other experiences. We measured experience in four categories: personal, close other's, stories, and media. For each, we also measured aspects of the experience that might be relevant for participants' belief. We identified 41 participants who met the criteria for high belief with no personal experience. We then evaluated what other experiences those participants might have had. We also evaluated potential models to account for the experience-belief relationship. For example, is all experience treated the same, or would the best model separate experiences (e.g., personal vs. other sources).

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6:00-7:30 PM (5082)

Classification of Spam Emails Along Dimensions of Prose, Structure, and Plausibility. SARAH E. WILLIAMS, DAWN SARNO, JOANNA LEWIS, POOJA PATEL, MINDY SHOSS, MARK NEIDER and COREY BOHIL, *University of Central Florida* (Sponsored by Corey Bohil) — Subjects completed three classification tasks for a large set of spam e-mails. To create categories, stimuli were pre-rated on degree of "awkward prose," "abnormal structure," and "plausible premise." Each task included four categories created by a factorial combination of two of these dimensions (task-1: awkward (yes/no) x abnormal (yes/no); task-2: plausible x awkward; task-3: plausible x abnormal). For task-1, accuracy was highest for emails with awkward prose/abnormal structure and with non-awkward prose/non-abnormal structure. For task-2, accuracy was highest for plausible/non-awkward emails and for non-plausible/awkward emails. For task-3, accuracy was highest for non-plausible/abnormal and for plausible/non-abnormally structured emails. Application of general recognition theory models indicated violations of perceptual independence and perceptual separability. Specifically, there was a positive relationship between perception of awkward prose and abnormal structure, but a negative relationship between plausible premise and awkward prose and between plausible premise and abnormal structure.

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6:00-7:30 PM (5083)

Illusion of Control in Space Pilot Task. ZACH BUCKNOFF and JANET METCALFE, *Columbia University* (Sponsored by Lisa Son) — In certain contexts, people experience illusions of control. They overestimate the degree to which their actions influence outcomes. We investigated the effect of outcome frequency on control judgments in non-contingent variants of the space pilot task. Participants used the mouse to move a cursor to pop Xs and avoid Os as they scrolled down a computer screen. Each participant played 4 non-contingent versions of the game, meaning the likelihood of an X popping bore no relationship to the player's action. Each version used a different

probability of popping Xs (pop rate): 25%, 50%, 75%, and 100%. Given prior research showing that positive outcomes inflate control judgments regardless of the contingency between action and outcome, we hypothesized that control judgments would show a positive relationship with pop rate. Consistent with prior research, linear regression analysis showed that control judgments increased as a function of pop rate.

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6:00-7:30 PM (5084)

Individual Differences in Prediction Tasks: No Evidence for a Common Factor. MICHELLE L. EISENBERG, JEFFREY M. ZACKS and THOMAS L. RODEBAUGH, *Washington University in St. Louis* (Sponsored by Rose Zacks) — People constantly make predictions about the near future—what others will do and say, and which potential actions will bring rewards. Prediction happens in multiple domains, at multiple timescales, and is no doubt subserved by multiple neural mechanisms. However, a reasonable and important possibility is that a common mechanism allows for prediction within everyday events on the timescale of seconds to minutes, across features and modalities. To test this, 226 participants completed four prediction tasks: the Iowa gambling task, the weather prediction task, the visual world task, and a task involving predictive looking in events. To control for the effects of general intelligence, fluid and crystallized intelligence were also assessed. Performance across the prediction tasks was not correlated. This suggests that individual differences in prediction tasks do not result from a common mechanism, and raises the question of which, if any, common mechanisms underlie everyday event prediction.

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6:00-7:30 PM (5085)

Spontaneous Recruitment of Executive Functions During Long-Term Memory Consolidation. LINDSAY PLATER, ELIZABETH INFANTE and NASEEM AL-AIDROOS, *University of Guelph* (Sponsored by Naseem Al-Aidroos) — Long-term memory consolidation has long been considered a passive process that does not require executive functioning. However, research has shown that consolidation may be more active than previously thought. For example, performance on a long-term memory task is impaired when memory encoding is followed by tasks that tax the executive functions (such as working memory tasks), rather than wakeful rest (Dewar, Alber, Butler, Cowan, & Della Sala, 2012). Here we investigated whether consolidation spontaneously recruits executive functioning by having participants memorize a list of words, and then testing for interference on a subsequent working memory task. To manipulate the demands on consolidation, participants encoded the list of words either once or twice. We observed a working memory impairment when the words were encoded once (high consolidation demand) relative to twice, which is consistent with a role for executive functioning in consolidation. These results suggest that consolidation spontaneously recruits the executive functions, even when this may be detrimental to other behaviourally relevant tasks.

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6:00-7:30 PM (5086)

What Determines Visual Statistical Learning Performance? Insights From Information Theory. NOAM SIEGELMAN, LOUISA BOGAERTS and RAM FROST, *Hebrew University of Jerusalem* (Sponsored by Ram Frost) — In order to extract the statistical structure underlying a continuous sensory input, the individual elements constituting the stream have to be encoded and their transitional probabilities (TPs) should be learnt. This suggests that variance in statistical learning (SL) performance reflects efficiency in encoding representations as well as efficiency in detecting their statistical properties. Interestingly, a recent study showed that the encoding of visual shapes and the computation of their TPs are not independent processes, rather that they display substantial interaction. Here, we entertain the hypothesis that one unifying construct – the extent of information per time unit – can account for this interaction. This theoretical approach merges processes related to encoding of events and those related to learning their regularities into a single processing principle. We present data from two large-scale experiments supporting this hypothesis, and discuss the implications to SL theory and its relation to language learning. Email: Noam Siegelman, noam.siegelman@gmail.com

6:00-7:30 PM (5087)

Speaking to a White or Asian Group: Influences on Memory and Metacognition. YOONHEE JANG, *University of Montana*, HIJO BYEUN, *University of Chicago*, OLIVIA CAO, ABIGAIL FEINBERG, SARA FRUCHTER and NINA PLOTNIKOV, *Barnard College*, LUCHENG WANG, *Beijing Normal University*, LISA SON, *Barnard College* (Sponsored by Yoonhee Jang) — Our goal was to see if being a minority influenced one's memory and metacognition. Subjects participated in conversation with either two White or two Asian confederates, who had previously memorized statements to be uttered during conversation. Later, participants were tested on their memory for the uttered phrases, in addition to memory for context items (e.g., confederate's accessories). Results showed that minority participants falsely recognized more unspoken statements, compared to majority participants, when conversing with the White group. Further, context memory was higher when the confederates were Asian, rather than White, regardless of the participant's ethnicity. Interestingly, participants were well aware that their own memory for context items was better when speaking with the Asian group. Most importantly, when speaking with the White group, minority participants believed that the confederates were more successful than themselves. These data suggest that memory and metacognitive processing may be affected more negatively for minority individuals. Email: Yoonhee Jang, Yoonhee.Jang@mso.umt.edu

6:00-7:30 PM (5088)

Implicit vs. Explicit Social Classification in Unfamiliar Face Perception. LAURA L. HEISICK (Graduate Travel Award Recipient), DINA ACKLIN, JUAN D. GUEVARA PINTO and MEGAN H. PAPESH, *Louisiana State University* (Sponsored by Megan Papesh) — Unfamiliar face matching is error-prone, even under optimal viewing conditions (Bindemann et al., 2010). Research has demonstrated that social categorization

(SC), classifying faces as members of social in-groups versus out-groups, also influences face perception (Bernstein et al., 2007). The current studies investigated the automaticity and potential benefits/drawbacks of SC in unfamiliar face recognition (Experiment 1) and matching (Experiment 2). Some participants reported social categories (explicit) and others did not (implicit). Experiment 1 revealed no SC effects, with comparable accuracy for faces identified as in-group, relative to out-group, and no differences across explicit or implicit categorization. In Experiment 2, participants' matching accuracy was higher for in-group faces than out-group faces, and instructions to explicitly categorize faces by group improved match accuracy. These results suggest SC effects are relatively automatic, occurring without explicit instruction or salient visual cues, and provide empirical support for social cognitive theories of face perception (Hugenberg et al., 2010). Email: Laura L. Heisick, lheisi1@lsu.edu

6:00-7:30 PM (5089)

Dual-Memory Efficiency After Practice: Impact of Strategy Manipulations. FRANZISKA ORSCHESCHEK, *Medical School Hamburg*, TIMOTHY RICKARD, *University of California, San Diego*, TORSTEN SCHUBERT, *Martin-Luther-University Halle-Wittenberg*, TILO STROBACH, *Medical School Hamburg* (Sponsored by Tilo Strobach) — Past studies investigated the role of practice effects on dual-memory retrieval from a single cue and the associated cognitive architecture. These studies demonstrated enhanced retrieval efficiency and the presence of learned parallelism in the context of the set-cue bottleneck model, i.e. two responses are retrieved in a single capacity-limited step. However, there have been no investigations on the effects of response strategy, in the form of instruction manipulations, on the efficiency of dual-memory retrieval after practice. The present study realized this practice with strategy instruction manipulations in three different groups: An instruction to synchronize two responses, an instruction to use a sequential response style, and a neutral instruction without a specific instruction on response strategy. Our results indicate that strategy instructions are able to influence the efficiency of retrieval. Particularly, the instruction to synchronize responses led to enhanced retrieval efficiency and the presence of learned retrieval parallelism. Email: Franziska Orscheschek, franziska.orscheschek@medschool-hamburg.de

BILINGUALISM III

6:00-7:30 PM (5090)

Bilinguals Automatically Access Their Second Language When Processing Speech in Their First Language. AMY S. DESROCHES, *The University of Winnipeg*, DEANNA C. FRIESEN, *The University of Western Ontario*, MATTHEW J. TELES and CHLOE A. KORADE, *The University of Winnipeg* — Several studies have found that bilinguals activate their first language (L1) when operating in their second language (L2). Here, we used event related potentials [ERPs] to investigate whether bilinguals automatically access their L2 phonology when listening to speech in their L1. English-French bilinguals



performed a picture-word matching task in English where they saw a picture and then heard a spoken word that matched (e.g., BEACH-“beach”) or mismatched the picture in one of two ways (e.g., unrelated mismatch: BEACH-“tack”; or L2 competitor mismatch (L2C): BEACH-“plaid”, where the auditory word sounds like the French word for beach: “*plage*”). As we have seen in our previous research, N400 responses were larger to unrelated mismatch conditions compared to match. Critically, as we predicted, N400 responses were reduced for L2C mismatches compared to unrelated mismatches. The results indicate that when bilinguals process information in their L1, they automatically access lexical options from their L2.
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6:00-7:30 PM (5091)

Semantic Accents in Bilinguals: A Feature-Based Approach. ERIKO MATSUKI, *University of Western Ontario*, YASUSHI HINO, *Waseda University*, DEBRA JARED, *University of Western Ontario* — A challenge for bilinguals is that translation equivalent words often do not convey exactly the same semantic information, partly because there are cultural or contextual differences in how certain concepts are perceived, used, and/or realized using the two languages. The current study tested Japanese-English bilinguals and investigated whether L1-specific semantic features are included in the semantic representations that are activated by L2 translation equivalent words (i.e., whether there is a semantic accent in L2). Furthermore, we investigated factors likely to affect the acquisition of L2-specific features, such as feature type (perceptual vs situational) and length of residence in the L2 country, and whether L2-specific semantic features are included in the semantic representations activated by L1 words. Both explicit (typicality rating, feature verification) and implicit (semantic priming with lexical decision) tasks were used. We found evidence of semantic accents in both L2 and L1, and their strength depended more on length of residence in the L2 country than L2 proficiency.
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6:00-7:30 PM (5092)

Living in a Noisy World: Examining Monolinguals’ and Bilinguals’ Performance During Listening-in-Noise Tasks. GIOVANNA MORINI, *University of Delaware*, ROCHELLE S. NEWMAN, *University of Maryland* — Listeners frequently hear speech in environments that are rich in auditory cues. To understand messages, listeners must process competing sounds and rely on cognitive abilities and linguistic knowledge to interpret the information being conveyed. Bilinguals must “manage” two linguistic systems – regularly monitoring and switching between two languages. This practice has been linked to advantages in cognitive tasks. We explore whether an advantage is also present during language tasks, and specifically while processing speech in noise. We present data from a word-comprehension and a word-learning task with monolingual and bilingual adults (n=128; 64/task). Bilinguals are less accurate than monolinguals at identifying familiar words in noise. However, this group difference is not present when listeners are asked to learn novel words heard either in noise or in quiet.

These findings suggest that both linguistic experience and task demands play a role in the ability for listeners to process speech in noise.

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6:00-7:30 PM (5093)

Top-Down Structure Influences Learning of Statistical Dependencies in an Artificial Language. HAO WANG, *University of Pennsylvania*, JASON ZEVIN, *University of Southern California*, JOHN TRUESWELL, *University of Pennsylvania*, TOBY MINTZ, *University of Southern California* — Statistical learning has been described as a bottom-up process of learning local statistics given sequential elements. Here, we examine how top-down information influence statistical learning. We report a series of artificial language experiments in which nonsense syllable sequences were preceded by four-word English sentences, entraining listeners to a four-word-per-sentence rhythm. We find that highly predictable adjacent and non-adjacent dependencies can only be learned if the dependencies fall within the entrained 4-word sentence boundaries; when they cross the sentence boundary even simple adjacent dependencies were unlearnable. We present a simple model that could account for the data, and conclude that top-down information brackets sequential elements into subsequences before statistics are learned.
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6:00-7:30 PM (5095)

Happy Music = Happy Killer Whale and Sad Music = Sad Killer Whale? A Pilot Study on the Influence of Music on Emotional State of Killer Whales. HEATHER M.M. HILL, *St. Mary’s University*, SARAH DIETRICH, *University at Buffalo, State University of New York*, JENNIFER ZWAHR, *St. Mary’s University*, NICOLAS MIRELES, *East Tennessee State University*, MARIO SALGADO, *St. Mary’s University* — Watching a shark swimming on a screen with ominous background music produces more negative views of sharks than upbeat or no music. This pilot study assessed if the type of background music during a video clip influenced emotional judgements about welfare and behavior of a killer whale. Recruited through snowballing, most participants were female (18 to 50 years) with the majority between 18-22 years. Significantly more (37%) reported that the killer whale was happy while another third indicated the killer whale was emotionally neutral. When silent, sad, and happy music conditions were experienced, participants also rated the killer whale as experiencing the same emotion, respectively. Responses about welfare of the killer whale were not influenced by the music heard while viewing the video. Future research will manipulate other beliefs about the killer whale to assess the resulting influences of setting and background music on the emotional and welfare state of killer whales.
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6:00-7:30 PM (5096)

Source Memory in Bilinguals: Evidence That Contextual Associations are Made at the Conceptual Level. RENEE MICHELLE PENALVER, URIEL SAPIEN SOTO, BIANCA V. GURROLA, NAYLA P. BEJARANO CHACON, MICHELLE



MARTINEZ and WENDY S. FRANCIS, *University of Texas at El Paso* — Source memory is memory for the context in which a particular target item was learned. Three experiments systematically examined how language proficiency and word frequency affected external (auditory vs. visual), internal (overt vs. covert production), and internal-external (listening vs. imagining listening) source monitoring. In all experiments, Spanish-English bilingual participants showed better source discrimination for low-frequency words than for high-frequency words, but no difference in source discrimination for words in their more and less proficient languages (as determined through objective assessments). The dissociation of the effects of word frequency and language indicate that associations formed between words and their episodic contexts are made at the conceptual level rather than the word-form level. Supported by NIH Grant 1R15HD078921-01A1.

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6:00-7:30 PM (5097)

L2-L1 Noncognate Translation Priming Effects in Episodic Recognition and Lexical Decision Tasks: A Test of the Episodic L2 Hypothesis. KEISUKE IDA, *Waseda University*, MARIKO NAKAYAMA, *Rikkyo University*, STEPHEN J. LUPKER, *University of Western Ontario* — L2-L1 noncognate translation priming effects have been difficult to observe in lexical decision tasks (LDT), with those effects being reported more reliably in episodic recognition tasks (ERT). The Episodic L2 hypothesis explains the task specificity of the effects by assuming that, at least for unbalanced bilinguals, L2 words are represented only in episodic memory (Jiang & Forster, 2001; Witzel & Forster, 2012). The present experiment was an attempt to examine the Episodic L2 hypothesis's assumptions about the nature of L2 representations. Proficient Japanese-English bilinguals completed an ERT and an LDT. Significant L2-L1 priming effects were observed for these individuals in both tasks, a result that the episodic L2 hypothesis has trouble accommodating. We discuss how these results may be better explained within the framework of the BIA+ model, which assumes that L2 words have much lower resting activation levels than L1 words (Dijkstra & van Heuven, 2002).

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6:00-7:30 PM (5098)

Neural Correlates of Attentional Control Processes in Working Memory: The Role of Aging and Bilingualism. MARGOT D. SULLIVAN, JOHN G. GRUNDY and ELLEN BIALYSTOK, *York University* (Sponsored by Ellen Bialystok) — Selective attention is required for working memory (WM) and is also theorized to underlie the process of selecting between two active languages in bilinguals. The present study manipulated the modality and attentional demands of a WM task while ERPs were recorded to investigate the neural correlates of WM processing for younger and older adults who were monolingual or bilingual. Participants performed a verbal and nonverbal version of a running memory procedure, which allows activity to be time-locked to item-by-item memory encoding and retrieval. The amplitude of the P3 component indexes the degree of engagement of attentional control in

WM. Typical age-related declines in memory performance were present. Effects of aging were shown for verbal encoding, such that older adults displayed larger P3 amplitude than young adults. Language effects were shown during spatial retrieval, such that bilinguals showed larger P3 amplitude increases than monolinguals for the more effortful condition.

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6:00-7:30 PM (5099)

Cross-Language Conceptual Activation and Development Through Expository Text Passages. KARLY M. SCHLEICHER and ANA I. SCHWARTZ, *University of Texas at El Paso* (Sponsored by Ana Schwartz) — The present study begins to bridge the gap between bilingual education practices and cognitive frameworks of bilingual conceptual access. A reading comprehension task was used to investigate how bilinguals activate and develop academic information across their two languages when reading. Using scientific texts, participants read two distinct passages pertaining to prior knowledge, as well as new, related conceptual information. At test, the participants were asked to complete true-false questions with one sentence justifications for their responses. A counterbalanced, mixed factorial design was used to infer how language dominance influences encoding and retrieval of expository information in bilinguals' two languages. Results indicate that prior academic knowledge is better recalled in the dominant language and when the language of text and test match. Furthermore, results suggested that unbalanced bilinguals may be better able to develop new conceptual features in their less dominant language.

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PSYCHOLINGUISTICS II

6:00-7:30 PM (5100)

Does Hand Proximity Affect Semantic Processing During Reading? GIORDANA GROSSI, *State University of New York - New Paltz*, ANNIE J. OLMSTEAD, *University of Kansas*, TRISHA CHABRIA, MATTHEW CHASON and REGINA PASKOFF, *State University of New York - New Paltz* — Davoli et al. (2010) found that participants' accuracy at judging the sensibleness of nonsense sentences differed depending on whether their hands were close to or far from the computer screen. The authors suggest two possible reasons: impoverishment of semantic processing near the hands, or a bias to respond "acceptable" because all sentences were grammatically correct. In the current study, we examine these explanations by asking whether hand position affects 1) other aspects of sentence processing, such as syntactic analysis and 2) semantic processing at the individual word level. In Experiment 1, participants judged whether sentences that were either correct or incorrect grammatically or semantically were acceptable or not. In Experiment 2, participants performed a semantic categorization task on individual words. Participants performed these tasks both with their hands near to and far from the computer screen. We found that processing was sometimes affected by hand proximity and sometimes not.

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**6:00-7:30 PM (5101)**

The Interaction of Semantic, Thematic, and Associative Overlap Strength in Predicting Recall. NICHOLAS P. MAXWELL, BOGDAN KOSTIC and ERIN M. BUCHANAN, *Missouri State University* — This study examined the interactive relationship between semantic, thematic, and associative word pair strength in the prediction of judgments and cued-recall performance. One hundred MTurk participants were shown word pairs of varying relatedness, and asked to judge these word pairs for their semantic, thematic, and associative strength. After completing a distractor task, participants then completed a cued recall task. Both judgment ability and recall performance were predicted by the three-way interaction of semantic, thematic, and associative word-pair norms, but the type of judgment did not affect recall or judgments. For low semantic feature overlap, thematic and associative strength were competitive: as thematic strength increased, associative predictiveness decreased. However, this trend reversed for high semantic feature overlap, wherein thematic and associative strength were complimentary as both set of simple slopes increased together. This result suggests that the amount of semantic feature overlap influences the predictiveness of associative and thematic word norm strength.

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6:00-7:30 PM (5102)

Foreign-Accented Sentence Comprehension in Children: An ERP Study of Semantics and Grammar. SARAH GREY, *Fordham University*, CARLA B. FERNANDEZ and JANET G. VAN HELL, *Pennsylvania State University* — Foreign-accented speech constitutes a challenge for language comprehension, as evidenced by ERP measures of semantic and grammar processing (Grey & Van Hell, 2017; Hanulikova et al., 2012; Romero-Rivas et al. 2015). Existing ERP research has only tested adults, and little is known about the neural correlates of foreign- and native-accented language comprehension in children, whose language system is still developing. In an ERP study, we tested monolingual English children (9-11 year-olds) listening to foreign-accented and native-accented speakers who made semantic or grammatical errors in sentences or produced correct sentences. Semantic violations elicited an N400 effect to native-accented speech, and a reduced and delayed N400 to foreign-accented speech. Grammatical violations yielded an N400-like response to native-accented speech, but no ERP effects to foreign-accented speech. Child listeners' ERPs thus show different responses to foreign- and native-accented speech. Moreover, their neural responses largely pattern with adult monolingual listeners (Grey & Van Hell, 2017).

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6:00-7:30 PM (5103)

Predicting the Development of Semantic Knowledge From the Distributional Statistics of Child-Directed Speech. JON A. WILLITS and PHILIP A. HUEBNER, *University of California, Riverside* — Using computational models constructed from millions of words of child-directed speech, we show that statistical learning mechanisms operating over noisy naturalistic

speech can be used to develop robust and surprisingly structured semantic knowledge. We show that the representations learned by these models mirror behavioral observations about semantic development. For example, our models show that taxonomic and hierarchical structures emerge automatically, that semantic knowledge develops in a progressively differentiating manner, and that robust differences between certain categories (e.g., artifacts and natural kinds) can be inferred from distributional structure. We also demonstrate that many features of child-directed speech (such as its progressive increase in complexity) greatly increase learning potential. The combination of large naturalistic datasets and computational models instantiating theories of learning and representation allow new opportunities to test theories involving the complex interactions between environmental structure and cognitive systems. These datasets also present numerous challenges, forcing us to confront blind spots and weaknesses in our existing theories of cognition, learning, and development.

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6:00-7:30 PM (5104)

New Normative Values For 1,200 Concrete Nouns in Free Recall, Accounting for Word Animacy. JOSHUA E. VANARSDALL, *Elmhurst College* — In a single large study, the role of animacy as a dimension of word meaning that affects free recall was investigated. Normative "recallability" values for free recall were collected for a set of 1,200 concrete nouns, of which some were animate (e.g., "bluejay", "child", and "shepherd"), some of which were inanimate (e.g., "diamond", "guitar", and "hat"), and some of which were ambiguous (e.g., "eye", "demon", and "tree"). Data was collected from 843 participants, both online using Amazon Mechanical Turk and in-lab; completely randomized lists were used such that each participant received a new random sample of unique words. Previously-collected normative data on 21 word dimensions including six scales related to animacy, common semantic word dimensions such as concreteness, imagery, and arousal, as well as orthographic features for these 1200 words were used to predict the observed free recall scores. Of the 21 dimensions used to predict free recall scores, regression and relative-weight analyses indicated that word animacy was consistently a leading predictor of free recall scores across a variety of analyses. These results contribute both new recall norms as well as further support for the importance of animacy in memory.

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6:00-7:30 PM (5105)

Searching for Neural Correlates of Inhibition of Return. JASON SATEL, *University of Tasmania*, VIVIAN ENG, ALFRED LIM and STEVE M.J. JANSSEN, *University of Nottingham Malaysia Campus* — Inhibition of return (IOR) is a behavioral phenomenon whereby responses to previously attended stimuli are inhibited in order to facilitate novelty seeking. To accomplish this functional role, IOR must be represented in spatiotopic coordinates and be long lasting. Early investigations using event-related potentials (ERPs) suggested that modulations of the early sensory P1 component reflected IOR. However, recent work has proposed that such



early sensory modulations are simply reflective of short-lasting, retinotopically coded effects of repeated peripheral stimulation, whereas modulations of later attention-related ERPs, such as the Nd and N2pc components, are likely reflective of IOR. Since calculation of N2pc component requires a visually balanced design, we conducted a series of experiments with distractors presented along with targets. Participants fixated centrally or peripherally cued locations, then manually localized targets. Results provide further evidence that IOR is associated with modulations of later ERPs, such as the N2pc component.

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6:00-7:30 PM (5106)

How Does Rereading Improve Reading Comprehension? KIEL CHRISTIANSON, NAYOUNG KIM and SARAH-ELIZABETH DESHAIES, *University of Illinois* — Rereading has been shown to improve comprehension. Yet data also show that readers miscomprehend sentences, and that rereading is not always helpful in correcting errors. Readers also vary in how they reread. We use an eye-movement contingent variable trailing mask paradigm to examine what text readers target in rereading, and whether rereading improves comprehension. We use a 2 (ambig., unambig.) x 5 (mask, when the eyes reach the position marked *) design (1), and relate rereading measures to offline comprehension accuracy (2).

*

1. a. While Rick drove(.) the car that was red veered off the road into the ditch.
- b. xxxxx xxxx drove(.) the car that was red veered off the road into the ditch.
- c. xxxxx xxxx xxxxx(.) the car that was red veered off the road into the ditch.
- d. xxxxx xxxx xxxxx(.) xxx xxx that was red veered off the road into the ditch.
- e. xxxxx xxxx xxxxx(.) xxx xxx xxxx xxx xxx veered off the road into the ditch.

2. Q: Did Rick drive the red car? (no)

The results address the question of whether rereading is more revisionary (Frazier & Rayner, 1982) or confirmatory (Christianson et al., 2017).

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6:00-7:30 PM (5107)

Talker's Voice Can Affect Word Meaning: Evidence From Eye Movements. EFTHYMIA C. KAPNOULA, *Basque Center on Cognition, Brain and Language*, ARTHUR G. SAMUEL, *Basque Center on Cognition, Brain and Language; Stony Brook University* — Non-linguistic acoustic information (e.g. talker's gender) can affect spoken word recognition, but does not seem to affect a word's meaning. Is the absence of such effects a result of learning, or is it due to internal constraints of the system? During training, participants learned novel words (e.g. *bifa*) and their meanings (familiar objects). For half of the words, each voice was linked to a specific picture (e.g., *bifa* spoken by talker A referred to a specific table). For the other half, voice-to-referent mapping was randomized. During testing, voice-to-referent mapping either matched that of training (*congruent*), or not (*incongruent*). Looks to the target indexed lexical activation.

We hypothesized that listeners can harness the systematicity of voice-to-referent mappings, when such systematicity exists. Participants looked significantly more to the target on congruent than incongruent trials; this difference was more robust when congruency was determined based on gender. These results suggest that indexical information can be encoded in lexical representations, and can be used in referent selection. Email: Efthymia C. Kapnoula, kapnoula@gmail.com

6:00-7:30 PM (5108)

Facilitatory and Inhibitory Effects in One-Letter Masked Form Priming. DAVID R. HARVEY and JAMES S. ADELMAN, *University of Warwick* (Sponsored by James Adelman) — Masked priming has been used extensively to explore how words and non-words can facilitate or inhibit lexical processing, but little has been done to investigate how such processing can be affected by a single letter. We present research that uses one-letter primes in a lexical decision task. We found that a single letter identity prime (e.g., b+++ - BAND) caused reaction time facilitation relative to an unrelated letter prime (e.g., j+++ - BAND). A prime consisting of a letter taken from a neighbour of the target word (e.g., k+++ - SNOW) caused inhibitory priming relative to an unrelated letter prime (e.g., m+++ - SNOW). These priming effects were no longer present when a 33ms backward mask (%%%) was introduced. Either activation of letter representations is fragile enough to decay over a 33ms interval, or the significant priming effects were due to prime-target blending that was prevented by the backward mask. Either interpretation has important implications, both for experiments using masked form priming paradigms and for models of visual lexical access.

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6:00-7:30 PM (5109)

Top-Down Cognitive Factors Influence Second-Language Word Identification in Noise. ROBERT LJUNG and DOUGLAS MACCUTCHEON, *University of Gävle*, FLORIAN PAUSCH and JANINA FELS, *RWTH Aachen Institut für Technische Akustik* — Forty-four sequential bilingual children aged fifteen underwent assessments of speech-in-noise perception, first and second language vocabulary and auditory working memory (forward digit span). In order to investigate the signal driven processes might affect bilinguals' "spatial release from masking" (SRM) a listening in spatialized noise paradigm was adapted for the bilingual context. A simple number and colour identification task presented in English and Swedish, and the talker was masked adaptively by speech-shaped noise and eight-talker babble under two spatialized conditions in simulated room acoustics; targets and maskers were either collocated at zero degrees azimuth or spatially separated at ninety degrees azimuth to either side. The resulting language and noise conditions were contrasted with existing research on bilingual adults and native-language speaking children, extending findings to a younger sample of sequential bilingual children. The results indicating a significant relationship between cognitive ability and second-language speech reception thresholds

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6:00-7:30 PM (5110)

Learning Context and Variability in Gender Assignment Affect Gender-Based Prediction in a Second Language.KAILEN SHANTZ and DARREN TANNER, *University of Illinois at Urbana-Champaign* (Sponsored by Darren Tanner)

— Grammatical gender has been shown to ease comprehension by making nouns more predictable in context, and thus easier to recognize. Despite this benefit, late second language (L2) learners struggle to use gender in this manner. The Lexical Gender Learning Hypothesis (LGLH) proposes that learning context and unstable gender representations underlie this deficit. Our study provides the first direct test of these claims by combining an artificial language learning task with a visual world eye-tracking task to assess how learning context influences the predictive use of gender. Anticipatory eye movements are only found when trials are restricted to those with stable gender representations. Moreover, only participants who learned the artificial grammar in a manner that emulated first language acquisition showed robust anticipatory effects. These findings support the LGLH, and have important implications both for how grammatical gender is taught, and for how gender processing in an L2 is assessed.

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6:00-7:30 PM (5111)

Word Similarity and Translation Direction During Study Affects Foreign Language Vocabulary Recall.LISA S. KEMP and JANET L. MCDONALD, *Louisiana State University* (Sponsored by Janet McDonald)

— We examined the influence of semantic and form similarity and translation direction on foreign language vocabulary learning. Research shows that semantic similarity sometimes helps and sometimes hurts this process, while form similarity generally hurts it. Adult native English speakers learned 30 Lithuanian-English word pairs in five conditions in a study/test paradigm with translation direction varied between subjects. A final test was given on the same day and a week later. Results showed that on the same day as study, participants did better on the test if it was in the same translation direction as study. A week later, participants did better if they had studied a word list with no similarities compared to lists with similarities but only when the test was in the opposite direction as study. Participants who studied semantically similar word lists made more semantic errors compared to the control list. Other error types will be explored.

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6:00-7:30 PM (5112)

Space-Language Interactions in the Auditory Modality.CAMERON M. SMITH (Graduate Travel Award Recipient) and AMIT ALMOR, *University of South Carolina - Columbia* (Sponsored by Amit Almor)

— Multiple studies have suggested that spatial representations are used during language comprehension in different paradigms (e.g. Ferreira et al., 2008; Gunter et al., 2015). These studies have largely focused on the visual modality, suggesting that people may use spatial cues in the visual environment to aid them in language comprehension. However, the primary modality of spoken language is audition, which raises the question of whether the reliance on spatial

information is specific to referents that are (or have been) visible. We examined whether spatial cues are used in language comprehension in the auditory modality. We show that participants retain auditory non-visual spatial information to encode referents and activate this information in a cross-modal reading task. Our results are consistent with findings from studies of sign language and manual gesture that suggest that spatial representation may influence the reference process (e.g. Emmorey, 1996; Gunter et al., 2015). These results thus represent an important first step in understanding how spatial representation may influence spoken language comprehension. Email: Cameron Smith, cms21@email.sc.edu

6:00-7:30 PM (5113)

Biased Reading and Neutral Representations: How Presentation Order of Comprehension Questions Alters Reading Strategies Without Influencing Final Representations.JACK DEMPSEY and LAUREL BREHM, *Pennsylvania State University* (Sponsored by Laurel Brehm)

— Garden-path sentences, where later syntactic information makes an initial structure infelicitous (*While Mark investigated the murder occurred*), require reconciliation of conflicting semantic and syntactic cues, providing insight on what mechanisms drive syntactic repair and how initial incorrect parses affect comprehension. Previous work has shown that reading times at disambiguation regions (*occurred*) remain unaffected by semantic biases, suggesting separate mechanisms for semantic processing and syntactic repair. We investigated the integration of information in garden-path sentence reading with a self-paced reading experiment, varying the presentation order of sentences and comprehension questions. Questions preceding sentences provide a strong cue to direct reading effort, potentially facilitating processing. We found that preceding comprehension questions resulted in longer response times and longer overall reading times while not affecting response accuracy. This suggests that comprehension questions alter participants' strategies in reading but do not affect representations obtained, calling into question the relationship between reading times and comprehension.

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LETTER/WORD PROCESSING I

6:00-7:30 PM (5114)

Repetition Priming Reveals Hemispheric Differences in Compound Word Processing.ANNUKKA K. LINDELL and PRISCILLA SAVOPOULOS, *La Trobe University*

— The left (LH) and right (RH) hemispheres are thought to implement different mechanisms for visual word recognition; the LH's parallel encoding strategy is more efficient than the RH's serial, letter-by-letter analysis. Here we examine differences in hemispheric language processing strategy by investigating repetition priming of compound words (e.g., *buttercup*) and their constituents (e.g., *butter*, *cup*). Eighty-eight right-handed participants (29 M, 59 F) completed a lexical decision experiment in which centrally-presented compounds primed related (whole compound, first constituent, second constituent) and unrelated targets presented laterally to the left or right



visual field; participants made button-press word/nonword decisions. Consistent with the LH parallel/RH serial distinction, repetition priming prompted an RH advantage for first constituents, whereas the LH performed equally efficiently in response to both first and second constituents. These data thus highlight differences in the hemispheres' language processing strategies, offering new evidence supporting a relative parallel/serial distinction in LH/RH visual word recognition.
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6:00-7:30 PM (5115)

How Does Foveal Processing Difficulty Affect Parafoveal Processing During Reading? AARON VELDRE and SALLY ANDREWS, *University of Sydney* — Models of eye movement control during reading assume that the difficulty of processing a fixated word modulates the depth of processing of the upcoming word (or words) in the parafovea. This *foveal load hypothesis* is widely accepted in the literature despite surprisingly few replications of the basic effect. We sought to establish whether observing a foveal load effect depends on the type of parafoveal preview used in the boundary paradigm. Participants' eye movements were recorded as they read sentences in which a low- or high-frequency word preceded a critical target word. The preview of the target word was manipulated such that it was either identical to the target, an orthographically similar word or nonword, or an unrelated word or nonword. The results revealed that the foveal load interaction with preview benefit was entirely due to the unrelated nonword baseline. The remaining conditions produced completely additive effects of preview type and pretarget frequency. These findings raise questions about the presumed mechanisms underlying the foveal load effect. Implications for theories of reading are discussed.
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6:00-7:30 PM (5116)

Phonological-Orthographic Consistency Effects on Orthographic Familiarity Ratings and Lexical Decision Performance for Japanese Kana and Kanji Words. YASUSHI HINO, *Waseda University*, STEPHEN J. LUPKER, *The University of Western Ontario*, YUU KUSUNOSE, *Bunkyo Gakuin University* — Many word recognition models assume that phonological-orthographic (P-O) activation operates when hearing words. This assumption implies that a word's orthographic familiarity should be affected by hearing that word. Specifically, the ease of retrieving the correct spelling pattern from a word's sounds, which should depend on the word's P-O consistency, should affect a word's orthographic familiarity. In our analyses, we examined the effect of P-O consistency on orthographic familiarity ratings for Japanese kanji and kana words. The familiarity ratings were modulated by P-O consistency for kanji words but not for kana words with kana words having higher familiarity ratings overall. These results imply that, although P-O consistency should affect kanji word processing, it should not affect kana word processing, a prediction borne out in our lexical decision data. Based on these

results, the nature of the interaction between orthography and phonology and how it might vary across languages/scripts is discussed.

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6:00-7:30 PM (5117)

Lexical Stress and the Interaction With the Orthographic Lexicon. LUCIA COLOMBO, *Università di Padova*, SIMONE SULPIZIO, *Università Vita-Salute San Raffaele* — Italian word recognition is influenced by distributional information of different stress patterns in the language. In Italian, stress is predominantly on the penultimate syllable (caROta-carrot, ~80%), with smaller percentage on the antepenultimate (LIbero, free, ~18%) and an even smaller one on the last syllable (verità-truth, ~2%). Lexical decision is faster on words with penultimate than antepenultimate syllable stress (Colombo & Sulpizio, 2015). However, if words are presented with an orthographic stress mark, is distributional information offset by the atypical representation? In two lexical decision experiments, words with typical (carota, libero, verità) and atypical orthography (stress marks on all words, caròta, libero, verità) were presented to two groups. When the stress mark is always present, if stress assignment occurs through the sublexical mechanism (Perry et al., 2014) no advantage of penultimate stress words should be found, because of their atypical representation, that does not correspond to the orthographic lexical entry. Indeed, this was confirmed, and penultimate stress words were apparently the most penalized by the orthographic manipulation. Results are discussed in light of existing models.

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6:00-7:30 PM (5118)

Does Visuospatial Orientation Have an Influence on Transposed Character Effects? HUILAN YANG, *University of Western Ontario*, JINGJUN CHEN, *Hunan University of Science and Technology*, STEPHEN J. LUPKER, *University of Western Ontario* — Witzel, Qiao and Forster's (2011) data argue that the mechanism responsible for transposed letter/character effects acts at a totally abstract orthographic level (i.e., one in which visuospatial orientation is irrelevant to nature of the orthographic code). The present experiments were an attempt to expand this conclusion beyond alphabetic scripts and the syllabic Kana script used by Witzel et al. to a logographic script. The specific question was, does visuospatial orientation have an influence on transposed character effects in Chinese? Experiment 1 showed masked identity and transposed character priming with primes and targets both in left-to-right horizontal and in vertical orientations, replicating Witzel et al. Experiment 2 showed that Chinese readers even produce masked identity and transposed character priming when the text is presented in the right-to-left direction. These results support an abstract character unit account of transposed letter/character effects across script types while failing to support a perceptual learning account.

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6:00-7:30 PM (5119)

Individual Differences in Chinese Word Recognition: Insights From the Chinese Lexicon Project. MELVIN J. YAP and ROSEMARIE LIM, *National University of Singapore*, CHI-SHING TSE, *The Chinese University of Hong Kong* — The Chinese Lexicon Project (Tse et. al., in press) is a repository of lexical decision data for 25,286 Chinese two-character compound words. 594 participants responded to approximately 3,000 words and nonwords over three sessions. The present study examines: 1) the reliability of Chinese lexical decision performance, and 2) the influence of individual differences on Chinese lexical decision. We found high within- and between-session reliabilities for mean response times, and ex-Gaussian and diffusion model parameters. Drift rate and d-prime were computed for each participant; higher values on these measures reflect greater lexical processing proficiency. Using linear mixed effects models, we found reliable interactions between proficiency and lexical effects. Specifically, more proficient readers showed smaller effects of character frequency but larger effects of word frequency and stroke number. These results support the stability of Chinese word recognition performance, and are consistent with a flexible lexical processing system that adapts to task demands.

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6:00-7:30 PM (5120)

Examining the Invariance of Word Processing: Do Manipulations of Size Affect Size Judgments? NATALIE A. KACINIK, *Brooklyn College & The Graduate Center, City University of New York*, KOLE NORBERG, *Kingsborough Community College, City University of New York*, MARYAM CHOUDHARY, *Brooklyn College, City University of New York*, MARISSA SCOTTO, *Brooklyn College & City College, City University of New York* — Numerous studies have shown that the processing of linguistic stimuli is respectively facilitated or hindered by perceptually or motorically consistent vs. inconsistent contexts. These findings have been used as evidence that our semantic representations are embodied or grounded in sensorimotor experiences. However, our prior research failed to show effects of perceptual information (i.e., text size manipulated to be congruent or incongruent with an object's actual size) on memory, property judgments, lexical or semantic decisions about words. The current study continued this work by presenting participants with the same stimulus materials and asking them to explicitly judge the size of what the item represents or the word's appearance according to font size. Like our previous findings, the size manipulations generally had no significant effects; suggesting that word processing is indeed invariant of perceptual appearance and potentially challenging the embodiment of semantics, although some issues and potential explanations will be discussed.

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6:00-7:30 PM (5121)

On the Time Course of Proper and Common Names Processing in the Brain. REMO JOB, *University of Trento*, SIMONE SULPIZIO, *Vita-Salute San Raffaele University* — All languages have names for things (common names, CN)

and for people (proper names, PN). Some languages mark the difference at the linguistic level, and Italian does so at the orthographic level: Capitalization of the first letter is the rule for PN but it is context-dependent for CN (e.g. in sentence-initial position). We investigated whether, in Italian, the orthographic differences between PN and CN are mirrored in how the brain processes them. We recorded ERPs in a lexical decision task. PN and CN were presented in their standard (Teresa/matita, pencil) and non-standard (teresa/Matita) form. Results showed effect of both early and late negativities (N100, N400) and early and late positivities (P200, Late Positivity). The positivities showed an interaction between orthographic congruency and name category, while negativities were associated with letter case independently of name category (N100), or with category distinctiveness independently of case (N400). Our results indicate that the brain detects the distinction between PN and CN early on and keeps track of such distinction at different points in time during processing. The results are consistent with the Orthographic Cue Hypothesis (Peressotti et al, 2003).

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6:00-7:30 PM (5122)

Is Spatial Attention Modulated by Word Valence During Visual Word Processing? An ERP Investigation. STÉPHANIE MASSOL, *Universitat Jaume I*, MARTA VERGARA-MARTINEZ, ANA MARCET and MANUEL PEREA, *Universitat de Valencia* — Previous behavioral experiments have reported additivity of spatial attention and lexical effects in visual word identification tasks (e.g., McCann et al., 1992, JEP:HPP). As emotion words may attract more attention than neutral words, we examined this issue by manipulating the valence of words/pseudowords (emotion [positive, negative] vs. neutral) in an ERP-lexical decision task using a spatial cueing paradigm. Targets were preceded by a cue that appeared either in the same (valid trials) or opposite (invalid trials) location. A facilitative behavioral effect of cueing was obtained for words and pseudowords regardless of their valence. The electrophysiological counterpart consisted of larger negative amplitudes for valid compared to invalid trials in the 300-500 ms time window. Furthermore, positive words produced faster reaction times, fewer errors and less negative amplitudes than neutral and negative words. These results suggest that spatial attention and visual word processing originate from different sources.

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6:00-7:30 PM (5123)

Multivariate Laterality as a Novel Measure of Laterality and Marker for Word Inversion Sensitivity in the Visual Word Form Area. BRANDON J. CARLOS, ELIZABETH A. HIRSHORN, CORRINE DURISKO, JULIE A. FIEZ and MARC N. COUTANCHE, *University of Pittsburgh* (Sponsored by Marc Coutanche) — Individual readers vary in the degree of reading disruption they experience when words are presented in an inverted orientation (i.e., word inversion sensitivity). The present study tests whether individual differences in word inversion sensitivity are a marker for differences in the lateralization of orthographic representation. To do so, compared two methods



for assessing functional lateralization within the visual word form area (VWFA) and its right hemisphere homologue (rVWFA). Specifically, we assessed the lateralization of word-processing in the VWFA and rVWFA using univariate analyses (conventional method) and multivariate analyses with machine learning (new method). We then examined the relationship between individuals' lateralization results and corresponding inversion sensitivity scores. We find our multivariate method can detect the lateralization of word-processing with a greater degree of specificity, than is possible with conventional measures. Further, our multivariate laterality index, but not conventional laterality measures, can predict an individual's sensitivity to word inversion.

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6:00-7:30 PM (5124)

Statistical Learning Affects Orthographic and Semantic Aspects of Word Learning. VICTOR KUPERMAN and BRYOR SNEFJELLA, *McMaster University* (Sponsored by Victor Kuperman) — Individual ability to extract non-linguistic distributional patterns from noisy environment (statistical learning) is known to predict acquisition of L2 (Frost et al., 2013). Less is known about how statistical learning ability influences specific aspects (phonological, orthographic, or semantic) of word learning in L1. A sample of 38 readers were eye-tracked while reading 9 novel words appearing in 5 contexts each: eye movements were online indices of word learning. Participants also completed a battery of tasks, including visual statistical learning tests, and outcome measures of word learning (orthographic choice and definition tests). Mixed-effects models showed that individuals more proficient in statistical learning were faster to reach a floor value in fixation durations than less proficient ones. They were also more accurate in the orthographic and semantic tasks. The findings confirmed a hypothesized link between non-linguistic and linguistic learning in L1 and demonstrated it at all levels of linguistic structure.

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6:00-7:30 PM (5125)

Am I Saying This Right? The Influence of Orthography and Others' Utterances on Pronunciation Expectations. DARCY WHITE, DREW WEATHERHEAD, DEREK BESNER and KATHERINE WHITE, *University of Waterloo* (Sponsored by Derek Besner) — In a series of experiments, we explored the role of orthography, other speakers' pronunciations, and other speakers' characteristics, on an individual's performance in an object identification task. In these experiments, Participants were trained on pairings of written novel words and novel objects, and were later presented with the same objects and heard another individual label them (with a regular or irregular pronunciation). Finally, at test, participants were presented with the same objects as in the earlier phases 3 times; once with a regular pronunciation, once with an irregular pronunciation, and once with a third unrelated word. Participants were asked to indicate whether the word was the correct label for the object. These experiments yielded results that imply that individuals

give more weight to some types of information than others, and reveal the role of speaker characteristics in this weighing of information.

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6:00-7:30 PM (5126)

Predictability in the Brain During Reading of Connected Texts. BENJAMIN T. CARTER and STEVEN G. LUKE, *Brigham Young University* (Sponsored by Steven Luke) — Predictability is known to influence eye movements in reading. However, prediction is likely a graded process; other information might be predictable even when the full word form is not. We investigated how the predictability of different types of information (lexical, semantic, syntactic) is instantiated in the brain. Participants read passages from the Provo Corpus (Luke & Christianson, 2016, 2017) in the MRI while their eye movements were recorded. Regions sensitive to syntactic predictability included right fusiform gyrus, left anterior temporal lobe (Henderson, Choi, Lowder, & Ferreira, 2016), right superior and middle frontal gyri, and anterior cingulate. Regions sensitive to semantic predictability included many previously identified as part of the semantic system (Binder et al., 2009). Regions sensitive to lexical predictability included many of these same syntactic and semantic regions, but also included frontal and temporal right-hemisphere regions (including the right auditory cortex) not sensitive to syntactic or semantic predictability alone.

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FALSE MEMORY II

6:00-7:30 PM (5127)

Links Between Naturally Occurring Mood States and the Production of False Memories. ANNE-LAURE GILET, FABIENNE COLOMBEL and CHRISTELLE EVRARD, *Université de Nantes* — Research has shown that the susceptibility to false memories increases under induced positive mood states. The current study investigated the links between naturally occurring emotional states (e.g., life satisfaction, positive and negative affects) and the production of false memories using the Deese/Roediger-McDermott (DRM) procedure. Forty-seven younger participants were presented with DRM lists followed by a free recall test. Participants also completed several questionnaires assessing their mood state as well as their life satisfaction, and optimism. The production of false memories was positively and significantly associated with life satisfaction ($r = .37, p = .011$, and $r = .48, p < .001$) but negatively and significantly associated negative affect as measured with the PANAS ($r = -.35, p = .016$). Consistently with past studies, our results showed a significant relationship between mood states and the production of false memories.

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6:00-7:30 PM (5128)

Imagining Experiencing an Event in the Future Inflates Certainty That it Occurred in the Past. DUSTIN P. CALVILLO, ANDREA N. FLORES, PAUL M. LARA and WHITNEY C. HAWKINS, *California State University, San*



Marcos — Imagination inflation occurs when participants increase their certainty that an event has occurred after they imagine that event occurring. The present study examined the effects of imagining events in the future on participants' certainty they had experienced those events in the past. Because of the functional and neurological similarities in episodic future thinking and counterfactual thinking, we predicted that imagining events in the future would result in imagination inflation similar to imagining events in the past. Participants rated their certainty in having experienced 40 events and then either imagined experiencing four of those events in the future or in the past. Two weeks later, participants completed certainty ratings a second time. In both imagination conditions (future and past), certainty ratings increased more for imagined events than for control events. This suggests that imagining events in the future makes people more certain that they have happened in the past.

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6:00-7:30 PM (5129)

The Influence of Photographs on Memory for Fake News Headlines. JANICE L. BURKE, KARIMA K. SHEHADEH, JESSICA R. LEE and JEFFREY S. ANASTASI, *Sam Houston State University* — Previous research has shown that individuals can easily develop false memories for fake news stories. The current study evaluated individuals' false memory for true and fabricated news headlines with and without the presence of photographs. Participants' memory for both true and false news headlines was increased when accompanied by a photograph compared to those headlines that were not accompanied by a photograph. Specifically, results showed that, overall, participants remembered more true headlines than false headlines, with a greater increase in memory for false headlines due to the presence of photographs. Additionally, participants made more "remember" judgments for false headlines accompanied with a photograph compared to those without a photograph. True headlines failed to show a similar increase in remember judgments. Findings are discussed with regard to false memory production as well as the current discussion concerning "fake news."

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6:00-7:30 PM (5130)

Does Change Detection Following Misinformation Enhance Memory? JARUDA ITHISUPHALAP, *Kent State University*, ERIC RINDAL, *Georgia College & State University*, MARIA S. ZARAGOZA, *Kent State University* — The claim that misinformation is harmful to memory has received extensive empirical support. For example, studies of the "misinformation effect" have amply demonstrated that exposure to misinformation can seriously undermine the accuracy of eyewitness reports. In a recent paper, Putnam, Sungkhasettee, and Roediger (2017) argue that there are cases where misinformation can actually enhance memory. In support of their claims, Putnam et al. (2017) showed that when they restricted their analysis of misled items to those cases where participants detected a change between the witnessed event and the postevent misinformation, the misled condition evidenced enhanced recognition of the

witnessed items relative to the control. In the present study, we sought to test the alternative hypothesis that the Putnam et al. (2017) findings reflect a selection effect rather than evidence that change detection enhances retention.

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6:00-7:30 PM (5131)

Source Credibility as a Moderator of the Effect of Initial Testing on the Reporting of Misinformation. PAUL WILLIAMSON and YIK S. LAM, *Flinders University*, GLEN E. BODNER, *University of Calgary* — Initial testing can have an effect on the misinformation subsequently reported on a second test. Chan et al. (2009) found higher reporting of misinformation after an initial test (i.e., retrieval enhanced suggestibility: RES). In contrast, Huff et al. (2016) found reduced reporting of misinformation after an initial test (protective effect of testing: PET). The contrasting effects might be driven by differences in the credibility of the source providing the misinformation, such that an RES pattern is expected when source credibility is high and a PET pattern is expected when it is low. To test this proposition, a 2 (test condition: no initial test vs. initial test) \times 2 (source credibility: high vs. low) between-subjects experimental design was used. Source credibility was manipulated using feedback about the accuracy of bogus recall reports provided by previous participants. The results are interpreted in terms of differential discrepancy detection and source monitoring.

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6:00-7:30 PM (5132)

Comparing Suggestibility to Additive vs. Contradictory Misinformation Following Divided Attention and/or Explicit Error Detection. SHARDA UMANATH, *Claremont McKenna College*, MARK J. HUFF, *The University of Southern Mississippi*, FRANCOIS RIES and LAUREN M. CLUBB, *Claremont McKenna College* — After reading a fictional story, participants answered related questions containing misleading details that were either additive (not originally included) or contradictory (a change to the original). During this misleading question phase, two factors of interest were manipulated: Attention and error detection. Some participants answered the questions under full attention whereas others did so while completing a secondary digit-monitoring task and some participants were instructed to mark any detected errors while others were not. On a final test, additive misinformation was endorsed more frequently than contradictory, replicating prior work. Dividing attention however, reduced suggestibility exclusively for additive misinformation whereas error detection reduced contradictory (only under full attention). Divided attention therefore affects the likelihood that additive misinformation will be encoded during misinformation exposure, whereas error detection under full attention affects the likelihood contradictory misinformation will be rejected at retrieval, providing additional evidence for the dissociation between additive and contradictory misinformation.

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6:00-7:30 PM (5133)

The Effect of Environmental Context on False Recognition: Evidence From the Remember-Know Paradigm. YOONHEE JANG and KEVIN E. KUPER, *University of Montana* — This study investigated whether false recognition would be influenced by environmental context. For the study, participants received lists of semantically related words in a typical lab. For the recognition memory test, one group moved into a new room (different context) while the other group stayed in the same room (same context). Participants were asked to provide Remember-Know judgments to recognized items. Results showed that reinstatement of the environment context increased true and false recognition. On the Remember-Know judgment task, the different-context group selected Remember responses more frequently than Know responses for both correctly recognized studied words and falsely recognized critical lures. Interestingly, the same was marginally true for the same-context group only when they correctly recognized studied words; they did not differentiate these responses for falsely recognized critical lures. These results suggest that reinstatement of the environment context may play an important role in false recognition judged as Know responses.

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6:00-7:30 PM (5134)

Testing the Reconsolidation and Attention Explanations of the Retrieval Enhanced Suggestibility Effect. DIANNA S. LONG and ROBERT F. BELLI, *University of Nebraska-Lincoln*, LEAMARIE T. GORDON, *Assumption College* (Sponsored by Robert Belli) — Retrieval enhanced suggestibility (RES) occurs when initial testing prior to postevent misinformation increases the misinformation effect. One explanation suggests introduction of postevent misinformation disrupts the reconsolidation process initiated by reactivation. To test this explanation, half of the participants received an initial test prior to exposure to consistent, neutral, and misleading postevent information. A final modified cued recall (MCR) test asked participants to report both original event and postevent details. Results demonstrate the RES effect such that the number of misled responses on the MCR increase following reactivation. Results for event-detail responses indicate main memory impairment and test-enhanced learning effects, but no interaction effect involving reactivation contrary to the disrupting reconsolidation hypothesis. An alternative hypothesis proposes that RES results from increased attention to postevent details. Analyses indicate that accuracy during reactivation weakly increases postevent responses suggesting that the impact of an attention mechanism is attenuated in an MCR test.

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6:00-7:30 PM (5135)

Getting High and Distorting Emotional Memory: THC at Retrieval Increases False Alarms. MANOJ K. DOSS, JESSICA WEAVER, DAVID A. GALLO and HARRIET DE WIT, *University of Chicago* (Sponsored by David Gallo) — Marijuana is becoming increasingly prescribed to treat anxiety disorders such as posttraumatic stress disorder, but surprisingly, little

work has investigated its effects on emotional episodic memory. Here, we tested the effects of $\Delta 9$ -tetrahydrocannabinol (THC) on the retrieval of emotional memories using a two-day procedure. On the first day, participants viewed labels describing emotionally negative, neutral, and positive pictures. After half of these labels, the corresponding picture was presented. Two days later, participants received THC (15 mg) or placebo, and their memory for the pictures was tested by presenting the labels. Although THC had little effect on hit rates, false alarms were increased, especially for positive items. Furthermore, THC at retrieval increased false alarms on the Deese-Roediger-McDermott task with less of an effect on critical lures, suggesting that THC alters semantic activation. Therefore, THC may not actually suppress emotional memories once they have been encoded, though it may distort them via reconstructive processes. These findings are in line with others demonstrating that recreational drugs can distort emotional memory retrieval with potential specificity for positive memories.

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6:00-7:30 PM (5136)

Resisting Misinformation via Discrepancy Detection: The Effects of Unaware Exposure to Smell. RONA SHEAFFER and AINAT PANSKY, *University of Haifa* (Sponsored by Morris Goldsmith) — Previous studies have shown that contaminating effects of misinformation can be reduced by drawing eyewitnesses' attention to the discrepancy between the misinformation and the original information. We tested whether a similar reduction could be obtained implicitly (without awareness), by drawing on the metaphorical connection between fishy smells and suspicion, following Lee and Schwarz (2012). Experiment 1 established the generality of this metaphoric connection by replicating their findings under conditions in which the smell associated with suspicion is unspecified in the language (as in Hebrew, unlike English). In Experiment 2, the metaphor's long-term effects on subsequent memory were examined using the misinformation paradigm. Forty-eight hours after viewing an event, participants received misinformation in a room sprayed with either a fishy or control-pleasant smell. As expected, the fishy smell eliminated misinformation interference and lowered suggestibility on the final test compared to the control condition, presumably due to an increase in discrepancy detection.

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6:00-7:30 PM (5137)

Short-Term False Memories Vary as a Function of List Type. SHUOFENG XU and ZHICHUN YU, *Colby College*, DAWN M. MCBRIDE, *Illinois State University*, JEN COANE, *Colby College* (Sponsored by Jen Coane) — In long-term memory, false memories for verbal materials can vary as a function of the type of relationship between list items and non-studied lures. Semantic lists sometimes yield higher error rates than phonological lists (Watson et al., 2003, Exp. 2) and lists that share semantic features with a lure yield higher errors than lists that are purely associatively related (Coane et al., 2016). Whether such effects occur in short-term memory is unclear. In a modified Sternberg task, participants studied lists of



semantically or phonologically related items (Experiment 1) or lists of purely associatively related or semantically and associatively related lists (Experiment 2). In both studies, lists that were more similar to non-studied lures resulted in more false alarms – whether the similarity was in terms of orthographic-phonological features or primitive semantic features. Thus, multiple types of relationships affect activation of information in STM and can result in errors.

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6:00-7:30 PM (5138)

Picture (Im)Perfect: Recognition Memory Illusions can be Created by Photographs. JOSEPH CLARENCE WILSON and DEANNE WESTERMAN, *Binghamton University* (Sponsored by Deanne Westerman) — Photographs can create false autobiographical memories, but what is the underlying mechanism? Enhanced processing fluency has been offered as an explanation, however, the effect has not been studied in a straightforward recognition memory test, where the effect of fluency is well-documented. If pictures do enhance the fluency of events, they should similarly influence recognition judgments. Five experiments explore enhanced fluency as a possible mechanism for the effects of photos on memory. Results suggest that photographs enhance the fluency of related words (Experiment 1), that false memories can be induced by photos on a recognition memory test (Experiment 2), that such effects depend on a within-subjects manipulation of photo (Experiment 3), and appear only on conceptually-driven recognition tests (Experiments 4 & 5). The results support the notion that photograph-based illusions of memory stem from the ability of related photographs to increase the speed and ease of conceptual processing.

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HUMAN LEARNING AND INSTRUCTION III

6:00-7:30 PM (5139)

Understanding the Mnemonic Effects of Disfluency Through a Material Appropriate Processing Framework. CAROLE L. YUE, *Covenant College*, ROBERT A. BJORK, *University of California, Los Angeles*, MARK A. MCDANIEL, *Washington University in St. Louis* — The mnemonic effects of text disfluency are inconsistent. In an effort to more fully understand these effects, we applied the material appropriate processing (MAP) framework, which states that interventions enhance recall inasmuch as they complement processing of the to-be-learned material. Specifically, we tested whether presenting words in a disfluent (i.e., hard-to-read) font would promote item-level processing in text with an existing organizational structure. Participants read a folktale in one of four conditions: a control condition in which all text was in fluent (i.e., Times New Roman) font; a letter-deleted condition in which some words were missing letters; a word-disfluent condition, in which some words were presented in disfluent (i.e., Brush Script) font; and an all-disfluent condition in which the entire text was in disfluent font. Replicating previous findings, participants in the letter-deleted condition recalled more than control. Importantly, participants in the word-disfluent condition recalled more than

those in control and all-disfluent conditions and no differently than those in the letter-deleted condition. Results suggest that a MAP framework may help explain the mnemonic effects of disfluency.

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6:00-7:30 PM (5140)

Using Product Label Information to Refute Misconceptions About Aspirin: The Effects of Selective Attention and Processing Strategy. MICHAEL P. RYAN, PAULA COSTA and AUBREY B. CRUZ, *University of Texas at San Antonio* — Naïve misconceptions that consumers have about over-the-counter drug products may not be dispelled by a careful reading of the product label. The co-activation of naïve misconceptions during the reading of refutation text is thought to be a necessary but not sufficient condition for correcting misconceptions. What has not been examined in prior studies is the encoding strategy used by the individual to reconcile an activated misconception with corrective text information. Participants examined highlighted cue-words on an aspirin label in one of two ways. Some wrote short sentences explaining why a given drug fact might be “easily ignored.” Others wrote short sentences explaining why a given drug fact might be “easily confused.” Easily-Confused processing increased truth ratings for label-congruent aspirin claims more than did Easily-Ignored processing. Neither processing strategy decreased truth ratings for label-discrepant claims about aspirin. However, the cued recall of refutational drug facts was greater with Easily Confused processing than with Easily Ignored processing. We conclude that processing strategy increases the recall of corrective text but does not serve to discredit associated misconceptions

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6:00-7:30 PM (5141)

All People are Created Equal – They all Fall Victim to Inaccurate Information. AMALIA M. DONOVAN, KIMBERLY S. SCOTT and DAVID N. RAPP, *Northwestern University* — People often reproduce the inaccuracies they encounter, even when they should know better. Recent sociopolitical concerns about the spread of fake news, and public beliefs about who is most likely to fall victim to false information, highlight the need for studying these effects as a function of individual differences. We examined whether reliance on inaccurate information differs as a function of political affiliation, moral dimensions, and thinking habits. Participants read fictional texts containing mixtures of accurate and inaccurate statements. They next completed a political affiliation survey, the Moral Foundations Questionnaire, the Metacognitive Awareness Inventory, and the Cognitive Reflection Test. Finally, they completed a trivia quiz that could be answered by using previously presented statements. Participants provided inaccurate answers to quiz questions more so after reading inaccurate than accurate statements. Performance did not correlate with the political, moral, and thinking measures, and no differences were identified across participant groupings.

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6:00-7:30 PM (5142)

The Memrise Prize: An International Optimal Learning Research Competition. ROSALIND POTTS and DAVID R. SHANKS, *University College London* — Much laboratory research has demonstrated the effectiveness of optimal learning strategies such as spacing, retrieval practice, and mnemonics. How can such techniques be optimally combined for real world learning? We ran a two-phase international research competition to find out. In Phase 1, research groups developed methods to maximize the number of Lithuanian-English words pairs that learners could acquire in an hour and successfully recall one week later, testing their own methods against our standardized control task. Five shortlisted methods and the control task were then compared on a common online platform in Phase 2, with a new language and vocabulary set. We collected retention data and metacognitive measures from over 4000 users of an online learning tool. While distinctly different, successful methods shared several key features. The competitive process represents an important new approach to the development of optimal learning techniques relevant to real world learning. Email: Rosalind Potts, rosalind.potts@ucl.ac.uk

6:00-7:30 PM (5143)

Content Knowledge Influences Secondary Education Stem Teacher Performance. CHRISTINA MCCARTHA, CHARLES HORN and RENEE STUBBS, *Newberry College* — The current work follows a group of in-service STEM secondary education teachers ($n = 6$) to determine if their pre-service training program will lead to higher rates of success in the classroom. Classroom success is measured using Clemson's EQUIP, an inquiry-based rubric (<https://www.clemson.edu/education/inquiry-in-motion/research-evaluation/equip.html>). Other variables collected included the teacher's previous undergraduate GPA, grant provided preparation activities, & Praxis content and pedagogy (PLT) exam scores. As the Year 1 sample size is small, relationships between variables were tested with a set of specific pair-wise comparisons. It was found that undergraduate GPA moderately correlated with EQUIP scores ($r(10) = .64, p = .16$). As data collection continues for the study, as more students become part of the in-service group these correlations will be modeled once again for robustness. The current data suggests that STEM teacher preparation programs should include a focus not only on leadership and classroom management, but strong content mastery. Email: Sara Peters, sara.peters@newberry.edu

6:00-7:30 PM (5144)

The Effect of Prequestions on Learning Introductory Biology. JASON GELLER, SHANA CARPENTER, CLARK COFFMAN, CARLY MANZ, SHUHEBUR RAHMAN, PATRICK ARMSTRONG and MONICA LAMM, *Iowa State University* — Taking a test before a learning episode can enhance memory for that information. This prospective benefit of testing is called the *prequestion effect*. Many studies have examined this effect in the laboratory, but few have examined it in the classroom. In the current study, the effect of prequestions was examined in an undergraduate biology course. Before each class, students provided responses to a prequestion, with no feedback, and

provided ratings about confidence, familiarity, and out-of-class reading. After class, students answered the prequestion again, along with a new question from the same lesson. On weekly quizzes, students answered the same questions posed in class (i.e., prequestions and new questions), along with never-before-seen (quiz-only) questions from the same lessons. Prequestions did not enhance learning of information from class; however, a prequestion at the beginning of class had a small effect on enhancing the effect of retrieval practice on later weekly quizzes. Email: Shana Carpenter, shacarp@iastate.edu

6:00-7:30 PM (5145)

Seductive Stories: Effects of Narrative Context on Metacomprehension, Interest, and Learning From Science Text. DILLON RUDIGER and SCOTT R. HINZE, *Virginia Wesleyan University* — This study explores the effects of expository and narrative contexts on memory and metacognitive judgments for science content. Undergraduate participants (preliminary $n = 46$) read a text about the circulatory system (Wolfe & Mienko, 2007), with matched content presented either in a typical expository context, in a more interesting narrative context, or in a context-free summary. After reading, participants rated their interest and predicted future test performance, and then completed a short-answer test two days later. Preliminary results show significantly greater interest and performance predictions in the narrative condition compared to the summary condition, with moderate scores for the expository condition. Despite a lack of context, as well as lower interest and performance predictions, test performance was nominally higher for the summary condition than the expository and narrative conditions. These results are consistent with findings that readers often problematically rely on superficial cues like interest or ease of processing when making metacomprehension judgments (Thiede, Griffin, Wiley, & Anderson, 2010).

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6:00-7:30 PM (5146)

When and Why Video Manuals are Useful for Humans to do Assemble Tasks. ETSUKO T. HARADA and YUKI ENDOH, *University of Tsukuba* — Video manuals are sometimes awesome, and sometimes awful. What are the differences in their perceived usefulness? Previous studies have suggested that video manuals are effective when they contain important procedural information. Therefore, we conducted an experiment comparing video manuals and picture-based paper manuals for completing three tangram tasks with different degrees of importance attached to procedural knowledge. We also included manuals with and without pictures of hands, because only video manuals usually include hand pictures. Undergraduates ($N = 20$), assembled the three tasks using a given manual (learning phase), and again without a manual (incidental learning test). Results indicated that video was effective in the learning phase for 3D, but not for 2D tasks. However, videos did not show any effect during the test phase. Moreover, there was only restricted



learning of 2D tasks having difficult transitional changes with any manual. The meaning of procedural information and hands are discussed.

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6:00-7:30 PM (5147)

A Kitchen Sink of Cognitive Psychology for High-Stakes Test Prep. MATTHEW JENSEN HAYS and CHARLES J. SMITH, *Amplifire* — For decades, cognitive psychologists (e.g., Glover, 1989) have lamented the (limited) extent to which instructors and educational policymakers leverage robust human memory effects (e.g., retrieval, spacing, delayed feedback). When employed in an educational setting, these effects can substantially enhance learning (e.g., Metcalfe, Kornell, & Son, 2007). In two experiments, we evaluated the effect on learning of using a digital training platform designed to harness several of these phenomena. In Experiment 1, participants preparing for the Multistate Bar Exam (MBE; $N = 3,352$) provided an average of 3.6% more correct responses on topics for which they used the training platform than on those for which they did not. In Experiment 2, participants preparing for the Medical College Admission Test (MCAT; $N = 1,578$) were correct an average of 7.4% more often on test items that were related to concepts they encountered in the training platform than on those that were not. Our findings suggest that harnessing cognitive psychology phenomena in the design of adaptive educational systems can improve recall, which can increase learners' test scores and their likelihood of passing high-stakes exams.

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6:00-7:30 PM (5148)

Do Phonologically-Related Intervening Names Influence Spaced Retrieval of Proper Names? GEOFFREY B. MADDOX, RACHEL E. MYERS, HANNAH J. PORTER and KATHERINE K. WHITE, *Rhodes College* — Previous research has shown that names are particularly difficult to learn and retrieve, and related names sometimes facilitate and sometimes compete for retrieval with target names. This study investigated how phonologically-related intervening names influence acquisition and long-term memory for face-name pairs in a spaced retrieval paradigm. Participants studied target names (e.g., Max) and practiced cued retrieval of the names at short or long lags. A phonologically-related (e.g., Matt) or unrelated (e.g., Frank) name was presented immediately following the study trial or immediately preceding the retrieval trial for each target. Acquisition of target names was enhanced by phonologically-related names, but only at short lags. In contrast, retrieval of successfully-learned target names at final test was worse when intervening names were phonologically-related than unrelated. These results will be discussed within current accounts of spaced retrieval practice and interactive activation models of word retrieval.

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6:00-7:30 PM (5149)

Interpolated Testing Potentiates New Learning When Retrieval Practice is More Effortful: A Metacognitive Approach to the Forward Testing Effect. SARA D. DAVIS

and JASON C.K. CHAN, *Iowa State University* (Sponsored by Jason C.K. Chan) — Prior testing can facilitate new learning of educationally relevant materials (Wissman, Pyc, & Rawson, 2011). Most studies examining this effect have used interpolated recall tests, whereas no studies to date have investigated interpolated recognition, despite its prevalence in classroom settings. Recognition may not potentiate new learning because it is relatively less effortful than recall, and the retrieval fluency associated with recognition may lead to adoption of less successful encoding strategies for future learning. In two experiments, participants read either three (Experiment 1) or four (Experiment 2) sections of a passage, and were all tested on the final section. Before this section, participants either took interpolated cued-recall tests, multiple-choice tests, or were not tested. Relative to no prior testing, prior cued-recall potentiated new learning to a greater degree than multiple-choice, supporting the idea that the metacognitive knowledge gained during prior tests may contribute to the forward testing effect.

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6:00-7:30 PM (5150)

Can Retrieval Practice Benefit Causal Learning? LUKE GLENN EGLINGTON and SEAN H. KANG, *Dartmouth College* (Sponsored by Sean Kang) — There is ample evidence that retrieval practice can benefit memory (Roediger & Butler, 2008). However, less is known about whether retrieval practice can benefit causal learning (Rehder, 2003). In Experiment 1, participants read a passage that described a category defined by a chain of causal relations (e.g. Butane fuel causes a loose gasket, a loose gasket causes a hot engine, etc.), followed by either retrieval practice or restudy. Afterward, participants made likelihood judgments for exemplars that satisfied or violated the causal relations (e.g., a vehicle with butane fuel but a *tight* gasket). 24 hours later, participants returned to make the same likelihood judgments, followed by a free recall test. Retrieval practice significantly benefitted preservation of causal knowledge across the delay and final free recall performance, relative to restudy. In Experiment 2, we sought to extend this finding to different causal relations (e.g., conjunctive vs. independent causes).

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6:00-7:30 PM (5151)

Provided Examples Support Novel Application of Declarative Concepts. AMANDA ZAMARY, *Kent State University*, KATHRYN T. WISSMAN, *Skidmore College*, KATHERINE A. RAWSON, *Kent State University* (Sponsored by Katherine Rawson) — Declarative concepts are abstract concepts denoted by key terms and short definitions (e.g. *positive reinforcement*). Given that declarative concepts are abstract, an intuitive way to support learning of these concepts is through concrete examples. Although recent research suggests that examples support concept comprehension, instructors often aspire that students are able to apply concepts in novel contexts. The current research investigated if provided examples can directly benefit novel application. In two experiments, participants were



assigned to a definition or example practice group. Two days later, participants took final tests: definition and example cued recall and novel application (in which participants generated examples of concepts in novel scenarios). Of greatest interest, novel application was greater following example practice relative to definition practice ($d = .69 - .70$). Additionally, less time was spent during practice by the example practice group relative to the definition practice group (Experiment 1: $d = .97$; Experiment 2: $d = .30$). These findings suggest that provided examples can directly benefit novel application.
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6:00-7:30 PM (5152)

Using Multiple-Choice Tests to Improve Vocabulary Learning via Flashcards. ERIN M. SPARCK, GULNAZ KIPER, ELIZABETH LIGON BJORK and ROBERT BJORK, *University of California, Los Angeles* (Sponsored by Elizabeth Bjork) — Multiple-choice practice tests with competitive alternatives can improve later recall of both tested and related information from studied texts (Little, Bjork, Bjork, & Angello, 2012; Sparck, Bjork, & Bjork, 2016). In new research, we explore how multiple-choice testing might be incorporated into a flashcard system for GRE vocabulary learning, thereby expanding the positive benefits of multiple-choice testing to another domain. If, on the flashcard for a given GRE word, the alternatives to a multiple-choice question regarding the definition of that word are competitive, they might encourage retrieval of their associated definitions to the benefit of those words on a later test (in a way that cued-recall initial testing would not). We compare learning of vocabulary words using several different initial testing/study formats. Results suggest that when learners have a limited number of study trials and a large number of words to learn, flashcards incorporating competitive multiple-choice questions might have benefits over traditional flashcard formats.

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6:00-7:30 PM (5153)

Implementing Test-Enhanced Learning in Medical Education: Evidence From Meta-Analysis. LISI WANG, NATHANIEL RALEY and MICHAEL LEE, *University of Texas at Austin*, ANDREW BUTLER, *Washington University in St. Louis* (Sponsored by Andrew Butler) — Test-enhanced learning is an educational intervention that promotes learning through practice with retrieving and using knowledge. Within health sciences education, test-enhanced learning has become increasingly popular because it has been shown to increase retention of factual knowledge and facilitate the transfer of knowledge and skills across contexts. Although numerous studies have investigated the efficacy of test-enhanced learning in health sciences education, most of these studies have not been included in recent meta-analyses on the testing effect. We conducted a meta-analysis of test-enhanced learning in health sciences education. We coded for numerous potential moderating variables, including practice test format (recall vs. recognition), similarity in content between practice test and final test (match vs. mismatch), timing of feedback (immediate

vs. delayed), and type of feedback (explanation vs. correct answer). The majority of studies showed that taking practice tests was more effective than restudying the materials.

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6:00-7:30 PM (5154)

Does Self-Scoring Enhance Learning? GARRETT M. O'DAY and JEFFREY D. KARPICKE, *Purdue University* (Sponsored by Jeffrey Karpicke) — Many retrieval practice scenarios include multiple retrieval events with interspersed study trials. Consequently, retrieval practice often coincides with restudy opportunities, which may not be effective learning events. The present experiments examined the efficacy of self-scoring one's own retrieval practice responses as an alternative to restudying. In 2 experiments, subjects studied key-term definitions, recalled the definitions, then either self-scored their responses or restudied the correct definitions, and completed a final test over the definitions. Subjects were generally overconfident in their self-score responses. More strikingly, subjects who self-scored performed worse on the final test than did subjects who restudied correct definitions. Replacing the restudy event with self-scoring impaired how much people learned. These findings suggest that students who score their own responses during retrieval practice may be doing more harm than good.

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6:00-7:30 PM (5155)

Optimising Perceptual Training for the Detection of Hip Fractures on Conventional Radiography. WEIJIA CHEN (Graduate Travel Award Recipient), *The University of Melbourne*, DAVID HOLCDORF, MARK WILLIAM MCCUSKER and FRANK GAILLARD, *Royal Melbourne Hospital*, PIERS DOUGLAS HOWE, *The University of Melbourne* (Sponsored by Stephan Lewandowsky) — Diagnosing fractures on conventional radiographs can be a difficult task, usually taking years to master. Typically, students are trained ad-hoc, in a primarily rule-based fashion. Our study investigated whether students can more rapidly learn to diagnose hip fractures via perceptual training, without having to learn an explicit set of rules. One hundred and thirty-nine naive students were shown a sequence of plain film X-ray images and for each image were asked to indicate whether a fracture was present. Students were told if they were correct and the location of any fracture, if present. No other feedback was given. The more able students achieved the same level of accuracy as board certified radiologists at identifying hip fractures in less than an hour of training. Surprisingly, perceptual learning was reduced when the training set was constructed to over-represent the types of images participants found more difficult to categorize. Conversely, repeating training images did not reduce post-training performance relative to showing an equivalent number of unique images. Perceptual training is an effective way of helping novices learn to identify hip fractures in X-ray images and should supplement the current education program.

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6:00-7:30 PM (5156)

What Affects Letter and Digit Identification? Evidence for a Single Alphanumeric Identification System. TERESA M. SCHUBERT, *Macquarie University*, MICHAEL MCCLOSKEY, *Johns Hopkins University* — Literate adults are highly skilled at identifying letters and Arabic digits. Both types of characters are culturally-invented symbols, and have high visual similarity to each other. These similarities suggest they may be identified in a single cognitive system, rather than separate letter identification and digit identification processes. In this study, we presented adult participants with all pairwise combinations of letters and digits in a simultaneous same-different decision task. The response times (RT) in the 'different' trials serve as a measure of similarity between the characters: Higher similarity results in slower RT and lower similarity results in faster RT. Data were analyzed using linear mixed effects modeling, using Visual Similarity, Visual Complexity, Frequency, Name Similarity, and the Type of character (letter/digit) to predict RT. Visual Similarity and Frequency significantly predict RT, while the effect of Type is equivocal. Bayes Factor analysis indicates no interaction with Type, strongly suggesting that letters and digits are identified in a single system, leading to unitary effects of bottom-up variables on performance.

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6:00-7:30 PM (5157)

Does Retrieval Practice Enhance Transfer of Learning? A Comprehensive Meta-Analytic Review. STEVEN C. PAN and TIMOTHY RICKARD, *University of California, San Diego* — Does *retrieval practice* yield learning that transfers to different contexts? In the first investigation of its type, we meta-analyzed 192 transfer effect sizes extracted from 122 experiments and 67 articles ($N = 10,396$). A random effects model revealed that, overall, retrieval practice does yield transferrable learning as measured relative to a reexposure control condition ($d = 0.40$, 95% C.I. [0.31, 0.49]). Moreover, transfer of learning is greatest across test formats, to application and inference questions, to mediator and related word cues, and to problems involving medical diagnoses; it is weakest to rearranged stimulus-response items, to untested materials seen during initial study, and to problems involving worked examples. Moderator analyses further indicated that response congruency and elaborated retrieval practice, as well as initial test performance, strongly influence the likelihood of positive transfer. Together, these results motivate a three-factor model of transfer, have implications for theory, and offer practical insights for the effective use of retrieval practice in educational and other training contexts.

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PROSPECTIVE MEMORY

6:00-7:30 PM (5158)

Focal and Nonfocal Prospective Memory Differ in Their Relationship to Visual Search and Executive Control. CELINDA REESE-MELANCON, *Oklahoma State University*, KENDRA C. SMITH, *Washington University*, KRISTI S. MULTHAUP, *Davidson College*, CHRISTOPHER C. DAVOLI,

Central Michigan University — This experiment extends work (e.g., Davoli et al., 2009; Reese-Melancon et al., 2014) documenting that measures of visual search have different relationships to focal prospective memory (PM) than they do to nonfocal PM. We previously reported that visual search is related to both focal and nonfocal performance when there is a delay between the presentation of the PM target and the opportunity to make a PM response. Here we report findings indicating that when the opportunity to make a PM response is immediate, focal performance is largely unrelated to visual search and not related to task switching, whereas nonfocal performance is significantly related to automatic and controlled visual search skills, as well as task switching. This work is the culmination of a series of studies examining the relationship between visual search and PM and highlights the important role individual differences play in PM performance.

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6:00-7:30 PM (5159)

The Effect of Prospective Memory Difficulty on Precrastination. RACHEL VONDERHAAR and DAWN M. MCBRIDE, *Illinois State University*, DAVID A. ROSENBAUM, *University of California, Riverside* — The precrastination effect is the finding that individuals complete actions earlier to “get it out of the way” (Rosenbaum, Gong, & Potts, 2014). In the current study, we tested precrastination with a prospective memory (PM) paradigm to determine if this phenomenon generalizes to PM tasks that can be completed at a time chosen by the participant. Based on Rosenbaum et al.'s (2014) results that precrastination decreased when the task to be completed was more effortful, we investigated whether difficulty of the PM task affects when participants choose to complete the task. Our results indicated that the more difficult the PM task, the later participants chose to complete the task in the trial sequence. Reaction times (RTs) in completing the ongoing task were not influenced by participants' choice of when to complete the PM task or the PM task difficulty level, but ongoing RTs decreased after completion of the PM task.

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6:00-7:30 PM (5160)

Context Cue Focality Influences Strategic Prospective Memory Monitoring. HUNTER BALL and JULIE BUGG, *Washington University in St. Louis* — Previous research suggests that identifying the appropriate context to strategically heighten or relax prospective memory monitoring is an attentionally demanding process. In the current study, we first demonstrate that both younger and older adults are similarly able to strategically monitor in response to contextual cues. Next, we examine whether age-invariance in strategic monitoring may in part reflect that the ongoing task automatically orients attention to the relevant features of the context cue thereby reducing demands associated with identifying the appropriate context to increase and decrease monitoring. In a group of younger adults, we show that strategic monitoring is only evidenced during focal context cue conditions in which there is overlap between the type of processing needed for the ongoing task



and identifying the context cue. The implications for current theories of strategic monitoring and possible age-related differences in prospective memory are discussed.

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6:00-7:30 PM (5161)

After-Effects of Canceled Intentions and Retrieval Dynamics in Mouse Tracking. SAMANTHA N. SPITLER, JASON L. HICKS and MEGAN H. PAPESH, *Louisiana State University* — We investigated how a focal PM instruction and intention cancelation affects retrieval dynamics in mouse tracking. PM cues were shown in an active intention phase and then in a canceled intention phase of a lexical decision task. Word/nonword response fields were on the top/bottom right quadrants of the monitor and the PM response field was in the upper left. PM accuracy was very high in the active phase. Most accurate PM responses were reversals, such that they started toward the WORD response field and shifted toward the PM response field. We found very few PM cue commission errors after the intention was canceled and only modest evidence for attraction to the PM response field overall. Over 85% of responses to these stimuli were directly to the WORD response field. LDT performance was generally better in the canceled block, suggesting little or no intention-related cost. This lack of cost emerged in most dependent measures of mouse trajectories, including initiation time, x-flips, maximum curve deviation relative to an idealized straight line, and area under the curve. In general, PM words were processed much like other words in the canceled block, with only modest evidence for after-effects of having held the intention.

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6:00-7:30 PM (5162)

More Important Real-Life Prospective Memory Tasks are Higher in Accessibility. SUZANNA PENNINGROTH and WALTER D. SCOTT, *Washington State University* — Prospective memory (PM) tasks are intentions to be performed. In the Motivational-Cognitive Model of PM, higher task importance causes increased accessibility in memory. To test this prediction, we measured the correlation between importance ratings for real-life PM tasks and accessibility. In two studies, undergraduates listed their real PM tasks in a 4-minute recall paradigm and then rated each task on importance. Higher accessibility was defined as earlier recall. In Study 1, as predicted, earlier-recalled PM tasks were rated as more important. However, accessibility might have influenced importance ratings (e.g., if participants noticed the order of tasks recalled and this affected their ratings). Therefore, in Study 2 we scrambled the order of the PM tasks recalled before participants rated them on importance. The results replicated Study 1, providing stronger evidence that task importance influenced accessibility (not the reverse) and lending support for part of the Motivational-Cognitive Model of PM.

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6:00-7:30 PM (5163)

Individual Differences in Multiple Prospective Memory: The Role of Spatial Ability. VEIT KUBIK, *Stockholm University*, FABIO DEL MISSIER, *University of Trieste*, TIMO MÄNTYLÄ, *Stockholm University* — Prior research has primarily considered PM as a dual-task phenomenon, while in everyday life PM may rather involve *multiple* intentions in the context of *multiple* ongoing activities. We hypothesized that remembering multiple intentions, specifically across (compared to within) task domains, requires more cognitive control that may be alleviated by representing multiple intentions in spatial terms. Participants monitored four counters of forward-running digits following simple rules, and needed additionally to remember three delayed intentions that either referred to different counters (multi-domain PM) or the same counter (single-domain PM). Results showed that spatial ability incrementally explained multi- (but not single-) domain PM performance, when controlling individual differences in executive functioning and primary-task performance. In addition, men outperformed women in PM emerged, however, this gender effect was mediated by spatial ability. These findings suggest that with increasing cognitive-control demands other nonexecutive functions, such as spatial ability, may play a more important role.

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6:00-7:30 PM (5164)

Reversed Implementation Intentions and Goal Intentions did not Help Decrease Commission Errors in Prospective Memory. ANGEL MUNOZ GOMEZ ANDRADE, SEAN MCCREA and TESALEE SENSIBAUGH, *University of Wyoming* (Sponsored by David Kreiner) — Prospective memory (PM) commission errors (CEs) occur when individuals mistakenly perform a PM task when it is no longer relevant. Although researchers have identified factors responsible for producing CEs in PM, few studies (with partial success, e.g., Anderon & Einstein, 2017; Bugg et al., 2014) have explored strategies that might diminish CEs. We explored the extent to which implementation intentions (“And when I see the word “fish” again, then I will not press the red key!”) and goal intentions (“I will not press the red key, when I see the word fish!”) helped reduce PM CEs (compared to control). Following Pink and Dodson (2013, but without source-monitoring load), participants (N = 175, after power analysis) responded habitually to two PM target cues during a go phase, then during a no-go phase they were asked to stop making PM responses to some of the target cues while under divided attention. Surprisingly and despite these strong manipulations, the proportion of participants displaying CEs did not reliably differ between the goal (35%), implementation intention (44.8%), or control groups (47.4%), $X^2(2, N = 175) = 2.06, p = .36$. This suggests that PM CEs might be extremely difficult to avoid. Implications will be discussed.

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6:00-7:30 PM (5165)

The Effect of Mood on Event-Based Prospective Memory. RACHEL A. WORKMAN and DAWN M. MCBRIDE, *Illinois State University* (Sponsored by Dawn McBride) — Different



moods seem to elicit different processing styles (Hunt & McDaniel, 1993, Storbeck & Clore, 2005) and mood has been shown to affect retrospective memory in many ways. The current research investigated how induced mood affects event-based prospective memory (PM). Experiment 1 focused on mood-dependent memory effects at encoding and retrieval of the PM task. Experiment 2 examined mood effects on focal and non-focal PM retrieval. Although a mood effect was seen in Experiment 1 (a depressive mood induced before the PM block resulted in higher PM ongoing task accuracy than a positive mood), no effects of mood on PM cue detection accuracy or ongoing reaction times were significant in Experiment 2. These results suggest that mood may have a stronger effect at encoding than at retrieval of PM tasks.

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6:00-7:30 PM (5166)

Future Thinking: Influence of Prediction Outcome on Memory. ANDREA FRANKENSTEIN, MATTHEW MCCURDY, ALLISON SKLENAR and ERIC D. LESHIKAR, *University of Illinois at Chicago* (Sponsored by Audrey Duarte) — Prior research proposes that memory is used to make predictions about the future, suggesting an adaptive use of the contents of memory. To date, there has been little research investigating how prediction outcomes influence memory. An incorrect prediction may serve as an error signal, increasing the likelihood that the memory system tags that information as important, and hence more memorable. In the experiment, participants learned trait information about social targets and were asked to make predictions about those targets' behavior. Participants were given feedback about the behaviors, with half the behaviors consistent with predictions based on trait information and half inconsistent. Based on the adaptive memory framework and a portion of social cognition literature, a main effect of consistency was predicted, where inconsistent behaviors would be more memorable than consistent ones. Results showed that, contrary to the hypothesis, information consistent with the traits of social targets was better remembered than inconsistent information.

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6:00-7:30 PM (5167)

Seeing if Students Will Forget Their "Baby": Effects of Implicit Encoding on Prospective Memory for Cell Phones. ABIGAIL M. CSIK, ANDREA E. O'REAR and NATHAN S. ROSE, *University of Notre Dame* (Sponsored by Nathan Rose) — Despite the involvement of incidental encoding and personal relevance in real-world prospective memory (PM, e.g., remembering to take your baby with you), few studies have examined the contribution of these factors in PM failures. We collected cell-phones from 68 undergraduates (personally-relevant condition) and had them wear an activity tracker (experimenter-relevant condition) during a separate experiment lasting ~15-70 minutes, and measured how they remembered to retrieve their cell phone and return the activity tracker after the experiment. Encoding context was assessed by manipulating whether incidental encoding occurred inside or outside the test room. 11% of participants forgot and had

to be reminded before leaving the hall. Neither personal relevance nor encoding context affected the distance traveled before participants remembered the tasks; longer experiments did. Surprisingly, more people remembered to return the activity tracker before retrieving their cell phone. The results suggest that personal relevance alone isn't enough to support incidentally-encoded PM.

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6:00-7:30 PM (5168)

If I Believe It, Can I Achieve It? On the Reactive Effects of Prospective Memory Performance Predictions. KERI KYTOLA and CELINDA REESE-MELANCON, *Oklahoma State University*, TOM HANCOCK, *University of Central Oklahoma* (Sponsored by Kristi Multhaup) — To examine the impact of memory beliefs on prospective memory (PM) performance across PM tasks with varied retrieval demands and to determine the usefulness of different types of predictions, participants made single-item, multi-item, or no predictions about their PM performance on either a focal or nonfocal PM task embedded in an ongoing lexical decision task (LDT). Overall, both types of predictions had a beneficial effect on PM performance, but multi-item predictions were more effective for improving participants' nonfocal PM performance than were single-item or no predictions. However, multi-item predictions about nonfocal PM performance also led to greater ongoing LDT performance costs (i.e., task interference) than did single-item or no predictions. These findings suggest that predictions (particularly, multi-item predictions) are an effective strategy to improve PM performance, especially on more difficult PM tasks that require effortful monitoring processes to complete. Theoretical and practical implications are discussed, as are future directions.

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6:00-7:30 PM (5169)

Using the Relative Accessibility of Colors and Words to Test the Delay Theory of Prospective Memory. FRANCIS T. ANDERSON and MARK A. MCDANIEL, *Washington University in St. Louis* (Sponsored by Mark McDaniel) — In prospective memory (PM) research, costs (slowed response times with a PM task vs. without) have typically been interpreted as implicating a demanding monitoring process. However, using an accumulator model, the recently proposed delay theory (Heathcote, Loft, and Remington, 2015) found that costs were due to changes in decision thresholds. That is, in contrast to parameters that might reflect a monitoring process, Heathcote et al. found evidence that people were instead using a delay strategy, intentionally slowing their responding to allow more time for PM relevant information to accrue. A critical assumption of this theory is that both PM and ongoing task information are accumulated in parallel, but that PM information accumulates more slowly than ongoing task information (thus necessitating a delay). To test this, we created conditions in which PM-specific accumulation was either slower, faster, or equivalent to the ongoing task accumulation. Delay theory predicts that in situations when PM information accrues more quickly, there should be no costs, yet high PM. In



fact, we still obtained costs in the faster PM condition, and PM performance was significantly worse than the condition where accumulation rates were equivalent.

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6:00-7:30 PM (5170)

A Meta-Analysis of the Relationship Between Prospective Memory and Working Memory. EDDIE A. CHRISTOPHER and THOMAS REDICK, *Purdue University* (Sponsored by Thomas Redick) — The mental processes supporting our ability to remember to do something in the future (i.e., prospective memory) are not well understood. Previously, researchers theorized that prospective memory is supported by monitoring for the opportunity to complete one's prospective memory goal. We believed that monitoring processes would rely on working memory, allowing the individual to monitor while also performing an ongoing task. Past attempts to measure the relationship between prospective and working memory produced mixed results. We conducted a meta-analysis synthesizing these discrepant results. Individual differences in working memory were positively correlated with prospective memory performance, but only in situations where the prospective memory task was attentionally demanding. This has implications for our understanding of how prospective memory goals can be achieved, and encourages teaching individuals with low working memory to use strategies (e.g., implementation intentions) minimizing the need for executive attention when completing prospective memory tasks in the real world.

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6:00-7:30 PM (5171)

Measuring Ongoing Task Costs in Prospective Memory Paradigms: An Alternative to Reaction Time Difference Scores. JESSIE MARTIN and PAUL VERHAEGHEN, *Georgia Institute of Technology* (Sponsored by Paul Verhaeghen) — The degree to which individuals allocate resources towards executing a prospective memory intention varies based on factors such as task demands (focal or non-focal) as well as age. Further, the degree of ongoing task cost related to maintaining this intention is most frequently measured using a reaction time difference score, as estimate we hope to improve upon here. We investigated how both younger and older adults adjust ongoing task performance under different prospective memory task conditions, using an assessment of both speed and accuracy. Older and younger adults' performance was compared under both focal and non-focal task conditions. Ongoing task costs were evaluated using an adaptation of the Hughes et al. (2014) binning procedure which rank scores change in reaction time on accurate trials, and penalizes inaccurate trials. Results are discussed as they relate to our understanding of effortful processing as well as spontaneous retrieval.

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RECALL AND RECOGNITION

6:00-7:30 PM (5172)

Neural Correlates of Contextual Retrieval in a Hybrid Spatial-Episodic Memory Task. NORA A. HERWEG and ANSH JOHRI, *University of Pennsylvania*, MICHAEL R. SPERLING, *Thomas Jefferson University Hospital*, ARMIN BRANDT and ANDREAS SCHULZE-BONHAGE, *University Medical Center Freiburg*, MICHAEL J. KAHANA, *University of Pennsylvania* — The context in which we experience events helps to organize these events in memory. This organization can be inferred from the order in which information comes to mind in free recall tasks. To investigate the influence of spatial context on the organization of episodic memories, we recorded intracranial EEG data in 21 patients with medication-resistant epilepsy while they performed a hybrid spatial-free recall task. Patients navigated through a virtual town and items were revealed at a sequence of locations. We show that during successive recall of items that were presented at close spatial locations, high frequency activity (HFA) in the MTL increases compared to successive recall of distant items. This result suggests that HFA in the MTL marks the retrieval of spatial context information and is consistent with an important role for the MTL in both, spatial processing and episodic memory.

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6:00-7:30 PM (5173)

Time-Dependent Forgetting: The Role of Failed Item Reactivation. OLIVER KLIEGL and KARL-HEINZ T. BÄUML, *Regensburg University* — Time-dependent forgetting refers to the finding that recall of previously studied information declines with increasing delay between study and test. The present study sought to determine whether this type of forgetting is primarily caused by increased interference levels at test, or by problems in reactivating and sampling single items. To this end, we had participants study a list of unrelated nouns and, after either a 1-min, 10-min, or 30-min delay, asked them to recall as many of the words as possible. Results showed that response totals decreased with increasing delay, thus replicating typical time-dependent forgetting. Intriguingly, however, response latencies were also found to be reduced with longer delay. Because response latency is regarded a sensitive index of the size of participants' mental search set, these results indicate that longer delay can impair the sampling of studied items. Failed reactivation of studied items may critically contribute to time-dependent forgetting.

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6:00-7:30 PM (5174)

Effects of Grasp Compatibility on Long-Term Memory for Objects. DIANE PECHER, IVONNE CANITS and RENÉ ZEELLENBERG, *Erasmus University Rotterdam* — Previous studies have shown action potentiation during conceptual processing of manipulable objects. In three experiments, we investigated whether these motor actions also play a role in long-term memory. Participants categorized object pictures and object names that afforded either a power grasp or a precision grasp as natural or artifact by grasping cylinders with



either a power grasp or a precision grasp. In all experiments, responses were faster when the object was compatible with the type of grasp response than when it was incompatible. However, subsequent free recall revealed no better memory for compatible than incompatible items. The present results therefore do not support the hypothesis that motor actions play a role in long-term memory.

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6:00-7:30 PM (5175)

The Difference of Influence Between Handwriting- and Typing-Notetaking on Recall Performance. PEI-WEI YU and SHIAU-HUA LIU, *National Dong Hwa University* — With the recent widespread and advanced smart products, they have been utilized in learning and education. However, whether such technology can help learning still remains controversial. Nonetheless, previous research mostly compared the differences between typing and handwriting notes on academic performances. In those studies, they did not concern participants in terms of organizing the information. Therefore, aiming to let participants in both groups of note-taking by handwriting and by typing organize information at the same level, mind-mapping is included in this study to explore the differences of the recall performance. The findings reveal that firstly compared to the typing-note group, participants who take notes by hand retains higher level of performances. Secondly, the differences in volume of information intake do not cause the result to differ. Finally, the amount of ideas in mind-mapping note taking method and performance testing has low correlation. This study concludes that note-taking by hand has better impact on performance than note-taking by computers, which is consistent with previous literature.

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6:00-7:30 PM (5176)

Examining Source Memory for Ambiguous Drawings Using Pure- and Mixed-Lists of Sensical Descriptions at Encoding. LUKAS KLAPATCH, *Claremont Graduate University*, ARLO CLARK-FOOS, *University of Michigan - Dearborn*, JOSHUA LOPEZ and ROBERT WEISSENFELS, *Claremont McKenna College* — Previous work has shown that ambiguous drawings paired with sensical verbal descriptions that provide meaning to the drawings are better remembered than those same drawings paired with nonsensical descriptions. The memorial benefit is present in tests of recall as well as recognition (e.g., remembering-knowing and source memory). Whether differential encoding or retrieval processes cause the benefit is not well understood. Experimental manipulations of encoding can help reveal how encoding processes influence memory in this context. Experiments have focused on contrasting sensical and nonsensical conditions using mixed lists, an experimental manipulation that can influence attentional processing tradeoffs during encoding thereby producing memory differences compared with pure lists. We manipulate encoding by contrasting pure lists with mixed lists using perceptual and temporal source attributes to investigate the role of attention

during encoding in order to better understand the source-memory benefit for ambiguous drawings paired with sensical descriptions compared with nonsensical descriptions.

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6:00-7:30 PM (5177)

The Lack of Psychometrics in Retrieval-Induced Forgetting (RIF): Are There Two Types of RIF? JENNIFER L. BRIERE, *St. Thomas More College*, BRITTANY P. MARSH, *University of Saskatchewan*, TAMMY A. MARCHE, *St. Thomas More College* — Repeatedly practicing some information can induce forgetting of related, but un-practiced, information below a no practice baseline level, a pattern referred to as *retrieval-induced forgetting* (RIF). Contrary to the *inhibitory* account, reliability of RIF has only been established when identical materials are used. However, different cognitive mechanisms may have contributed to these results, as it was not possible to determine if the findings were due to *inhibition* or *interference* based on the memory test used. We examined the psychometrics of RIF using memory tests that were free from the cue present during learning (novel cue & recognition testing). In addition, we evaluated the inhibitory account by examining RIF performance on 5 RIF tasks (words & sentences), across 2 phases, using these memory tests. RIF was consistently eliminated under cue-free recognition testing and with novel cue testing at Time 1. When Ps repeated the novel cue RIF task, RIF emerged suggesting strategic use of the original category-cue at test with repeated attempts. The results conflict with the inhibitory account of RIF as significant reliability estimates were not achieved and RIF appears to be cue-dependent. Implications for theory are discussed.

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6:00-7:30 PM (5178)

Output Interference in Source Memory. ASLI KILIC and SINEM AYTAC, *Middle East Technical University* — Output interference (OI) refers to forgetting in memory due to the act of retrieval over the course of testing. OI has been shown in various episodic memory tasks such as item recognition and recall. The aim of the current study was to investigate whether OI would also be observed in a source memory task. In the experiment, participant were presented with a list of words either on a yellow or a blue background. At test, they were given a 2AFC source memory task in which they were required to indicate the background color of the test item. The results showed that as the number of test trials increased, the probability of correctly indicating the background color decreased. That means, judging the source of a test word caused a decrease in source memory performance for subsequent test trials. The theoretical implications of these results will be discussed.

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6:00-7:30 PM (5179)

Syntactic Alignment is not Partner-Specific. RACHEL OSTRAND, *IBM Research*, VICTOR S. FERREIRA, *University of California, San Diego* — Speakers modify various characteristics of their speech to match their linguistic partner's corresponding characteristics, known as linguistic alignment.



Five experiments assessed whether linguistic alignment is partner-specific (and thus intended to aid the listener's comprehension system) or partner-independent (and intended to aid the speaker's production system). Subjects interacted with two experimenters who each had unique and systematic syntactic preferences; for example, Experimenter A only produced double object datives (DO: "The boy threw the man the ball") and Experimenter B only produced prepositional datives (PD: "The boy threw the ball to the man.") Across various linguistic contexts and exposure conditions, there was no partner-specific alignment: Subjects produced PDs at the same rate to both experimenters, regardless of syntactic preference. However, subjects demonstrated other forms of syntactic learning, alignment, and partner-specific learning. Thus, linguistic alignment is partner-independent and likely occurs for the speaker's own benefit.

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6:00-7:30 PM (5180)

Testing Recognition Models With Joint Single-Item and Forced-Choice Recognition. QIULI MA and JEFFREY STARNES, *University of Massachusetts Amherst* — We distinguished the double high-threshold model (2HT) and the unequal variance signal detection model (UV) of recognition memory with forced-choice data. Participants studied a list of words, responded "old" or "new" to single test words, then chose the studied item in forced-choice trials. For the forced-choice trials, incorrectly recognized words from the single-item trials were paired with correctly recognized words that had the same response. For example, "old-old" pairs were made by pairing incorrectly recognized lures and correctly recognized targets. The 2HT model predicts that the forced-choice trials should be more accurate than the single-item trials because 1) people only need information about one test word to respond correctly and 2) the previous correct response was likely the product of accurate retrieval. The UV model predicts lower accuracy for forced-choice because 1) the studied word has to have higher memory strength than the nonstudied word and 2) words that received a previous error have misleading memory strength values (e.g., lures are called "old" if they have unusually high strength). We created versions of each model for our paradigm and competitively fit them to empirical data.

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6:00-7:30 PM (5181)

The EXTREME MEMORY® Challenge: A Search for the Heritable Foundations of Exceptional Memory. MARY A. PYC, DOUGLAS FENGER, PHILIP CHEUNG, J. STEVEN DE BELLE and TIM TULLY, *Dart NeuroScience* — We aim to discover candidate targets for drug therapies to enhance cognitive vitality throughout life, and to remediate memory deficits associated with brain injury and brain-related diseases. We implemented a Genome-Wide Association Study (GWAS) to identify genetic loci varying among individuals with exceptional and normal memory abilities. We first identified individuals with exceptional abilities via an online memory test – the Extreme Memory Challenge (<http://www.extremememorychallenge.com>). Next, a subset of subjects

were validated by a battery of secondary tasks, and provided saliva samples for GWAS. To date, 22,511 participants from 176 nations have been screened (with 14,193 completing both sessions). The sample is primarily Caucasian (55%), post-secondary school-educated (63%), 34 years old (gender evenly split), with an average forgetting rate across sessions of 10%. The secondary screening involved memory, IQ, attentional control, and personality measures. Analyses are underway to determine the relationship between exceptional memory and genomics.

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6:00-7:30 PM (5182)

Revisiting the List-Strength Effect in Recognition: An Output-Interference Account. TYLER M. ENSOR (J. Frank Yates Student Travel Award Recipient), *Memorial University of Newfoundland*, TYLER D. BANCROFT, *St. Thomas University*, AIMEE M. SURPRENANT, *Memorial University of Newfoundland*, WILLIAM E. HOCKLEY, *Wilfrid Laurier University* (Sponsored by Aimee Surprenant) — Presenting to-be-remembered items multiple times on a study list increases the probability that they will be recalled or recognized on a subsequent memory test—a process known as item strengthening. The list-strength effect (LSE) refers to the finding that, compared to pure lists, lists for which a subset of the items have been strengthened produce enhanced memory for the strong items and depressed memory for the weak items. Although the LSE is found in free and cued recall, it does not occur in old/new recognition (Ratcliff, Clark, & Shiffrin, 1990). Extant explanations of this discrepancy have overlooked the role of output interference. We show that, when test lists are specifically arranged so that the strong targets are tested before the weak targets, a recognition LSE emerges. In contrast, when probes are presented in a random order, or with weak targets first, the LSE disappears.

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6:00-7:30 PM (5183)

Is Familiarity Really a Fast Process? A Model-Based Approach to the Relative Speed of Retrieval Processes. KOYUKI NAKAMURA and CHARLES BRAINERD, *Cornell University* (Sponsored by Charles Brainerd) — Prior research on the relative speed of different retrieval processes has relied primarily on response latency tasks, in which subjects are asked to respond to memory probes under time pressure. Because false memory decreases as time pressure decreases, it has been assumed that familiarity is a fast process, while recollection is a slow process. The purpose of the present research was to test these assumptions using a new model-based method that allows us to quantify the speed of individual retrieval processes. We used a conjoint recognition design and collected response latency data, as well as choice responses, in order to fit a latency extension of the conjoint recognition model. Results showed (a) that this model fit joint choice-latency data well, (b) that familiarity was not the fast process that generated false memories, and instead, (c) phantom recollection was the fast false-memory process. True memory processes such as recollection rejection were also found to be faster than familiarity. This study is the



first to provide model-based evidence on the relative speed of recollection and familiarity and is also the first to demonstrate that recollective processes are faster than familiarity.

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6:00-7:30 PM (5184)

Inhibition of Distantly Related Items in Long-Term Memory Depends on Stimulus Type. BRITTANY M. JEYE and SCOTT D. SLOTNICK, *Boston College* (Sponsored by Scott Slotnick) —

In the current study, we evaluated whether long-term memory inhibition of distantly related items occurs for both abstract shapes and faces. During the study phase, participants were presented with either abstract shapes or faces. During the test phase, old items, related items (created by morphing old items along a continuum between highly related and distantly related items), and new items were presented and participants made “old”-“new” recognition judgments. Preliminary analyses revealed that memory representations were very specific as the “old” response rate differed between old items and highly related items for both abstract shapes and faces. Furthermore, the “old” response rate was lower for distantly related shapes than for new shapes, which reflects memory inhibition of distantly related items. However, the “old” response rate for distantly related faces did not differ from new shapes. These results suggest that inhibition of distantly related items in long-term memory depends on stimulus type.

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6:00-7:30 PM (5185)

No Source Memory Without Item Memory Despite Increased Motivation for Source Judgments After “New” Responses. SIMONE MALEJKA, ANN SOPHIE CIECIOR, CHRISTINA MÖLLER and ARNDT BRÖDER, *University of Mannheim* (Sponsored by Arndt Bröder) —

We replicated the finding of Malejka and Bröder (2016) who showed that source memory for unrecognized items is an artifact of implicit feedback. When the source question follows “old” responses and “new” responses to old items, participants know when a “new” response was incorrect. In the task proposed by Malejka and Bröder (2016), the source question followed every item response and thus no feedback was provided on the item question, which made the apparent effect of source memory for unrecognized items disappear. However, it remains debatable whether participants in the latter task are motivated enough to give source judgments to items they think are new. In the present study, items from two sources (top vs. bottom) were studied for different durations (2,000 vs. 16 ms). The legible items act as old items, whereas the illegible items act as new items. This should increase participants’ motivation to provide source judgments after responding “short” to the item question. The results show that, even when new items have a source, there is still no source memory in the absence of memory for old items. This finding is difficult to reconcile with the signal-detection theory but provides further evidence for two-high-threshold theory.

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6:00-7:30 PM (5186)

Imagery-Based Strategies Modulate Order Memory Within Word Pairs. TOMI ANN LIMCANGCO, KENICHI KATO and JEREMY B. CAPLAN, *University of Alberta* (Sponsored by Jeremy Caplan) —

An under-explored association-memory function is the degree to which participants can remember the order of constituent items (Christy Clark or Clark Christy?). Participants have a moderate ability to perform order-recognition of word-pairs, discriminating intact (AB) from reversed (BA) probes (Kato & Caplan, submitted). Here we tested whether easily instructed, imagery-based strategies, might modulate order-recognition. We compared interactive imagery, the peg list method (1-BUN, 2-SHOE, etc.), and a control group without strategy instructions on order-recognition of lists of noun-pairs. The peg list strategy was expected to produce the best order-memory. However, compared to pre-instruction order-recognition performance, this group performed worse, and the interactive imagery group performed significantly better than the other groups. In sum, interactive imagery produces not only superior association-memory Sahadevan et al. (in preparation), but also preserves constituent-order better than a strategy that explicitly codes list-position.

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6:00-7:30 PM (5187)

Familiarity Modulates Context Reinstatement Effect for Faces. CHRISTOPHER LEE, *University of Waterloo*, SHAHNAZ KOJI, *Columbia College*, MYRA FERNANDES, *University of Waterloo* (Sponsored by Myra Fernandes) —

Past research suggests that reinstating an encoding context, during retrieval, facilitates memory. We investigated how familiarity with a target face influenced context reinstatement effects (CR). During encoding, participants saw faces paired with photos depicting indoor or outdoor environmental contexts. At retrieval, faces were re-presented with either the same, switched, or new context. Face familiarity was manipulated by using famous versus non-famous faces as targets (Experiment 1), or pre-exposing participants to target faces either 0, 1, 3, or 10 times (Experiment 2). Experiment 1 showed the magnitude of the CR effect was reduced for famous compared to non-famous faces. Experiment 2 showed that CR magnitude decreased as number of pre-exposures increased, and was significantly smaller for faces pre-exposed 10 times compared to 0 times. Results suggest the effect of context reinstatement on memory applies primarily to novel targets; once familiar, other factors, such as strength of the memory signal guide performance.

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AUDITION

6:00-7:30 PM (5188)

The Role of Auditory Feedback at Vocalization Onset and Mid-Utterance. NICHOLE E. SCHEERER and JEFFERY A. JONES, *Wilfrid Laurier University* —

Auditory feedback (AF) plays an important role in monitoring and correcting speech. At vocalization onset, AF is compared to a sensory prediction generated by the motor system to ensure the desired pitch (F0) is produced. After vocalization onset, AF is compared to



the most recently perceived F0 to stabilize the vocalization. This study investigated whether after vocalization onset, AF is used strictly to stabilize speakers' F0, or if it is also influenced by the motor system's sensory prediction. In this ERP study, participants vocalized while their F0 was perturbed. For half of the vocalizations, at vocalization onset, their F0 was also raised. Thus, half of the perturbations occurred while participants heard their unaltered AF, and half occurred in already altered AF. If after vocalization onset AF is strictly used to stabilize speakers' F0, then similarly sized vocal and ERP responses would be expected across all trials, regardless of whether the perturbation occurred while listening to altered or unaltered AF. Results indicate that perturbations to unaltered AF resulted in larger vocal, N1, and P2 ERP responses than those to altered AF, suggesting that after vocalization onset AF is not strictly used to stabilize F0.

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6:00-7:30 PM (5189)

What's Good About Large Pupils? SEBASTIAAN MATHÔT and YAVOR IVANOV, *University of Groningen* — The pupil light response presumably reflects a trade-off between visual acuity (small pupils see sharper) and sensitivity (large pupils are better able to see faint stimuli); that is, pupils take on the smallest size that still allows sufficient light to enter the eye. But why then do pupils dilate when we get aroused, apparently perturbing this trade-off? We hypothesized that small pupils are best for calm, focused behavior, whereas large pupils are best for vigilance. To test this, we asked participants to perform one of several tasks: discrimination of a word or a fine tilted grating in central vision (both models of focused behavior); or detection of a faint stimulus in peripheral vision (a model of vigilance). We manipulated pupil size by varying ambient luminance. We found that discrimination performance did not systematically depend on pupil size; however, detection performance was much better when pupils were large. This suggests that pupil dilation in response to arousal is not, as is often suggested, a nonfunctional epiphenomenon; rather, it optimizes vision for vigilance.

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6:00-7:30 PM (5190)

The Clash of Spatial Representations: Modality Mixing Knocks Out the Simon Effect. SALVADOR SOTO-FARACO, *ICREA and Universitat Pompeu Fabra*, LEONOR CASTRO, LUIS MORÍS-FERNÁNDEZ and MANUELA RUZZOLI, *Universitat Pompeu Fabra* — Different sensory modalities represent spatial information in radically different formats that must be integrated into a unified reference frame for action. Many past studies report strong spatial compatibility effects between stimulus and action, such as the famous Simon effect. These effects classically abide to the dominant frame of reference of the particular sensory modality used for the task (e.g., spatiotopic for vision, anatomical for touch). However, unlike these single-modality situations, real-life scenarios involve various sensory modalities along with spatial information coded in their different 'native' coordinate systems. We address the behavioural and electrophysiological (ERP, EEG) expression

of the compatibility effects that arise in mixed-modality scenarios (vision, touch or audition). A remarkable outcome was that, in such scenarios, the visual Simon effect consistently disappeared when mixed with touch but not when mixed with auditory events. Our results highlight the importance of action-oriented reference frames in maintaining, and updating spatial representations.

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6:00-7:30 PM (5191)

Auditory "Object" Perception in Pigeons (Columba Livia). ASHLYNN M. KELLER and ROBERT G. COOK, *Tufts University* (Sponsored by Robert Cook) — Separating auditory signal from noise is necessary for survival. Our lab's previous research has suggested that auditory object perception was based on temporal features within a single auditory stimulus and across the auditory stimuli within a trial. To understand time's influence on auditory perception, pigeons were tested in an auditory same-different go/no-go task. They had to peck if sounds in a series were all different (S+) and suppress pecking if the series involved the same repeating sound (S-). Experiment 1 varied the auditory sequence's presentation rate and revealed no effect on the ability to recognize stimuli as the same. Experiment 2 changed the sound's local sequence by presenting the same sound forward and reversed and demonstrated that sound sequence did not impact their discrimination. Experiment 3 divided sounds into six equal parts before scrambling those parts in time. Results revealed that pigeons responded to series of scrambled sounds as if they were the same sound; they suppressed pecking over time. Altogether, these results suggest that pigeons use one or multiple time invariant features of auditory stimuli to solve a same-different discrimination.

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6:00-7:30 PM (5192)

Measuring Auditory Discrimination Thresholds in Preschool Children. NICOLA GILLEN, TREVOR R. AGUS and TIM FOSKER, *Queen's University Belfast* (Sponsored by Aidan Feeney) — The ability to discriminate between sounds is vital for the development of language and literacy skills. However variability in the short-term memory (STM) and attentional capacities of young children make it very difficult to reliably measure their discrimination thresholds. Here we aimed to identify the most appropriate task parameters for estimating reliable auditory discrimination thresholds in pre-schoolers, controlling for individual differences in STM and attention. The effect of task response paradigm, presentation style and threshold estimation procedure on the reliability of 3-, 4-year old and adult thresholds was measured. Reliabilities differed by age, but reasonable reliabilities were obtained for 4-year-olds, similar those observed in adults. There was little effect of the task response paradigm or presentation on the reliabilities of participant thresholds irrelevant of age. These results will be discussed in the context of the impact of variable attentional and STM capacities on auditory threshold measurement.

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**6:00-7:30 PM (5193)**

Auditory Traits of "Own Voice". MARINO KIMURA and YUKO YOTSUMOTO, *The University of Tokyo* (Sponsored by Yuko Yotsumoto) — It is known that our recorded voice is perceived differently from our own voice. The feeling of discomfort when we hear our recorded voice may correspond to the floor of the alleged uncanny valley. To overcome the feeling of eeriness of the recorded voice, previous studies suggested equalization of the recorded voice with various types of filters such as step, band-pass, and low-pass. Thus, the aim of experiment 1 was to find which of the voices was the most representative of the own voice. The participant chose the most representative voice from the original recorded voice, equalized voices based on filters suggested by the previous studies, and the voice in which the participants freely adjusted the parameters. The result showed that there are large individual differences in the own-voice representative filter. Furthermore, Experiment 2 investigated if lip-synching would have an effect on the rating of own voice but no significant effect was revealed. Familiarity, eeriness and the proximity to own-voice were rated in Experiment 3: however, the uncanny valley was nonexistent. Email: Marino Kimura, kimura@fechner.c.u-tokyo.ac.jp

6:00-7:30 PM (5194)

A Comparison of Auditory and Visual Gist Perception. MARGARET MCMULLIN, SIMMI BHARVANI and MELISSA GREGG, *University of Wisconsin - Parkside* (Sponsored by Melissa Gregg) — Research has revealed that observers can extract a remarkable amount of information from visual scenes in as little as a quarter of a second. The purpose of this study was to determine if observers can also quickly extract auditory gist information from scenes. Four experiments were conducted comparing auditory and visual gist perception. In each experiment, a sound or picture target was presented, followed by 8 probe sounds/pictures. The task was to determine whether the target was present or not present within the series of 8 probes. The duration of targets and probes ranged from 25 msec to 333 msec. The results indicated no difference in ability to extract auditory and visual gist information. This finding suggests that auditory gist perception is a remarkably rapid process, like visual gist perception. The results make an important contribution to our understanding of how the auditory world is processed, perceived, and represented. Email: Melissa Gregg, greggm@uwp.edu

6:00-7:30 PM (5195)

Mice Can Discriminate Synthetic From Natural Vocalizations. ANASTASIYA KOBRINA, LAUREL SCREVEN and MICHEAL L. DENT, *University at Buffalo, State University of New York* (Sponsored by Peter Pfordresher) — Mice emit spectrotemporally complex ultrasonic vocalizations (USVs) which are thought to be important for various social interactions. Yet, little is known about how mice perceive or use these vocalizations. USVs have been categorized based on a variety of spectrotemporal parameters, including frequency, amplitude, and duration. Previous studies have established that mice are capable of detecting and discriminating natural, synthetic, and altered USVs. The current research examined

whether mice are capable of discriminating natural USVs from their synthetic analogs using operant conditioning procedures with positive reinforcement. Mice can discriminate between some natural USVs and their synthetic renditions but not others. Mice utilized duration, bandwidth, and peak frequency differently for natural and synthetic USV discrimination. These results contribute to our understanding of the ways USVs may be used for acoustic communication in mice.

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VISION**6:00-7:30 PM (5196)**

Motivational Instructions Reduce the Other-Race Effect for Participants With Low (but not High) Quality Other-Race Relationships. RACHEL FORSYTH, CALLIE CINQUE and CINDY M. BUKACH, *University of Richmond* — We tested the prediction of the Categorization Individuation Model (CIM) that experience reduces the Other-Race Effect (ORE) only when participants are motivated to individuate OR faces. We used a between-groups instructional manipulation with Caucasian and Black stimuli and 74 Caucasian observers. Both groups showed OREs in sensitivity (p 's < .01). Contrary to predictions of the CIM, OREs in both sensitivity and RT negatively correlated with experience for UNINSTRUCTED participants (r 's = -.367, p 's < .04) not instructed participants (p 's > .50). Further, motivation reduced the ORE in sensitivity for participants with low quality OR relationships, ORE = 1.02 and .28, $t(27) = 3.20$, $p = .003$, but not for participants with high quality OR relationships, ORE = .433 and .426, $p = .979$. Our findings support the claim that experience and motivation interact, but they may rely on different mechanisms to enhance performance. Motivation may be particularly influential for participants with little OR experience.

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6:00-7:30 PM (5197)

Prototype Estimation as a Weighted Average: Critiques and Development of Weight Estimation Methods for Statistical Representation of Sequentially-Presented Stimuli. KE TONG and CHAD DUBÉ, *University of South Florida* — Studies of summary statistical representation often focus on how people estimate the mean or 'prototypical' feature values of sequentially-presented stimuli. A weighted average of the feature values is widely assumed in the literature, however, methods for estimating those weights have received relatively little attention. Recent studies modeled subjects' estimation of the mean as the dot product of weights and features, and used OLS regression to estimate the weights (e.g. Hubert-Wallander & Boynton, 2015). This model assumes that the weights are strictly order-dependent, leaving no room for sequential dependencies from past stimulus values (Weiss & Anderson, 1969). We replicated the analysis and obtained similar recency-prioritized weights. However, the recency-weighted average did not perform better than unweighted averaging in predicting subjects' estimations.



A follow-up simulation helped to pinpoint the limitations of the model used in the regression method. We detail modifications that can be used to infer how prototypes are computed.

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6:00-7:30 PM (5198)

Reconfiguring Receptive Fields for Distance Assessment. STEPHEN DOPKINS and DARIN HOYER, *The George Washington University* — When vertical or horizontal distance is discriminated between pairs of points varying on both the vertical and the horizontal dimensions the slope of the psychometric function decreases as a function of the distance between the points on the irrelevant dimension, with the degree of decrease for a given increment of irrelevant distance decreasing with the maximum irrelevant distance. We suggest an account under which the distance between two frontal points is assessed from the number of receptive fields falling between representations of the points, with the fields being re-configured to support the required discrimination, the re-configuration in the present case being to increase extension of the fields on the relevant dimension and decrease extension on the irrelevant dimension. We show that the account can fit our data and is supported by the results of follow-up experiments using the same task and by the findings that the psychometric slope for distance discrimination 1) increases with the number of levels of distance tested and 2) is greater for vertical than horizontal distance but only if vertical and horizontal distance are assessed in the same context.

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6:00-7:30 PM (5199)

Persevering in the Face of Beauty. SCOTT NEW, ALEX JONES and IRENE REPPA, *Swansea University* — Can aesthetic appeal increase perseverance? When searching for information on a website, perseverance (amount of time users keep searching for difficult to find information) increases when the website is independently rated as aesthetically pleasing (e.g., Nakarada-Kordic & Lobb, 2005). The current study examined the effect of visual aesthetic appeal on perseverance in the social context of faces. Two groups of participants were tested: one group viewed faces independently rated as appealing while the other group viewed unappealing faces. Participants in both groups carried out a simple localisation task, responding to the location of a face presented either at screen centre or to the left or right of a fixation cross. Following 92 trials, the experiment was programmed to crash. The experimenter then gave the participants the option to restart again if they wished. Results showed that participants in the 'appealing faces' group were significantly more likely to restart the experiment than those in the 'unappealing faces' group. The results provide converging evidence that it we are indeed more likely to persevere in the face of beauty.

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6:00-7:30 PM (5200)

Eyebrows are Used as a Visual Feature in Face Recognition. JESSIE J. PEISSIG and ALEXIS T. DRAIN, *California State University Fullerton*, CINDY M. BUKACH, *University of*

Richmond — Prior research shows that eyebrows contribute to face recognition (Sadr et al., 2003). White's study (2004) found that the eyebrows are used as spatial marker in the face for recognition, not a visual feature. In this study we sought evidence that eyebrows are used as a recognition feature. To do this, we used sequentially presented male and female faces in a same/different task. On same trials, the faces were either the identical face, or had changed eyebrows. On different trials, the faces of two individuals had either the same or different eyebrows. We found a significant decrease in responding same on trials in which the same individual was shown with different eyebrows ($n=71$; 89.1% for identical images; 76.5% for images in which the eyebrows were changed; $p<.0001$). On different trials, we also found a significant decrease in responding different on trials in which the eyebrows were identical even though the remainder of the face was another individual ($n=71$; 88.2% when the faces were different; 83.7% for different faces were different but had the same eyebrows; $p<.0001$). These results suggest that people are not merely attending to the location of the eyebrows, but also attend to the specific visual of the eyebrows as well.

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6:00-7:30 PM (5201)

Magnified Continuous Flash Suppression. KATHERINE M. MATHIS, *Bowdoin College*, TODD A. KAHAN and MELODY R. ALTSCHULER, *Bates College* — When a low contrast image is shown to a person's non-dominant eye while rapidly changing Mondrian patterns are shown to the dominant eye, people are unaware of the static image. This effect is referred to as continuous flash suppression (CFS) because the continuously flashing displays suppresses awareness of the static image. Most investigations of CFS focus on the extent to which the unidentified image is unconsciously processed (e.g., whether grasp, shape, and meaning are extracted). In the current experiment we examined the duration of the suppression effect to see if this would be influenced by the nature of the Mondrian patterns shown to the dominant eye. We manipulated the degree to which changing Mondrian patterns or rotated versions of the same Mondrian were shown. Results revealed much longer-lasting suppression (i.e., magnified CFS) when participants were presented with a smoothly rotating Mondrian pattern in the dominant eye.

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6:00-7:30 PM (5202)

Cross-Cultural Comparison on Variance Perception of Facial Expression. SACHIYO UEDA and CHANGHONG GAO, *Ochanomizu University*, REIKO YAKUSHIJIN, *Aoyamagakuin University*, AKIRA ISHIGUCHI, *Ochanomizu University* — It is shown that there is cultural difference in the perception of individual facial expression. For example, Japanese and Chinese have different sensitivity to angry and happy expressions. Not only the individual faces, but also the expression of multiple faces, however, conveys important social information: The variety of facial expressions of a crowd shows the degree of unity of emotion in the group. Moreover, observer can perceive average and variance of multiple facial expressions sensitively



even when perception of individual facial expressions can not be accurately performed. In this study, in order to examine whether cultural differences exist in the variance perception of crowd facial expressions, we compared the accuracy of variance perception of facial expressions between Japanese and Chinese using emotionally morphed faces (e.g. angry, disgust, happy). As a result, the accuracy of individual face expression did not necessarily predict the accuracy of variance perception of crowd faces.

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6:00-7:30 PM (5203)

Becoming a “Bandwagon Fan” of a Sports Team Immediately Increases Preference for Colors Associated With the Team.

KAZUHIKO YOKOSAWA and SHUTO KITA, *The University of Tokyo*, MICHIO ASANO, *Rikkyo University* — Recent research has indicated that color preferences are caused by affective responses to associated entities learned through long-term experiences. This study examined whether preferences for colors change when they are associated with objects having neutral valences, and then valences increase. Participants watched a five-minute video of an international soccer game with one team wearing red and the other wearing blue uniforms. The teams represented countries for which participants had no particular positive or negative valence. Before watching the video, participants were asked to guess the team that would win and were then asked to cheer that team while watching the game. Participants rated preferences for various colors before and after these procedures. The results indicated that participants' preference for the color associated with the team they supported increased after watching the game. This suggests that color preferences can be modulated by sudden increases in valences for associated entities.

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6:00-7:30 PM (5204)

Biasing Toward the Group: Memory for an Emotional Expression Biases Towards the Ensemble. JONATHAN C. CORBIN and L. ELIZABETH CRAWFORD, *University of Richmond* — Memory for an object can be distorted by its surrounding context. For example, when presented with an ensemble of circles that vary in size, memory for an individual circle's size biases towards the ensemble mean (Brady & Alvarez, 2011; Corbett, 2016). We extend this work to socially complex stimuli – emotional facial expressions. In three preregistered experiments, participants saw an ensemble of 4 expressions, one neutral (the target) and three either happy or sad, without knowing which was the target. They then reproduced the expression on the target face from memory. In Experiment 1, the ensemble comprised images of the same actor; in Experiments 2 and 3, each image was a different actor. In each experiment, memory for the neutral expression was remembered as sadder when surrounded by sad expressions compared to happy expressions. The results suggest that ensemble representations can abstract away from specific individuals, capturing the “average” group expression.

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6:00-7:30 PM (5205)

Motion Perception Rather Than Conspicuity Might Be the Primary Determinant of Motorcycle Right-of-Way Violation Collisions. BERTRAND SAGER, ELISABETH KREYKENBOHM and THOMAS SPALEK, *Simon Fraser University* (Sponsored by Thomas Spalek) — The hypothesis that motorcycles are less detectable than cars in traffic is widely held and thought to be causally involved in motorcycle collisions that involve another driver. Yet despite substantial improvements in motorcycle conspicuity, collisions of the type where another driver violates the motorcyclist's right-of-way because they “did not see them” are on the rise. Here we report three experiments designed to examine factors that might underlie these failure-to-see collisions. The first experiment employed a change-blindness paradigm in a driving simulator and provided evidence that motorcycles are not less conspicuous than cars. A second experiment measured the effect of the motorcycle's lane position on oncoming drivers' braking behaviour, and combined with a third experiment that tested the effect of motorcycle lane position on drivers' judgement of time-to-arrival, suggested that the problem may be one of motion perception rather than conspicuity.

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6:00-7:30 PM (5206)

Do Different Summary Statistics Share a Common Mechanism? Examining Transfer of Discrimination Practice of Mean to Variance. YI YANG, *Ochanomizu University*, MIDORI TOKITA, *Mejiro University*, AKIRA ISHIGUCHI, *Ochanomizu University* (Sponsored by Midori Tokita) — A number of studies have shown that the human visual system can immediately and accurately extract different types of summary statistics of surrounding objects and/or events. The relationship among those statistics, however, remains unclear. By examining the performance correlation, we demonstrated that the mean and variance are represented via distinctive processes. Here, we further investigate this issue by testing how the training of the mean discrimination task may affect the variance discrimination performance. Participants perform variance discrimination task before and after the training. Participants in the training condition are trained on the mean task with feedback. Correct rate and response time are measured in each trial. We predict that if the variance estimation is not based on the calculation of the mean, that is, representation of mean and variance may mediate distinctive processes, the improvement in the mean task will not affect the variance discrimination. Results partly supported our prediction.

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6:00-7:30 PM (5207)

Experts of Chinese Calligraphy Perceive Characters Globally. MAKAYLA SZU-YU. CHEN and DENISE HSIEN WU, *National Central University* (Sponsored by Denise Wu) — Beauty appreciation is supported by multiple cognitive abilities and is subject to the influence of experience. The present study explored whether expertise on Chinese calligraphy interacted with local and global processing of visual features of stimuli. Specifically, brain activations from primary visual areas that



were reported to be sensitive to local (left BA18) and global (right BA18) processing in both experts and non-experts of Chinese calligraphy were compared when they made aesthetic judgment of calligraphic characters and scenery photos. Although the results exhibited higher activations in the left BA18 than the right BA18 in both groups of participants when they made aesthetic judgment on both types of stimuli, only the left BA18 of non-experts showed significantly higher activation when judging aesthetics of Chinese characters than experts, which suggested that non-experts relied more on local processing to perceive beauty in Chinese calligraphy than experts.

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6:00-7:30 PM (5208)

Converging Characteristic Properties of Information Processes With Perceptual Integral Stimuli Examined by two Non-Parametric Theories. YANJUN LIU, *Indiana University Bloomington*, RU ZHANG, *University of Colorado Boulder*, JAMES T. TOWNSEND, *Indiana University Bloomington*, MICHAEL J. WENGER, *University of Oklahoma* (Sponsored by James Townsend) — General recognition theory (GRT) characterizing possible information-processing dependencies using response-frequency-based measures and System Factorial Technology (SFT) characterizing the fundamental properties of information processing (architecture, stopping rule, capacity, and independence) using reaction-time (RT) are two nonparametric theories. The present study applied both theories using a set of long-accepted perceptual integral rectangular stimuli and no-biased vs. biased payoff matrices to test if the combined use of GRT and SFT would allow for converging sources of evidence regarding inferred perceptual representations and processing characteristics. Results suggest observers ($N = 8$) violated perceptual separability indicated by GRT, and showed parallel exhaustive processing indicated by SFT in both the unbiased and biased conditions. These coherent characteristic inferences of perceptual integral manner by both theories suggest a strong potential in the combination of GRT and SFT, allowing a more complete picture of information processing to be developed, including principled accounts of individual differences.

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6:00-7:30 PM (5209)

The Role of Inter-Region Information Synchrony in Processing Visual Stimuli. HEATHER BRUETT and MARC N. COUTANCHE, *University of Pittsburgh* (Sponsored by Tessa Warren) — The brain processes the many aspects of visual stimuli via the coordinated activity of a number of relevant regions. The processing targets of these regions can be uncovered by “decoding” multivoxel activity patterns, which can represent subtle distributed information. An approach that examines the timeseries of pattern discriminability – informational connectivity – can help determine which regions contain information in the same trials - in other words, which regions are acting in synchrony. I will present fMRI data that was analyzed via multivariate analysis tools and informational connectivity to determine how information synchrony plays a role in processing scenes and objects. We ask how regions within

the scene and object processing networks can decode scenes and objects from “pseudo-scenes”, which contain certain elements present in typical scenes but lack other visual components. We find that the strength of informational connectivity within these networks differs based on the object or scene discriminations examined.

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6:00-7:30 PM (5210)

Evaluation of Separable Model Forms in Joint Magnitude Estimation. JUSTIN G. HOLLANDS, *Defence Research and Development Canada*, BRIAN P. DYRE, *University of Idaho* (Sponsored by Brian Dyré) — Joint magnitude estimation is a useful tool in evaluating the need for separable (two-stage) models of supra-threshold scaling of stimulus intensity. We present four experiments using a joint magnitude estimation task for supra-threshold scaling of volume, color saturation, and area. These estimates were used to evaluate the necessity and sufficiency of sixteen separable models of supra-threshold magnitude scaling, defined by factorially combining four input functions (linear, log, power, and super-additive) with four output functions (linear, log, power, and Prelec), using various model-selection methods (information criterion methods: BIC, AIC, AICc; minimum description length or MDL). Overall, the MDL results indicate that separable models with two non-linear stages are generally necessary and that power functions specifying both the input and output stages appear to offer the best compromise between complexity and explanatory power. However, for some participants, less conservative model-selection methods suggest that more complex functions may be needed.

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SPATIAL COGNITION II

6:00-7:30 PM (5211)

Developing Global and Local Cognitive Maps Through Path Integration. XUEHUI LEI, WEIMIN MOU and LEI ZHANG, *University of Alberta* (Sponsored by Weimin Mou) — This study investigated whether people can develop a global map of local spaces by path integration. In our previous experiment (Psychonomics 2016), participants learned five buildings' locations, and then locomoted between two rooms to learn objects inside. During testing, they adopted a view and judged objects' directions in one room; the consecutive views were across rooms and locally or globally consistent (priming task). After that, they pointed to the buildings while adopting views in rooms. The results showed that participants knew their global headings relative to buildings and there were both local and global priming effects. Unlike this experiment, participants in the current study locomoted between the rooms through a hallway to minimize piloting cues. Participants in Experiment 1 learned the five buildings but those in Experiment 2 did not. Results showed that participants could estimate their global heading and there was a global but no local priming effect in Experiment 1 whereas there was a local but no global priming effect in Experiment 2, suggesting developing multiscale maps



may require significant cognitive resources and prior global learning might be critical to forming a global map through path integration.

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6:00-7:30 PM (5212)

Reference Object Structure Influences Spatial Memory.

DARIN L. HOYER and STEPHEN C. DOPKINS, *George Washington University* (Sponsored by Stephen Dopkins) — Vectors, comprised of distance and direction information can define the layout of a spatial environment. We hypothesize that environmental factors can influence the reliance on these separate pieces of information. Participants were tasked to remember the location of target objects using two reference objects of identical shape but differing orientation (one vertical and one horizontal) while in a VR environment. In three experiments, we hypothesized that distance information and direction information would not be encoded equally from the two different reference objects. When looking at the distribution of the placement of the target objects, results suggested that distance information could be better encoded from the extended reference object while direction information was better encoded from the vertical reference object.

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6:00-7:30 PM (5213)

Impact of Landmarks on Wayfinding While Driving.

YASAMAN JABBAR, MARTIN V. MOHRENSCHILDT and JUDITH M. SHEDDEN, *McMaster University* (Sponsored by Judith Shedden) — We investigated the preferred navigational strategy of young adults while wayfinding in a virtual town in a driving simulator. Several studies have examined participants' spatial behaviour in the presence and absence of proximal and distal landmarks. Acquisition and subsequent utilization of egocentric and allocentric strategy are supported by the use of proximal and distal landmarks, respectively. We designed a new paradigm in which participants find a target location in a virtual town under four learning conditions: learning in the presence of proximal, distal, both proximal and distal, or no landmarks. We will present results that distinguish differences in navigation performance depending on type of available landmarks during learning, as well as effects of practice across counterbalanced learning conditions.

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6:00-7:30 PM (5214)

Social Effects on Reference Frame Selection.

LUCIA A. CHEREP, JONATHAN W. KELLY and KRISTIA A. COSTABILE, *Iowa State University* (Sponsored by Jon Kelly) — The presence of another person in a spatial scene has been shown to induce spontaneous perspective-taking. This study explored whether presence of another person affects reference frame selection when representing locations in memory. Participants studied objects from one perspective and later performed judgments of relative direction from memory. Without another person in the scene, participants selected a reference frame aligned with the studied view. Mere presence of the experimenter at a different view had no effect. Requiring participants to process locations

from the experimenter's view during learning led to selection of a reference frame aligned with the experimenter. However, the same effect occurred when participants processed locations from the perspective of a wooden box. In sum, presence of another person did not affect reference frame selection, and participants can adopt a non-egocentric reference frame whether the non-egocentric perspective was occupied by a person or an object.

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6:00-7:30 PM (5216)

Individual Differences in Virtual Navigation Performance.

MEREDITH MINEAR, TES SENSIBAUGH and MIKAELA COWEN, *University of Wyoming* — Individual differences in the behavioral activation and behavioral inhibition systems (BAS/BIS) contribute to variation in both personality and behavior. Inhibition or avoidance sensitivity has been shown to be negatively associated with individuals' self-reported sense of direction and positively correlated with spatial anxiety (Minear, 2016). We tested whether individual differences in behavioral approach and inhibition tendencies would then predict actual performance on the Virtual Silcton (a desktop virtual reality paradigm designed to assess spatial navigation and cognitive mapping abilities, Schinazi, et al., 2013; Weisberg, et al., 2014). 110 participants (59 female) were tested using the Virtual Silcton as well as completing measures of BIS/BAS, spatial anxiety, sense of direction and two cognitive measures: mental rotation and a spatial orientation test. BIS again was associated with self-reported measures of navigational ability, but not with navigational performance in a virtual environment while both spatial orientation and mental rotation did predict virtual navigation ability.

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6:00-7:30 PM (5217)

Combinatory Mechanisms of Multiple Categorical Cues in Spatial Memory.

RANXIAO FRANCES WANG, *University of Illinois at Urbana-Champaign* — In the typical dot-localization task first introduced by Huttenlocher, Hedges, and Duncan (1991), individuals divide the task space into four quadrants delineated at the Cartesian axes and use each region's center to estimate specific target locations. However, individuals can flexibly include multiple categorical sources in their estimates of locations when reliable visual borders of an alternative category are shown during retrieval. The prevailing view is that the combined responses result from an optimal weighing process that occurs when multiple sources of information are available. The current study sought to differentiate among mechanisms by which categories are integrated with metric information, and to determine whether different sources are blended when multiple categories are available at estimation. Using a distribution analysis, we found that some individuals primarily used the default category and showed a symmetrical error distribution, while others primarily used the alternative category and showed a skewed errors distribution. These results suggested that there are at least two mechanisms categorical information is combined with metric information.

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6:00-7:30 PM (5218)

How Much Can You Remember the Route Knowledge in Driving? It was Determined by Your Explicit Learning. XIANYUN LIU, JIE HUANG and RUIHUA ZENG, *Tianjin Normal University* — Two experiments examined whether testing improves route knowledge acquisition during driving. In Experiment 1, participants learned a route by driving through a series of connected tunnels in virtual Reality. Each tunnel contained three entrances, only one of which can lead to the right direction. During learning phase, participants were shown the correct entrance of each tunnel and they need driving a virtual car to go through all of the tunnels twice. During subsequent exposure to the route, participants were either shown the correct sequence again or had to recall the sequence from memory with a feedback after their recall. Participants later completed a final test in which they drive through all of the tunnels without the guidance. In Experiment 2, the materials, design, and procedure were similar to those used in Experiment 1 except that participants were instructed to pay attention to the landmark in each tunnel instead of remembering the route in Experiment 1. The results showed that testing improved route memory compared to studying in Experiment 1 but not in Experiment 2. The findings indicated that testing improved route knowledge acquisition in driving only in explicit learning but not in implicit learning. Email: Xianyun Liu, liuxianyun.tjnu@gmail.com

6:00-7:30 PM (5219)

Multiple Views of Space: Movement Around a Stable Array Enhances Flexible Spatial Memory. CORINNE A. HOLMES, *Trinity College*, NORA S. NEWCOMBE and THOMAS F. SHIPLEY, *Temple University* — The ability to recall a spatial layout from multiple orientations – spatial flexibility – may be enhanced by experiencing the transition between static viewpoints not only as continuous visual flow, but also by actively creating the transition by rotating the array or moving around it. Last year, we reported that when an array was partitioned into areas that are not inter-visible, movement around the array enhanced spatial integration and flexible recall not seen in visual flow generated by rotation, with active walking providing an additional boost above passive movement. In this experiment, when the same array was inter-visible (i.e., barriers were removed) passive and active movement equally enhanced spatial flexibility. Furthermore, although participants viewed the array from multiple orientations, the first viewpoint was the most heavily weighted, and thus served as the preferred orientation of the stored representation. Together, these findings suggest that array stability is key to flexible spatial memory. Email: Corinne A. Holmes, holmesco@tcd.ie

6:00-7:30 PM (5220)

Testing the Role of Visuospatial Working Memory in Wayfinding and Direction Giving. ALYCIA M. HUND and OLIVIA J. CODY, *Illinois State University* — The goal was to test the role of visuospatial working memory in wayfinding and direction giving. In Study 1, 144 participants found their way through one floor of a complex building or provided wayfinding directions for a fictitious listener under three secondary task conditions: control (no secondary task), verbal secondary task

(word-nonword judgments), and visuospatial secondary task (clock hand judgments). Wayfinding was significantly slower when completing the visuospatial or verbal secondary tasks relative to control. Participants provided fewer spatial details when completing the visuospatial secondary task relative to control and verbal conditions. Men provided more spatial details than did women. In Study 2, 27 participants completed a spatial secondary task (point to cardinal directions) or not during wayfinding. Wayfinding was significantly slower with the spatial secondary task relative to control. Together, these findings confirm the role of visuospatial working memory in wayfinding and direction giving.

Email: Alycia M. Hund, amhund@ilstu.edu

6:00-7:30 PM (5221)

Training With Different Modalities and Spatial Thinking Styles Affect Mental Rotation. A. REYYAN BILGE, BUSRA TELLI and GOKCE TALASLI, *Istanbul Sehir University* — A set of experiments was conducted at Istanbul Sehir University to examine training effects on Mental Rotation (MR) performance. To this end, a puzzle game with 3-D block figures was used. Participants went through sessions of training (2 and 3) where their pre- and post- MR performance was recorded. Experimental groups were trained with 3-D wooden blocks (Katamino game) and touchpad application of the same puzzle (Pentablocks). Control group was not trained with spatial games instead they watched video clips of non-related material. After the tasks, participants filled out questionnaires assessing their mental representation (survey and landmark) and estimating their spatial thinking styles. Recently a new estimation scale was piloted to evaluate participants' large-scale navigational abilities. Preliminary analyses showed an improvement both in reaction time and accuracy in MR performance after 2- and 3- training sessions. Further findings propose a link between spatial skills, trainability, and spatial thinking styles. Email: Reyyan Bilge, reyyanbilge@sehir.edu.tr

6:00-7:30 PM (5222)

Memory for Routes in Virtual Environments: The Benefit of Active vs. Passive Encoding. MELISSA E. MEADE, JOHN G. MEADE and MYRA A. FERNANDES, *University of Waterloo*, HÉLÈNE SAUZÉON, *University of Bordeaux* (Sponsored by Jonathan Fugelsang) — Previous work suggests that active, relative to passive, encoding of real and virtual environments benefits memory for route knowledge. However, memory for routes is generally approximated by judging direction traveled, landmarks passed, or generating the most efficient route, which require access to survey knowledge. In the current study, we determine the effect of active relative to passive encoding on route knowledge by comparing accuracy in re-travelling routes initially created via active exploration or viewed passively by way of a guided tour using virtual reality. As predicted, active exploration, relative to passive guidance, during encoding led to greater memory accuracy in terms of percentage overlap between the routes traveled at study and at test. These results replicate and extend previous findings, suggesting that decision-making and motor control during encoding allows one to more accurately re-trace their steps when recalling a previously traveled route. Email: Melissa Meade, mmeade@uwaterloo.ca

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