HOW PRECISE ARE VERBAL WORKING MEMORY REPRESENTATIONS? EVIDENCE FROM PHONOLOGICAL AND SEMANTIC SIMILARITY.

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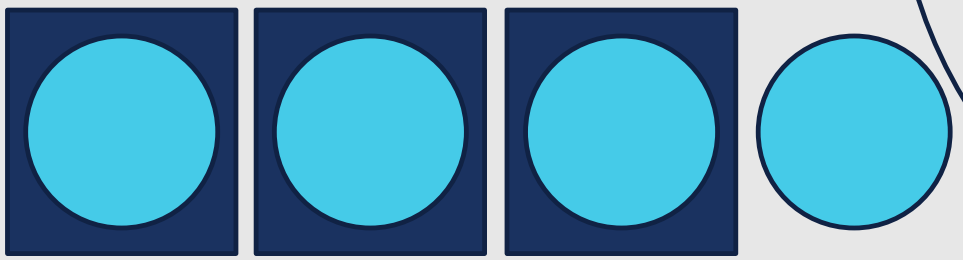
INTRODUCTION

What determines working memory (WM) performance?

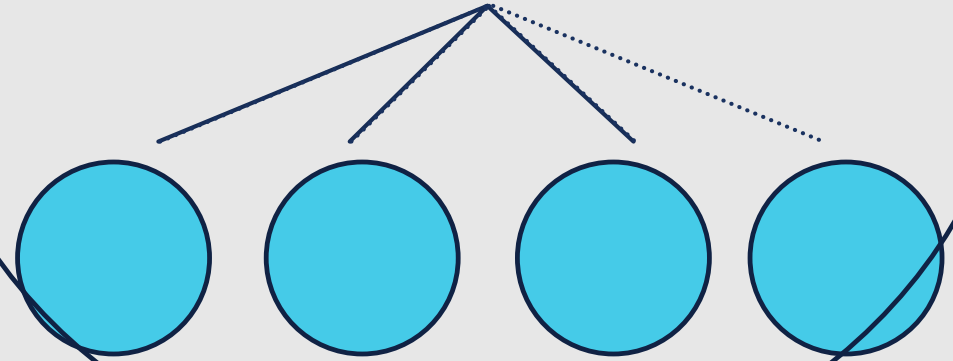
Capacity

- Limited number of items that can be held in WM
- Slot models (Miller, 1956; Cowan, 2001)
- Binary measure



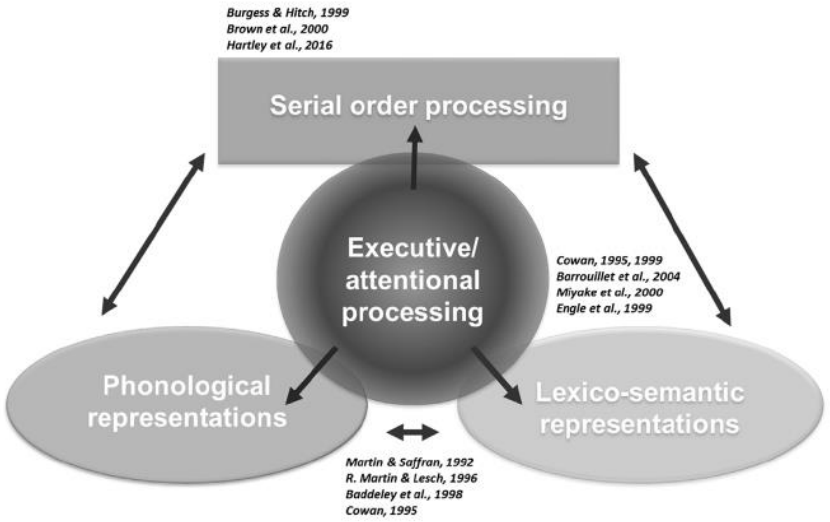
Precision

- Resolution with which items are stored in WM
- Resource models (Ma et al., 2014)
- Continuous measure



INTRODUCTION

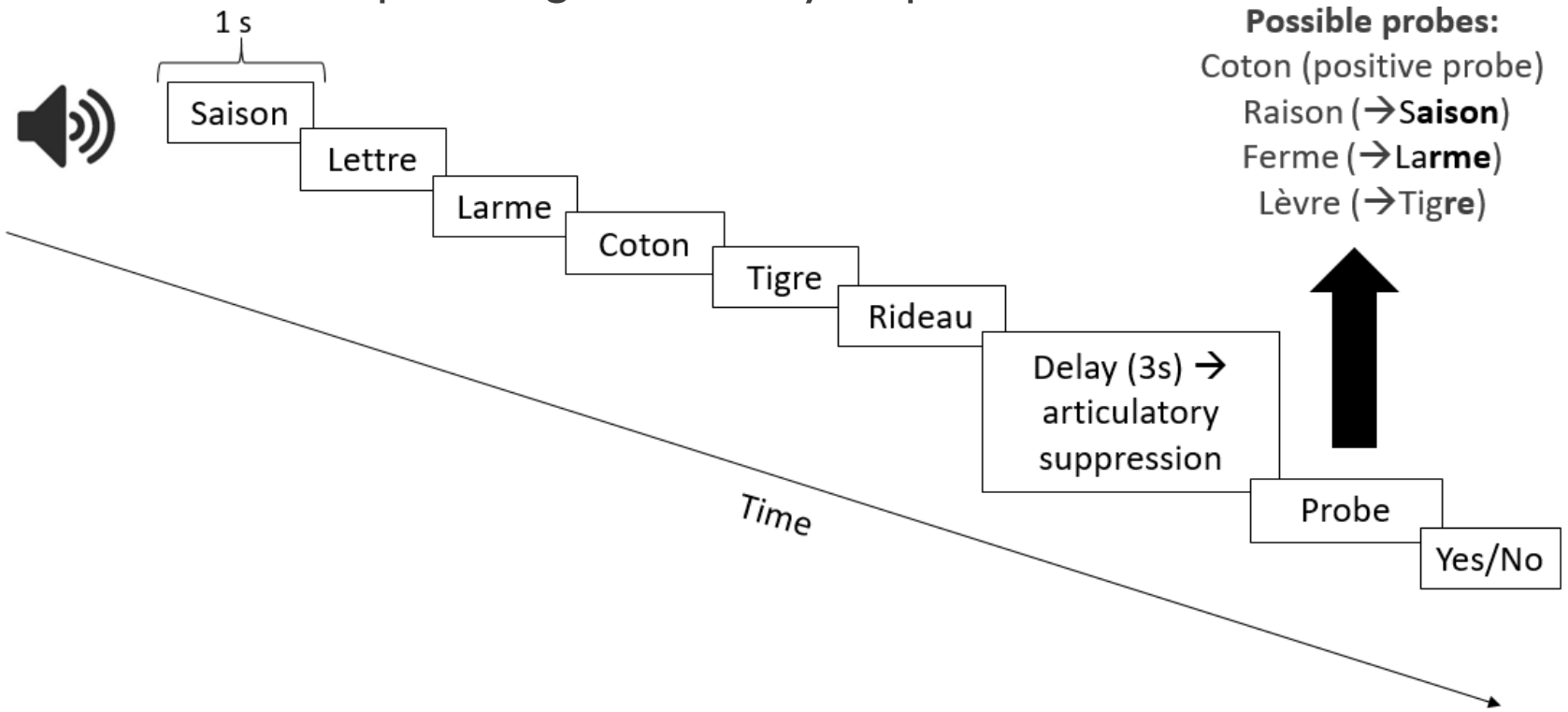
- Precision has mainly been studied in the visual domain (Bays et al., 2009; Zokaei et al., 2011; Burnett Heyes et al., 2012; Klyszejko et al., 2014)
- But is has been poorly explored in the verbal domain (Joseph et al., 2015, Hepner & Nozari, 2019)
  - Explore WM precision at a more complex, word-like level
  - Interdependence between WM and language system



Majerus, 2017

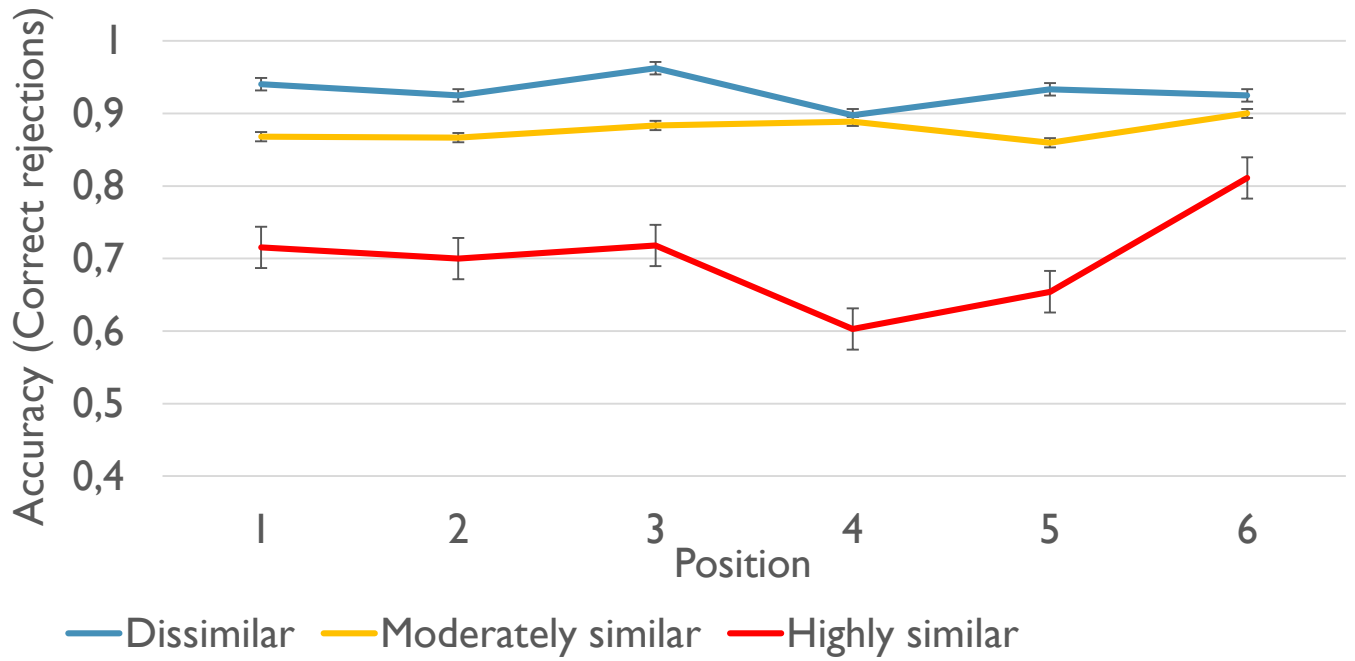
INTRODUCTION

- WM precision for whole words?
- Use of a phonological similarity gradient in a probe recognition task
  - Influence of phonological similarity on performance



INTRODUCTION

- First results (Bouffier & Majerus, in prep.)



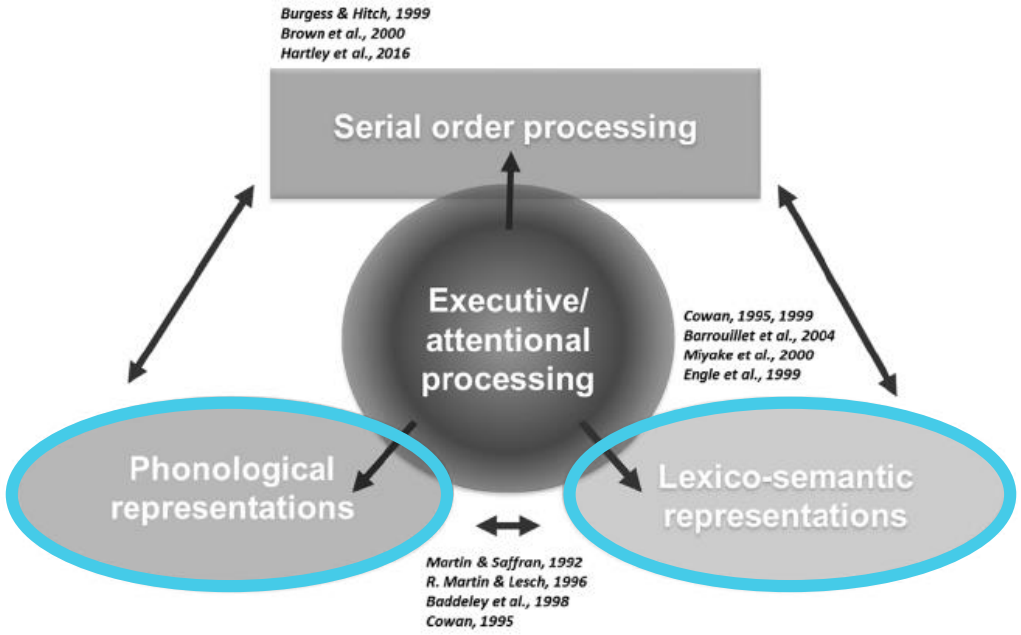
$BF_{Inclusion}$ Condition: 4.020e +63
$BF_{Inclusion}$ Position: 38.66
$BF_{Inclusion}$ Interaction: 14.94

N = 60

PRESENT STUDY AIMS

How is the information coded in WM, and what impacts WM precision?

- Phonological similarity (replication)
- Semantic similartity
- Within-subject design



Majerus, 2017

HYPOTHESES

1. More errors (false alarms) with increasing similarity
   - Less accurate discrimination between target and probe item
2. Interindividual differences
   - Sensitive index of the precision of representations in WM

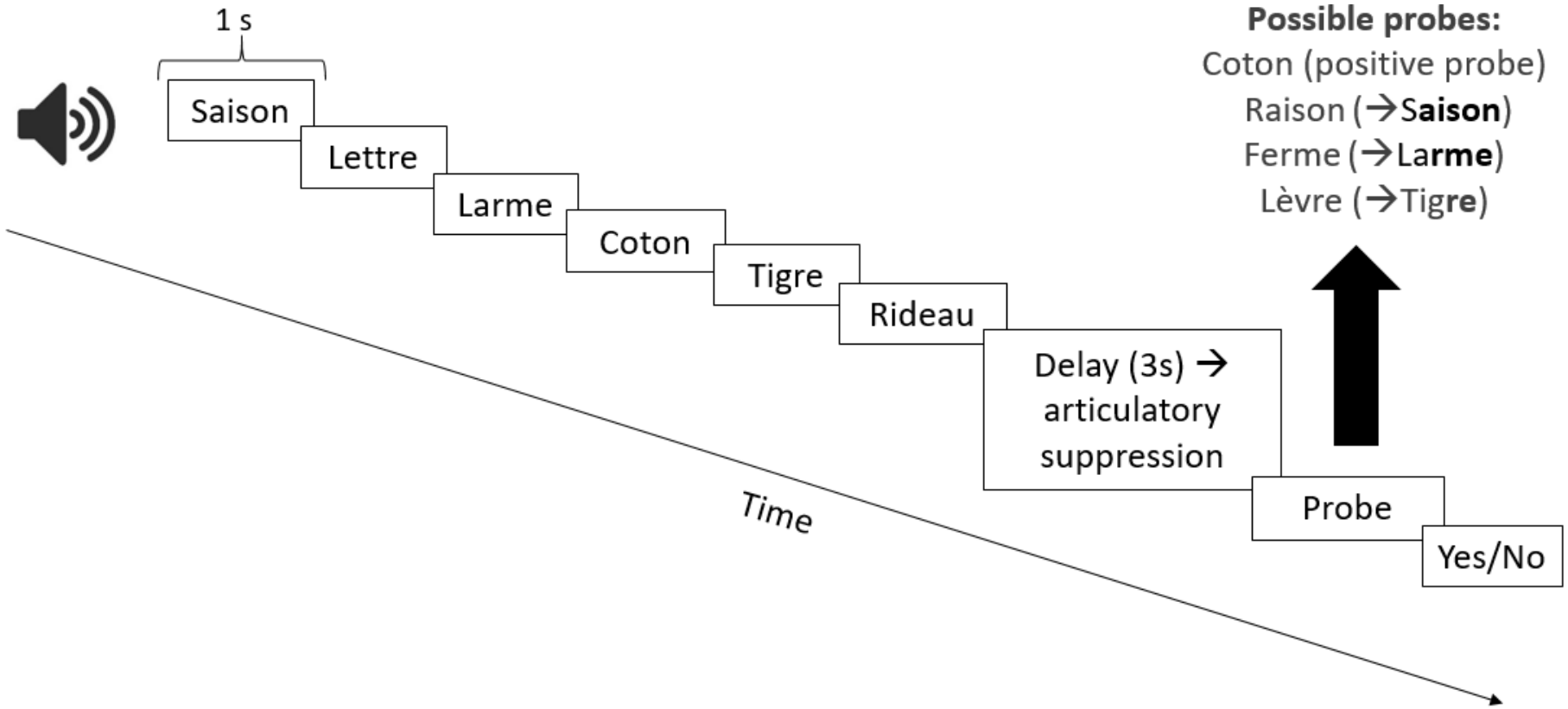
METHODS

Participants

- 51 French-speaking young adults (29 woman)
- 18-30 years (μ = 21.25 years; σ = 2.544)
- No neurological disorder, drug abuse, or learning disability

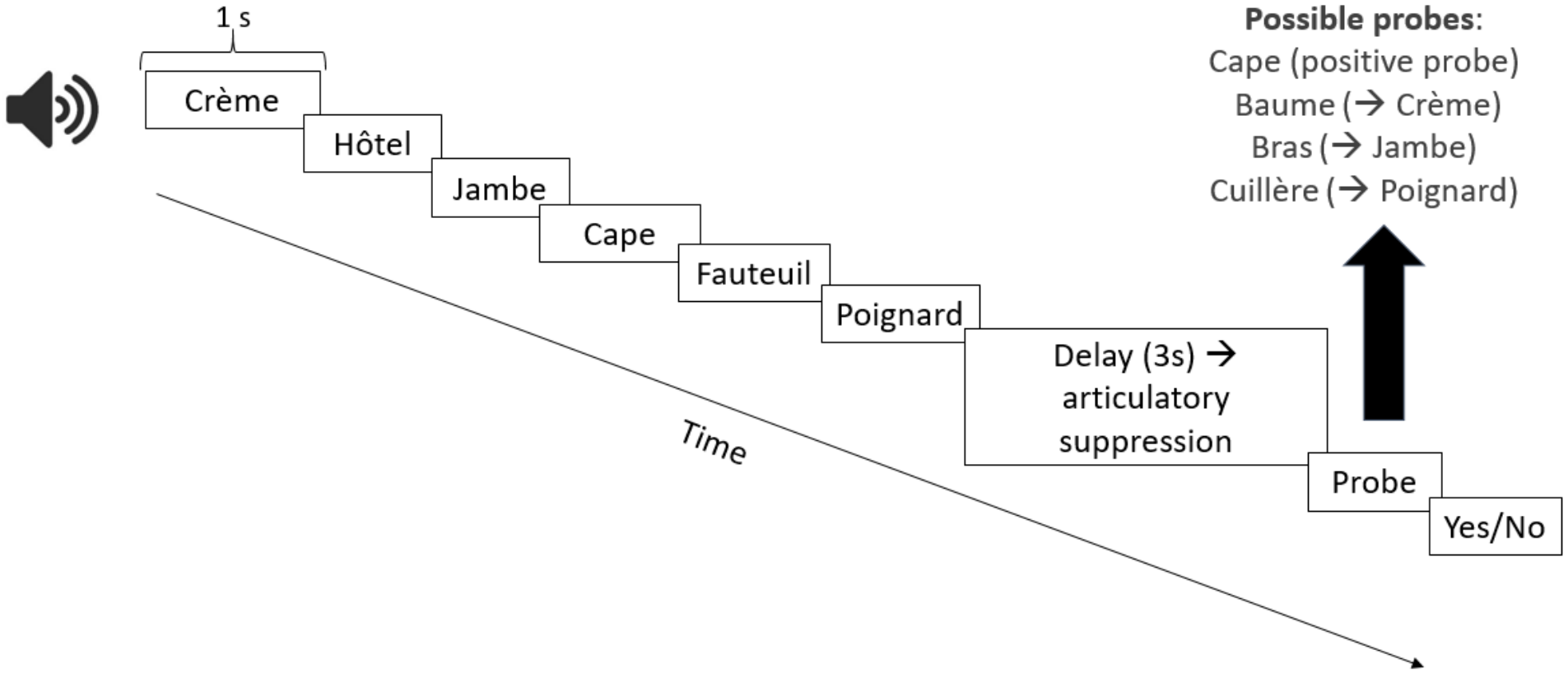
METHODS

Phonological similarity



METHODS

Semantic similarity

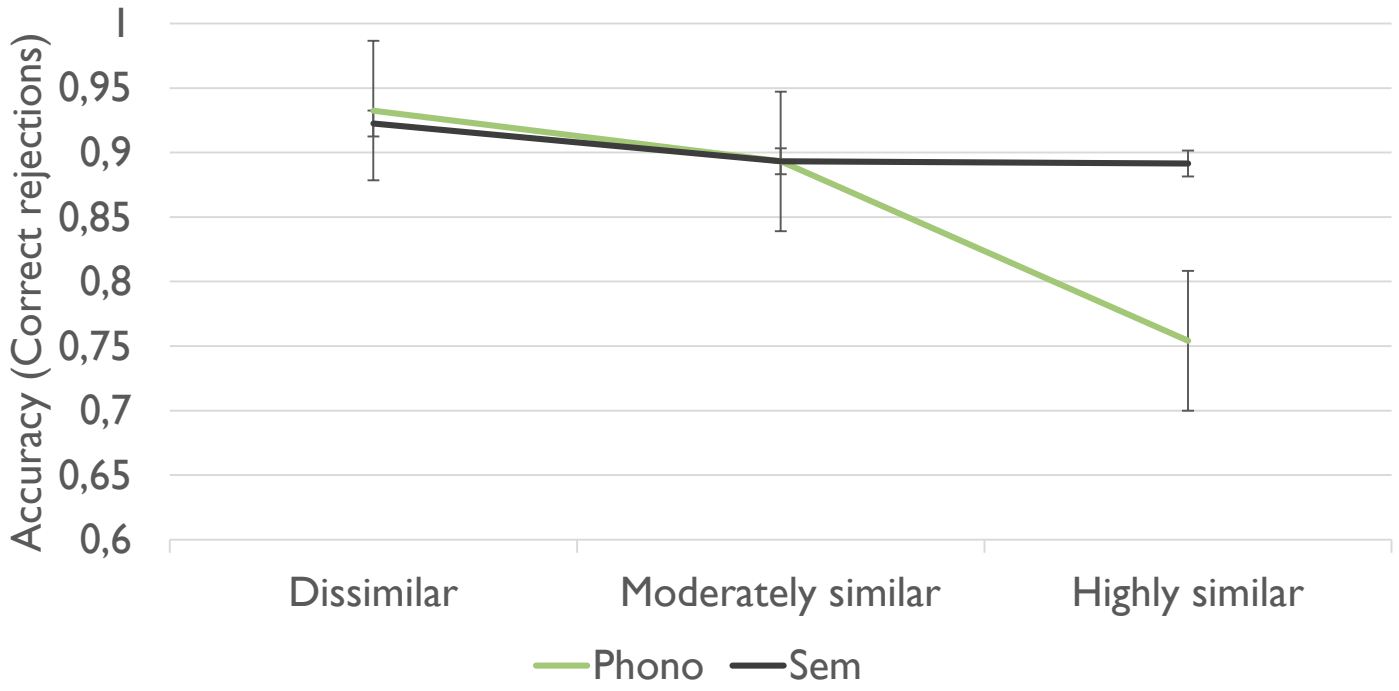


PROCEDURE

✓ Tasks counterbalanced

RESULTS

Global accuracy

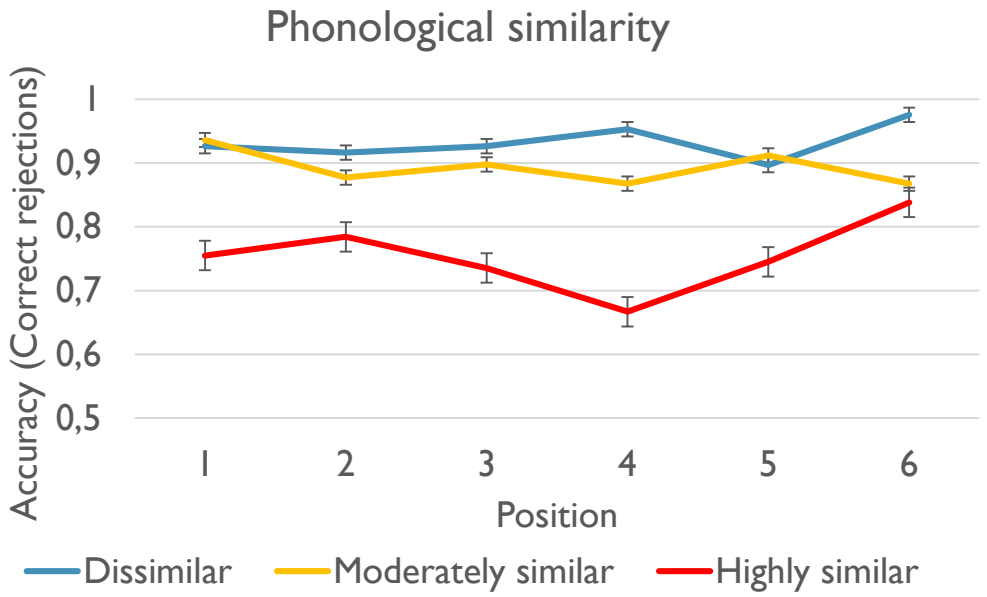


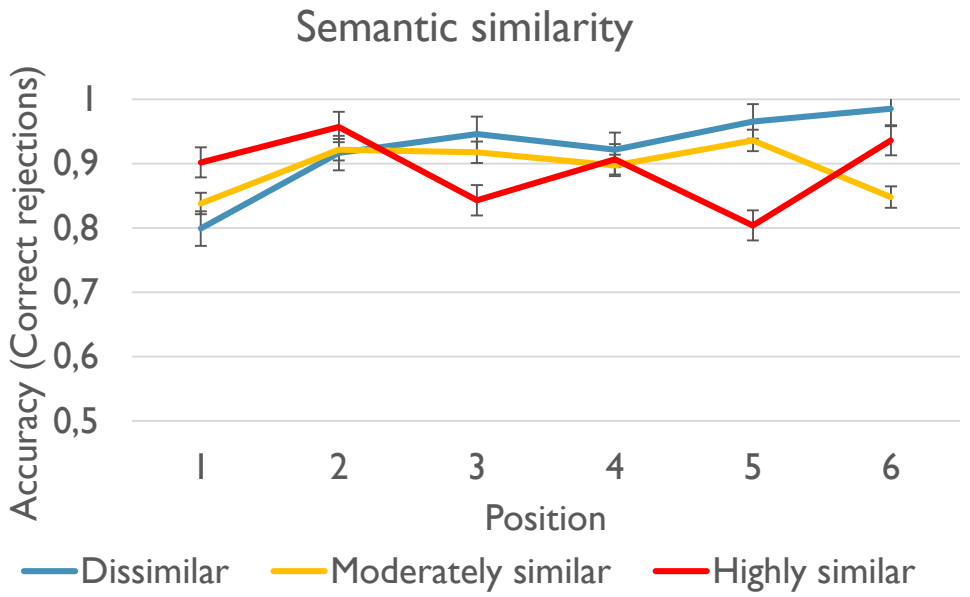
(Effects across matched models)

$BF_{Inclusion}$ Similarity condition: 1.145e +6

RESULTS

Separate analyses (Effects across matched models)



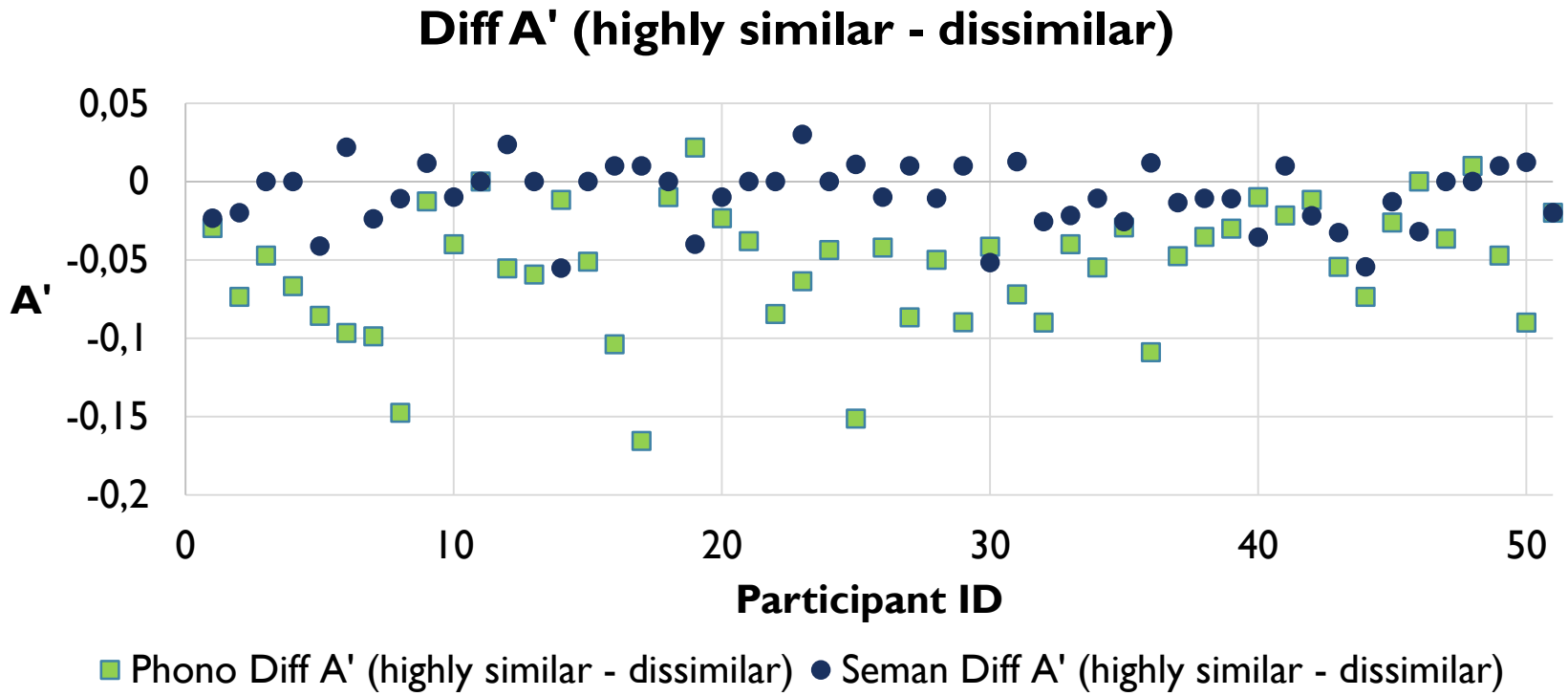


$BF_{Inclusion}$ Condition: 7.432e +38
$BF_{Inclusion}$ Position: 0.335
$BF_{Inclusion}$ Interaction: 56.886

$BF_{Inclusion}$ Condition: 1.277
$BF_{Inclusion}$ Position: 3506.225
$BF_{Inclusion}$ Interaction: 3.800e +12

RESULTS

Interindividual differences: A-Prime contrasts



DISCUSSION

- Very strong effect of phonological similarity
  - Replication of earlier study (Bouffier & Majerus, in prep.)
- Weaker effect of semantic similarity
- Are we more precise at the semantic than at the phonological level?
  1. Information represented at the semantic level
  2. Information coded phonologically
     - More precise representations thanks to phonological dissimilarity

CONCLUSIONS

- Phonological and semantic similarity as a measure of WM precision
- Phonological task
  - Limits of WM precision?
- Semantic task
  - Semantic coding?
  - Phonological processing alone?

THANK YOU FOR YOUR ATTENTION…

…to the phonological forms of my words and to their semantic signification.

BACKSLIDES

METHODS

- Target and probe items matched for:
  - Number of syllables
  - Lexical frequency
  - Imageability
- Semantic proximity evaluated via inter-rater agreement
  - 0-5 point scale