VIRTUAL WORKING MEMORY SYMPOSIUM

Information compression through between-item similarity: evidence from the visual domain

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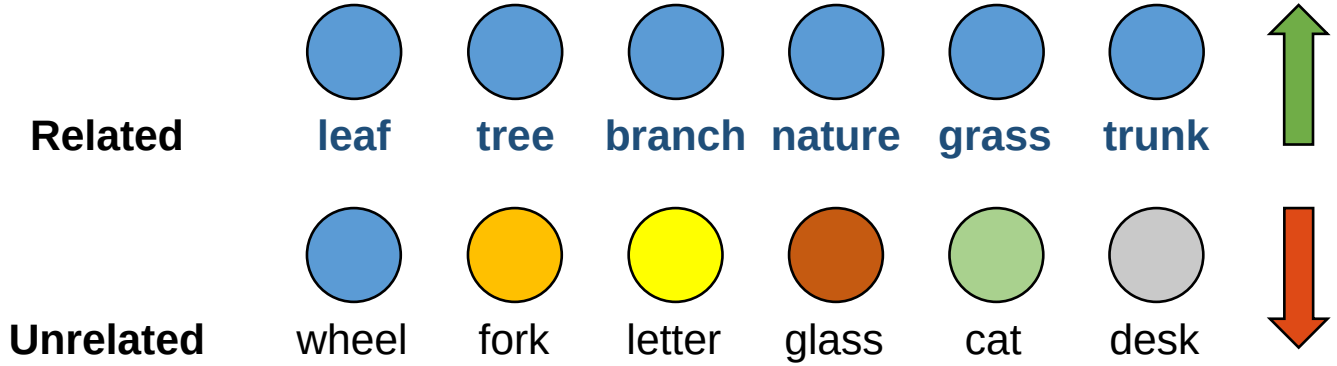
Université Grenoble Alpes

Introduction

Between-item similarity enhances WM performance

Semantic relatedness. Semantically related vs. unrelated words

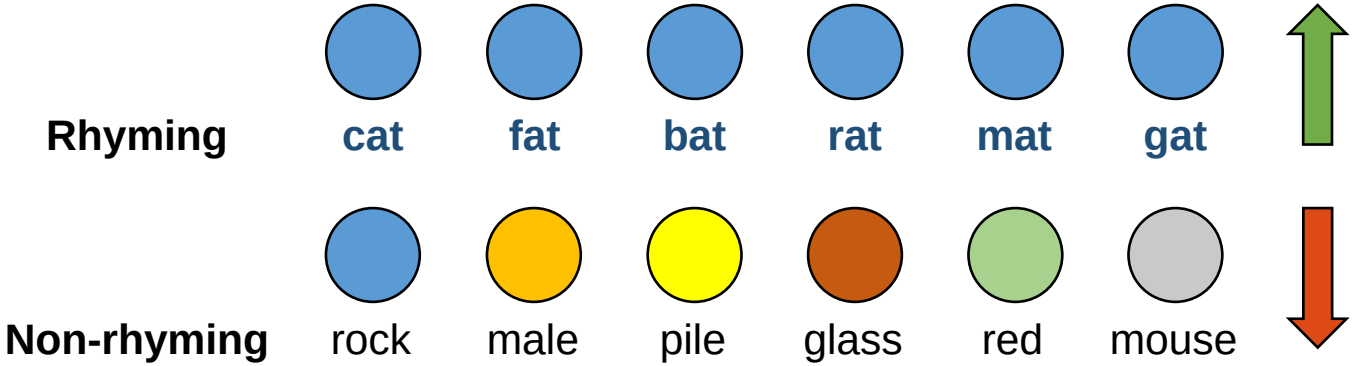


Poirier & Saint-Aubin (1996)

Introduction

Between-item similarity enhances WM performance

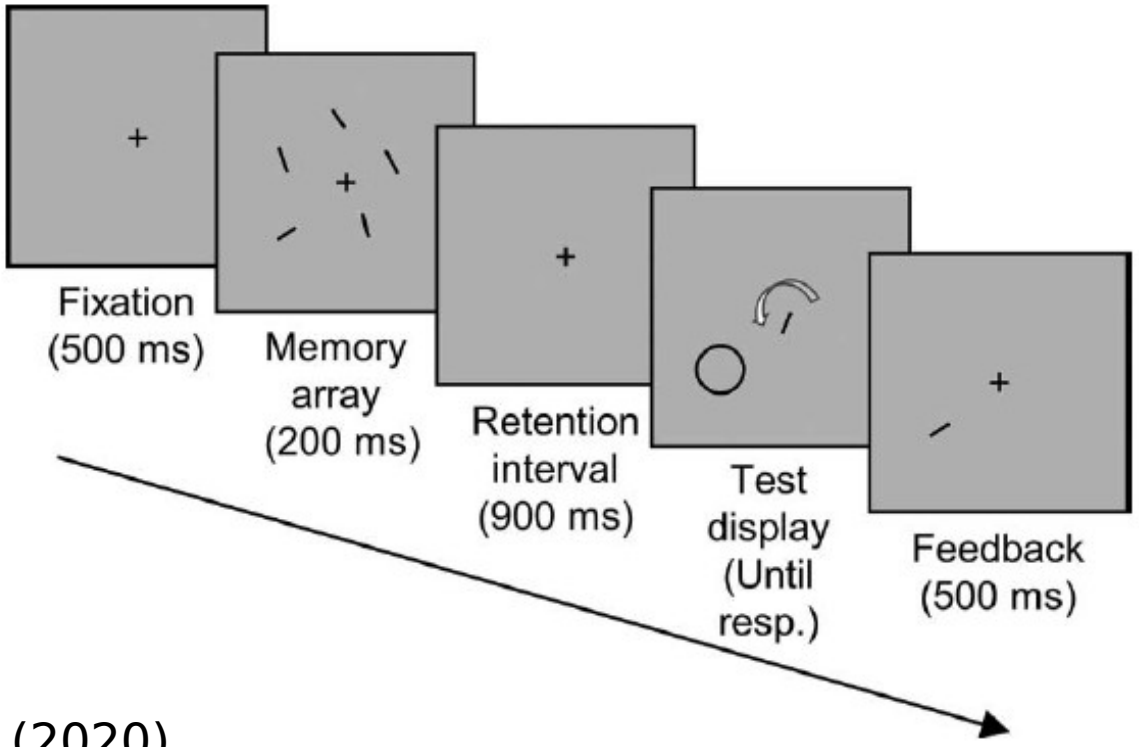
Phonological similarity. Rhyming vs. non-rhyming words



Gupta et al. (2005)

Introduction

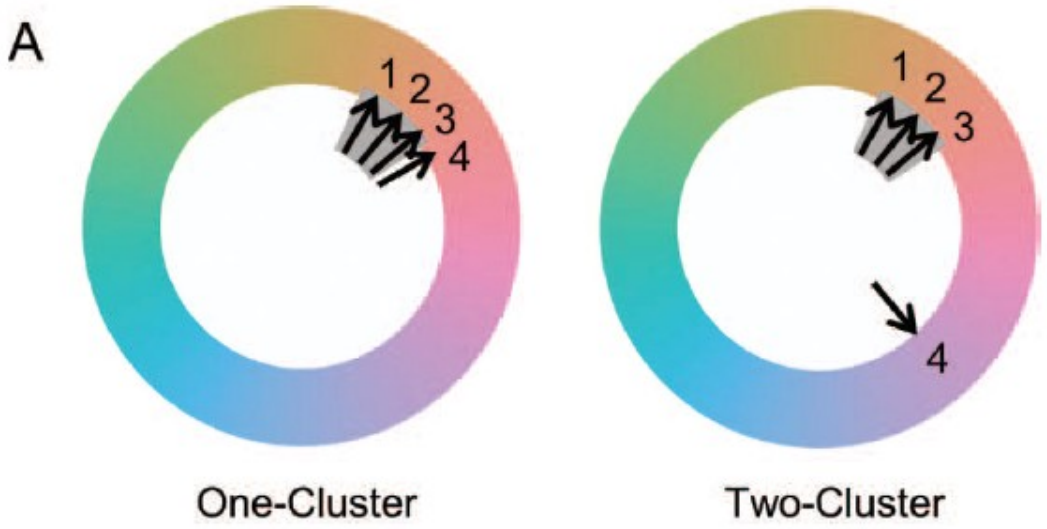
Between-item similarity enhances WM performance



Son et al. (2020)

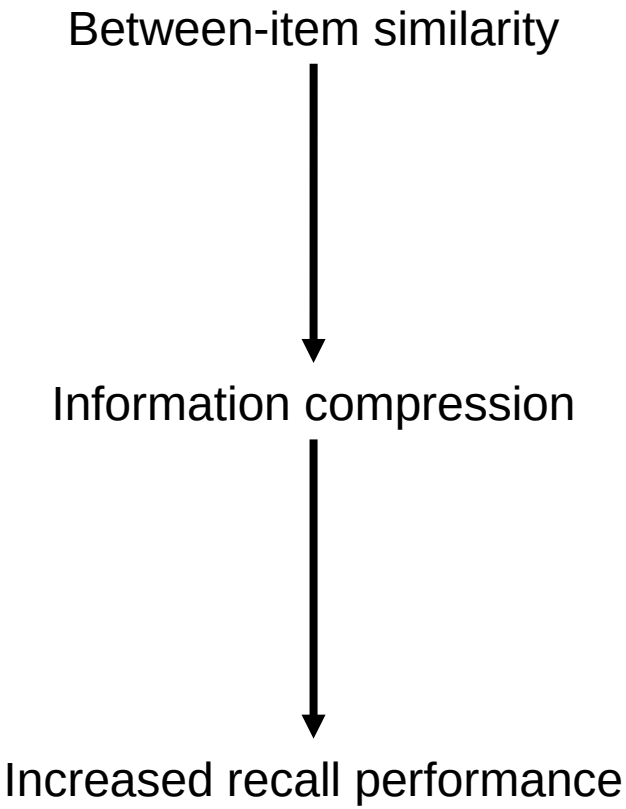
Introduction

Between-item similarity enhances WM performance



Son et al. (2020)

Introduction

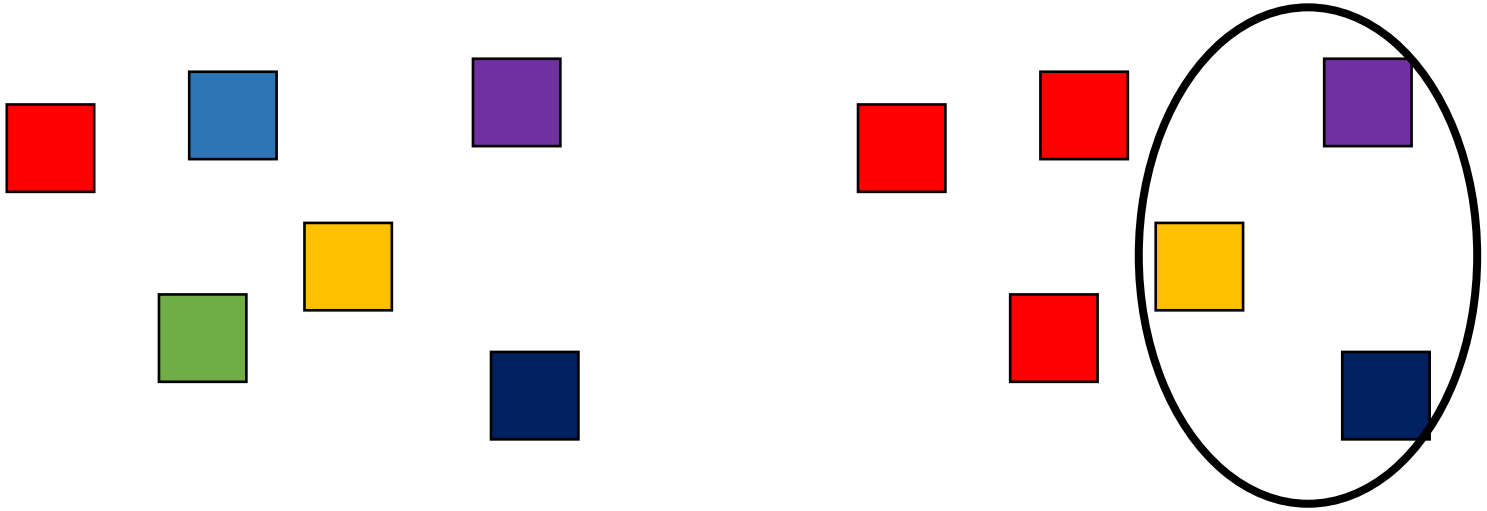


Chekaf et al. (2016)

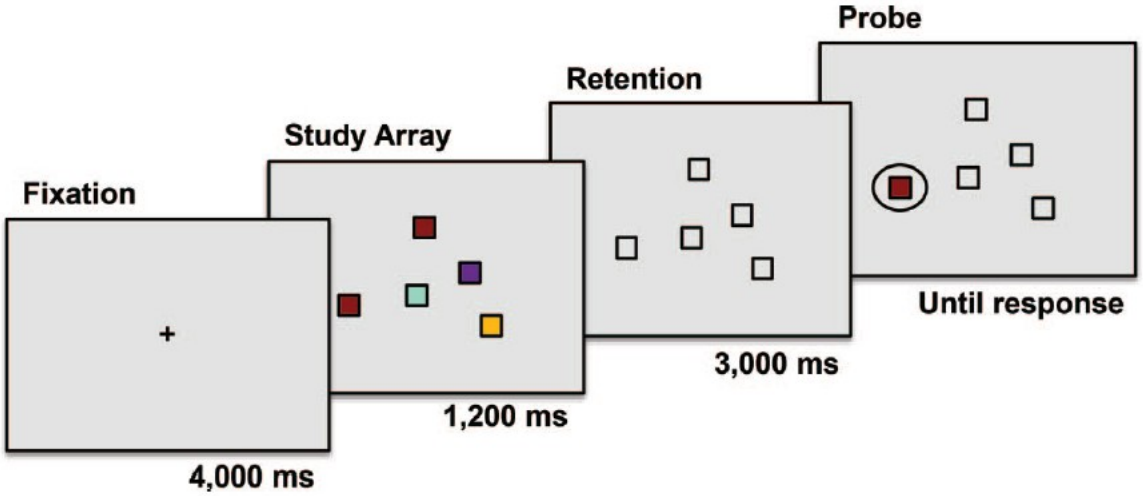
Introduction

Prediction:

Between-item similarity should enhance recall performance for other, dissimilar items.

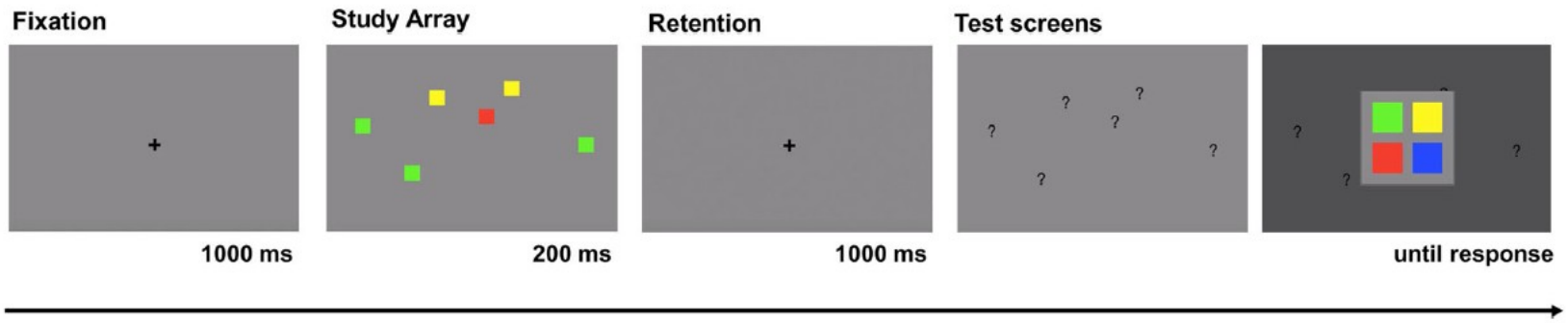


Introduction



Morey et al. (2015)

Introduction



Ramzaoui & Mathy (2021)

But:

Simultaneous presentation

Sequentiality?

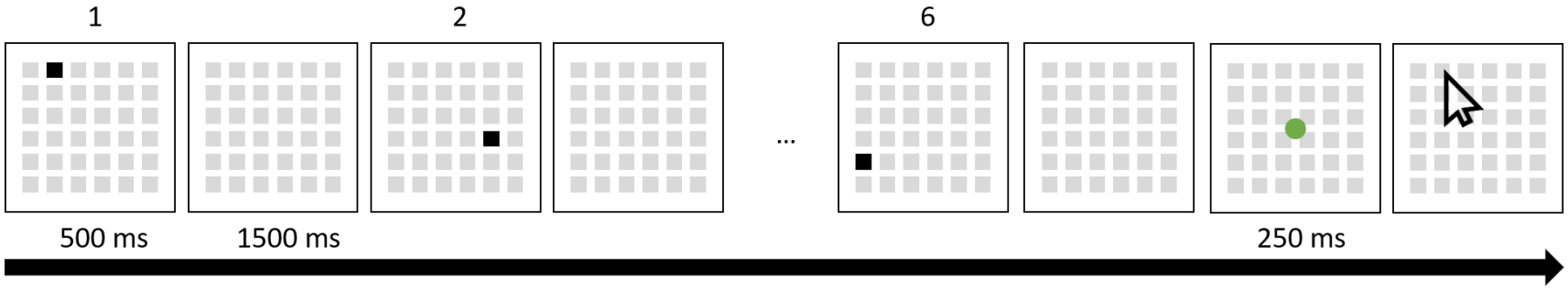
Aim:

Temporal dynamic

Visuospatial (Exp.1) and **visual** (Exp.2) domains

Methods: visuospatial domain

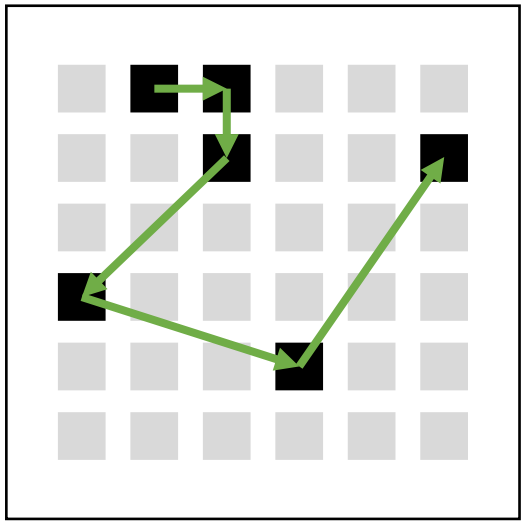
Experiment 1



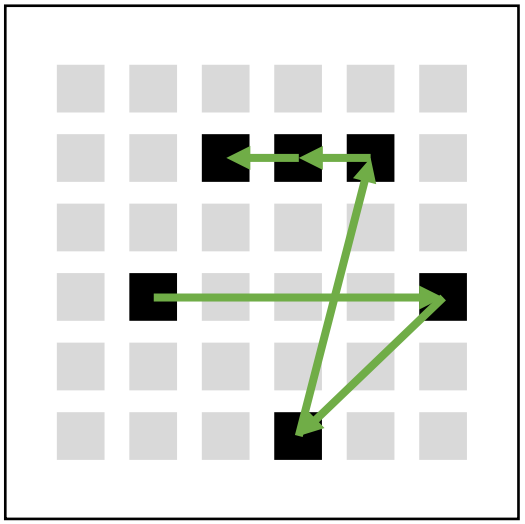
Methods: visuospatial domain

Similarity characterized by spatial proximity

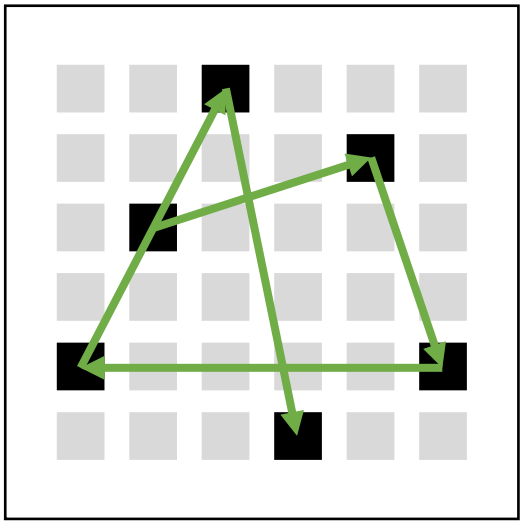
S1



S2



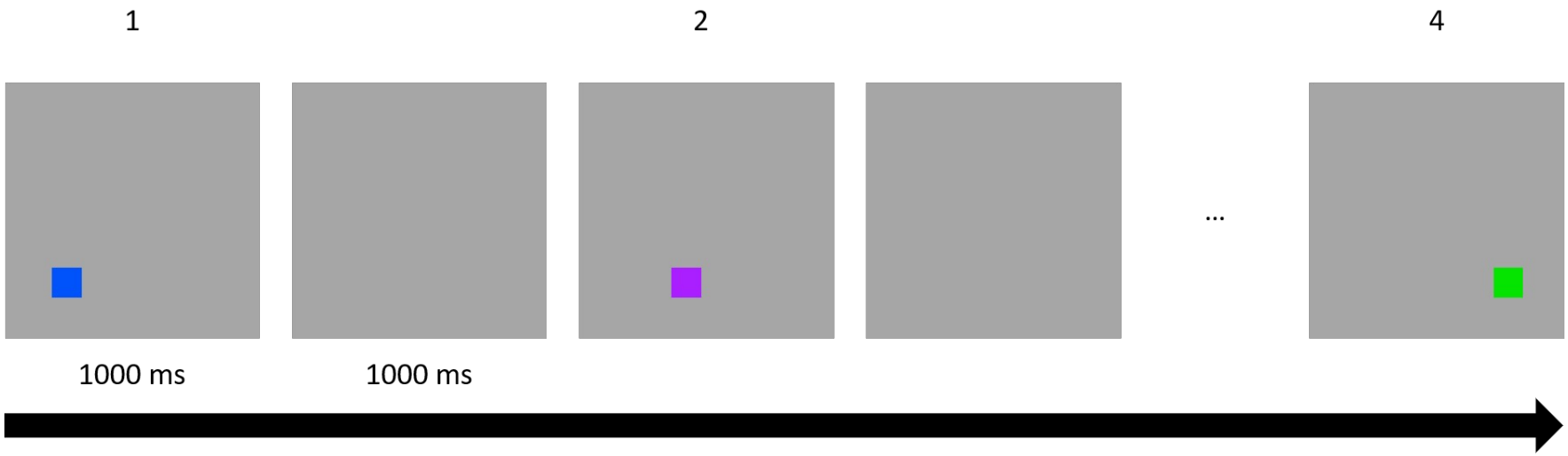
NS



20 trials / condition

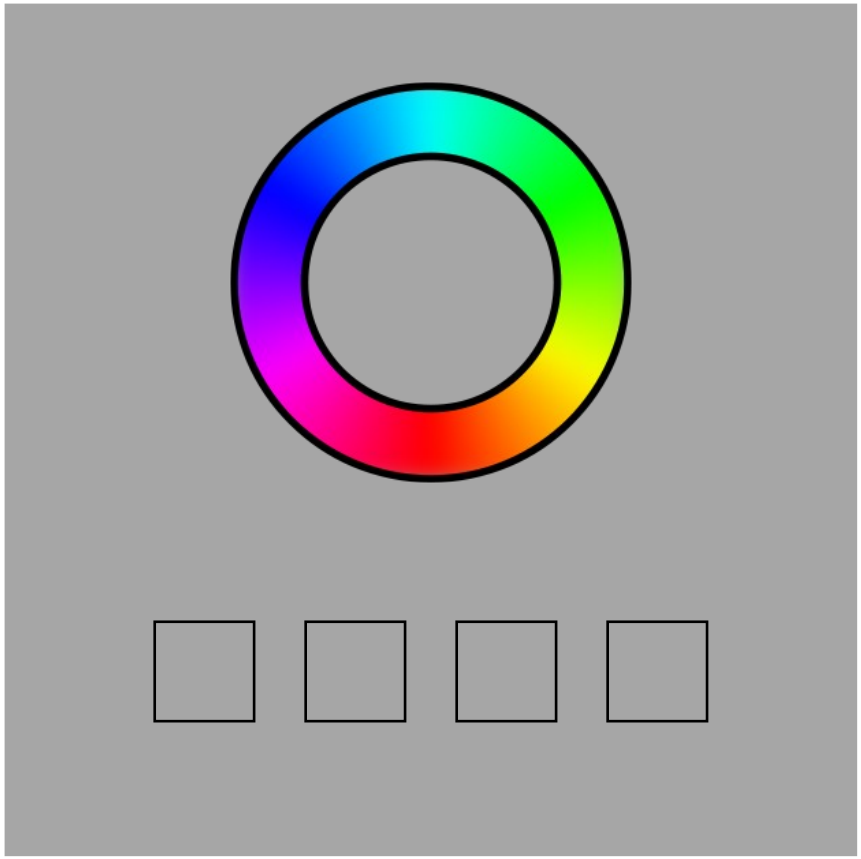
Methods: visual domain

Experiment 2



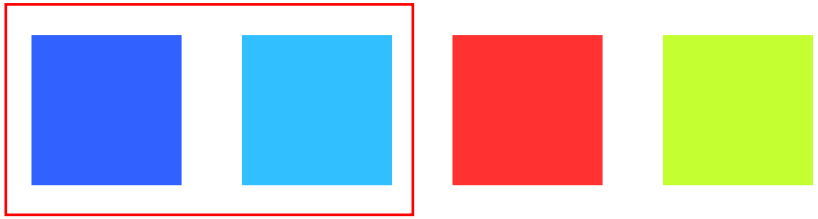
Complex articulatory suppression throughout the task (encoding + recall)
« Ba be bi bo bu »

Methods: visual domain

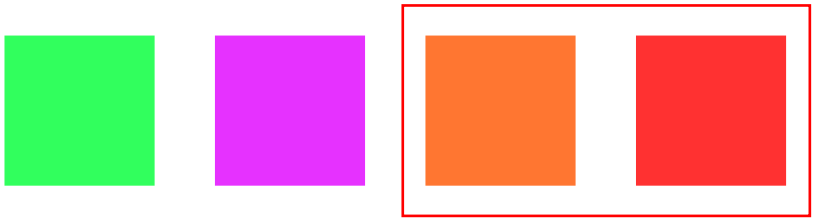


Methods: visual domain

S1



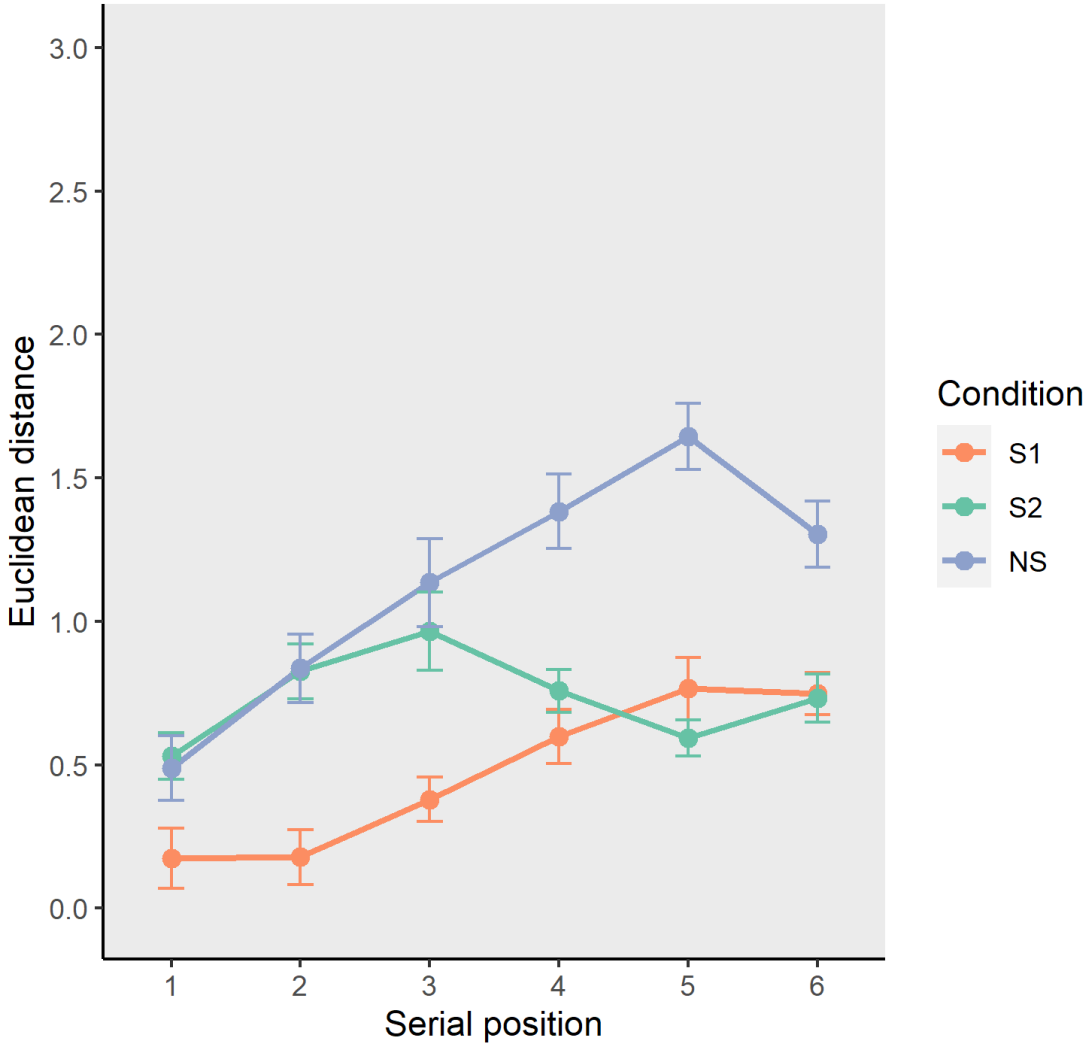
S2



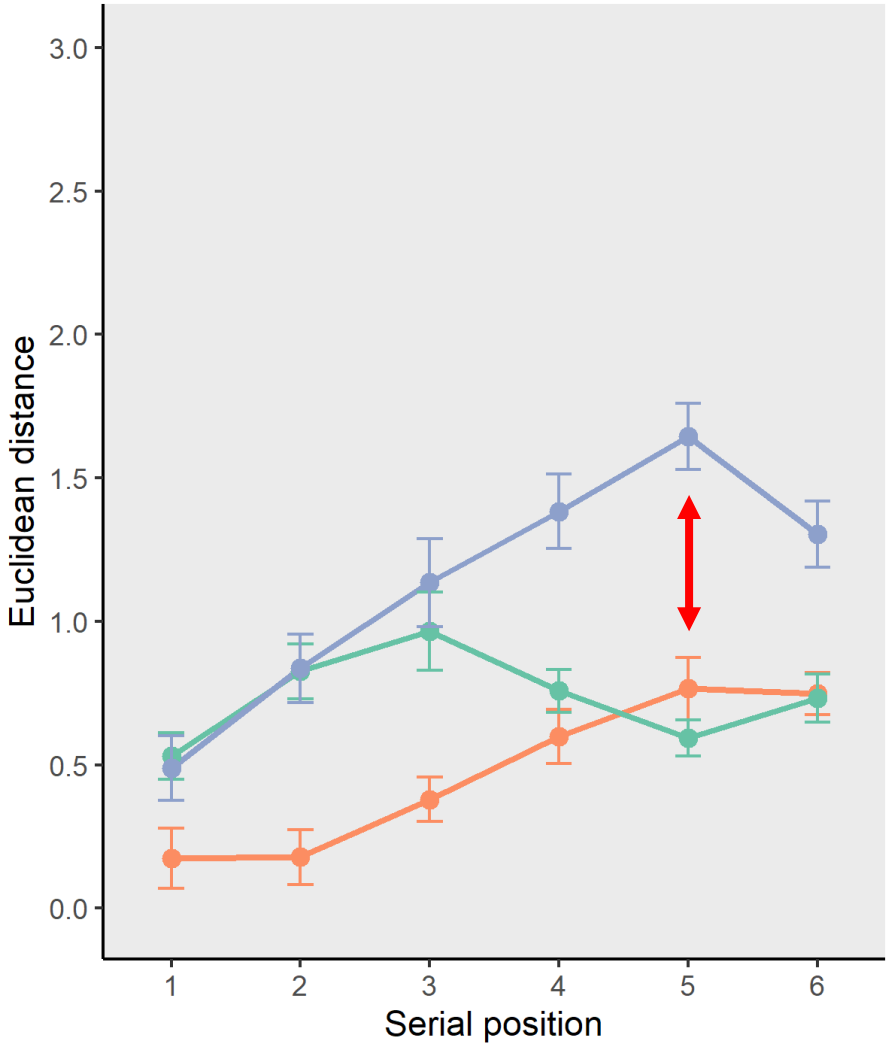
NS

20 trials / condition

Results: visuospatial domain

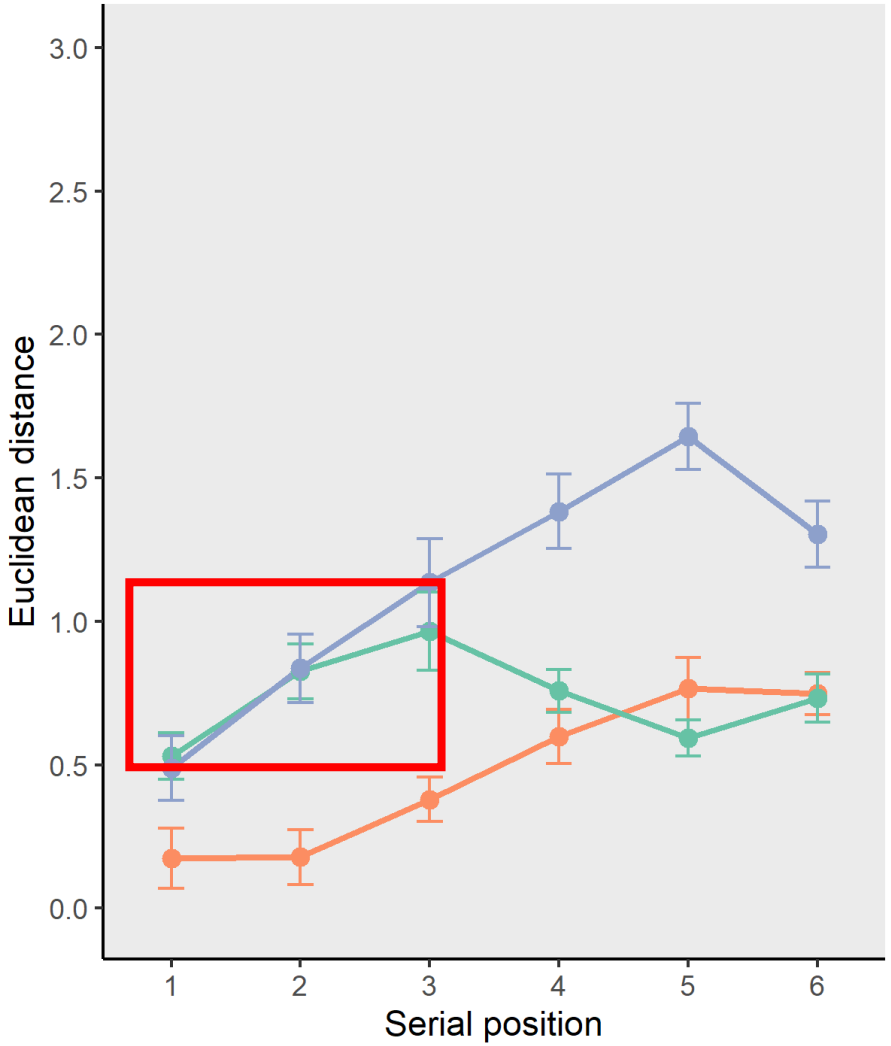


Results: visuospatial domain



Proactive effect

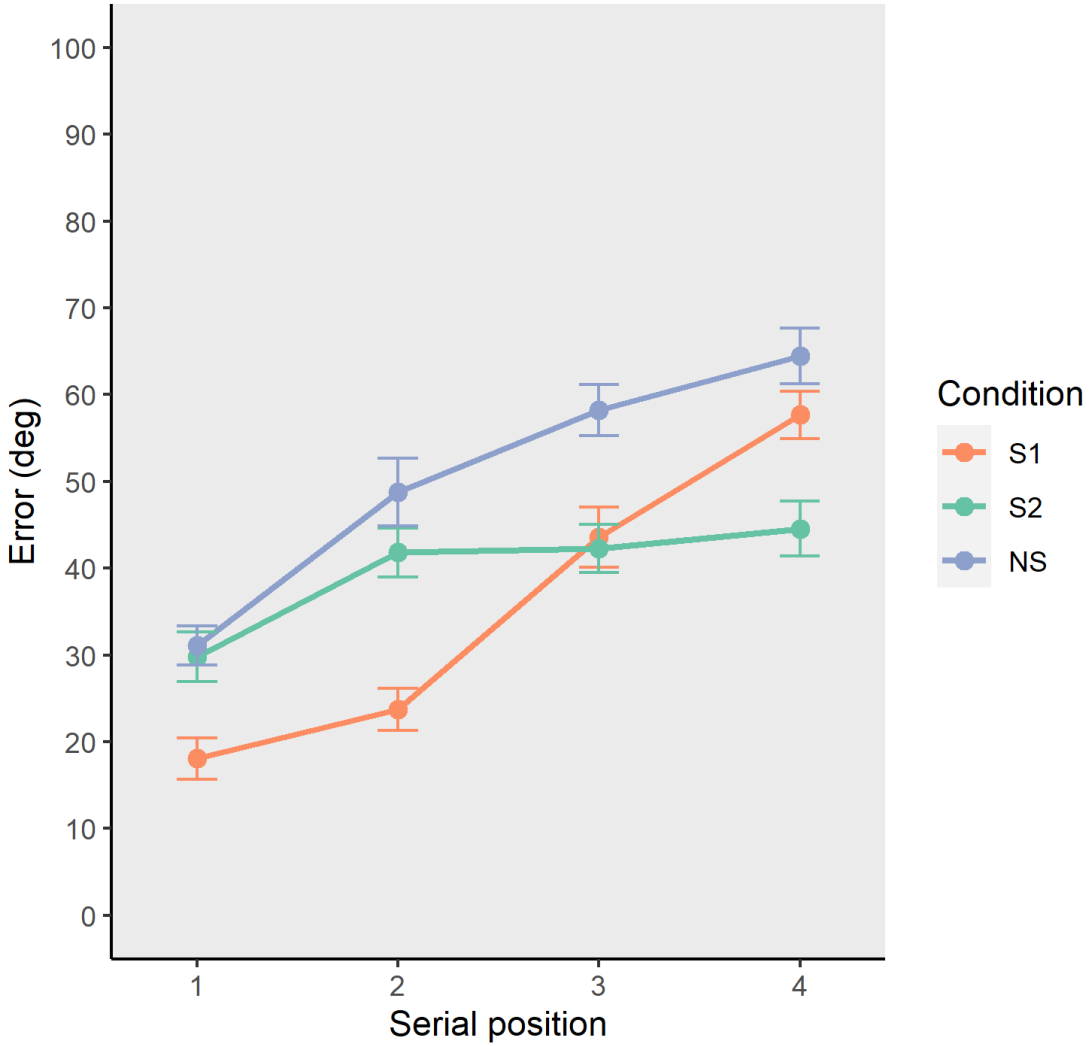
Results: visuospatial domain



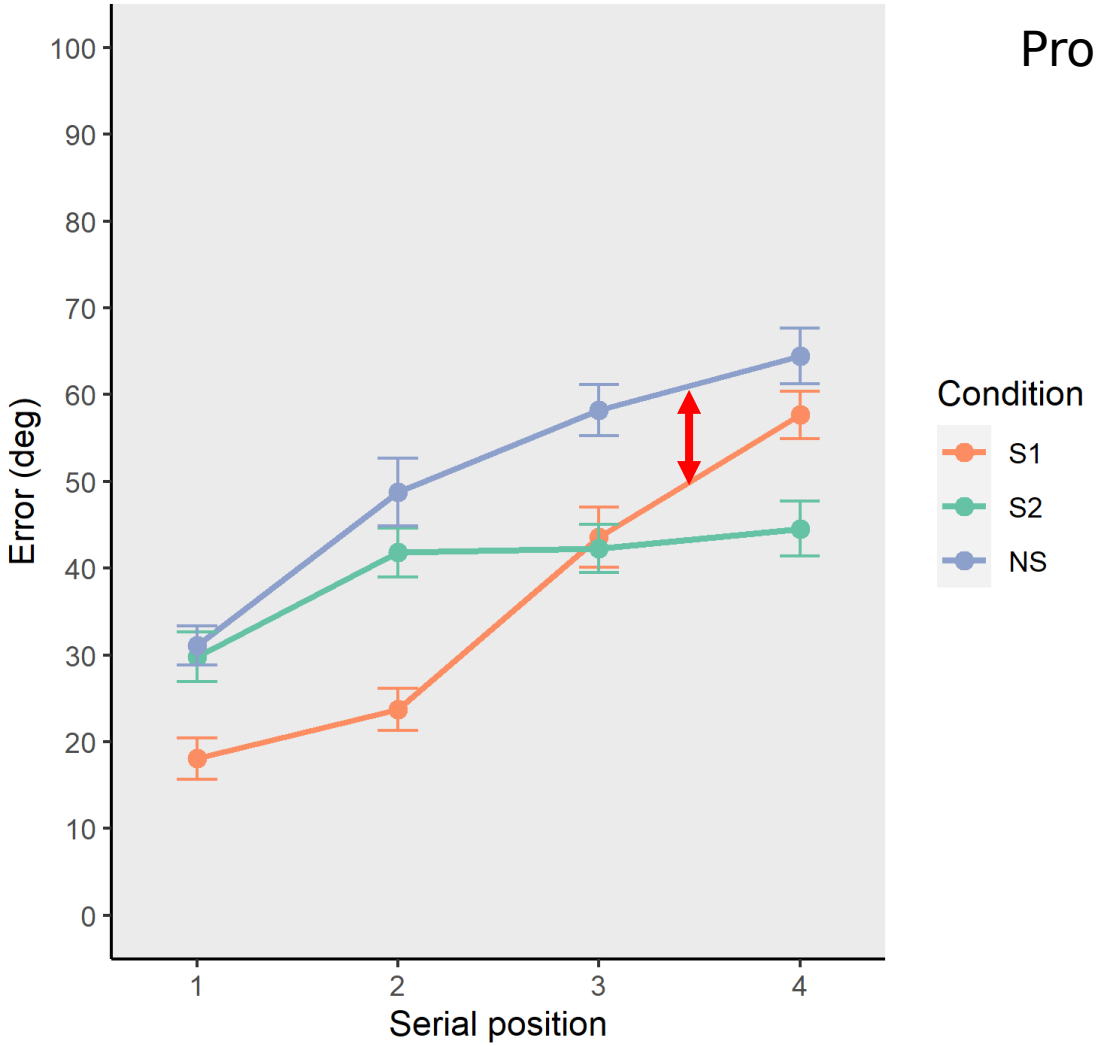
Proactive effect

No retroactive effect

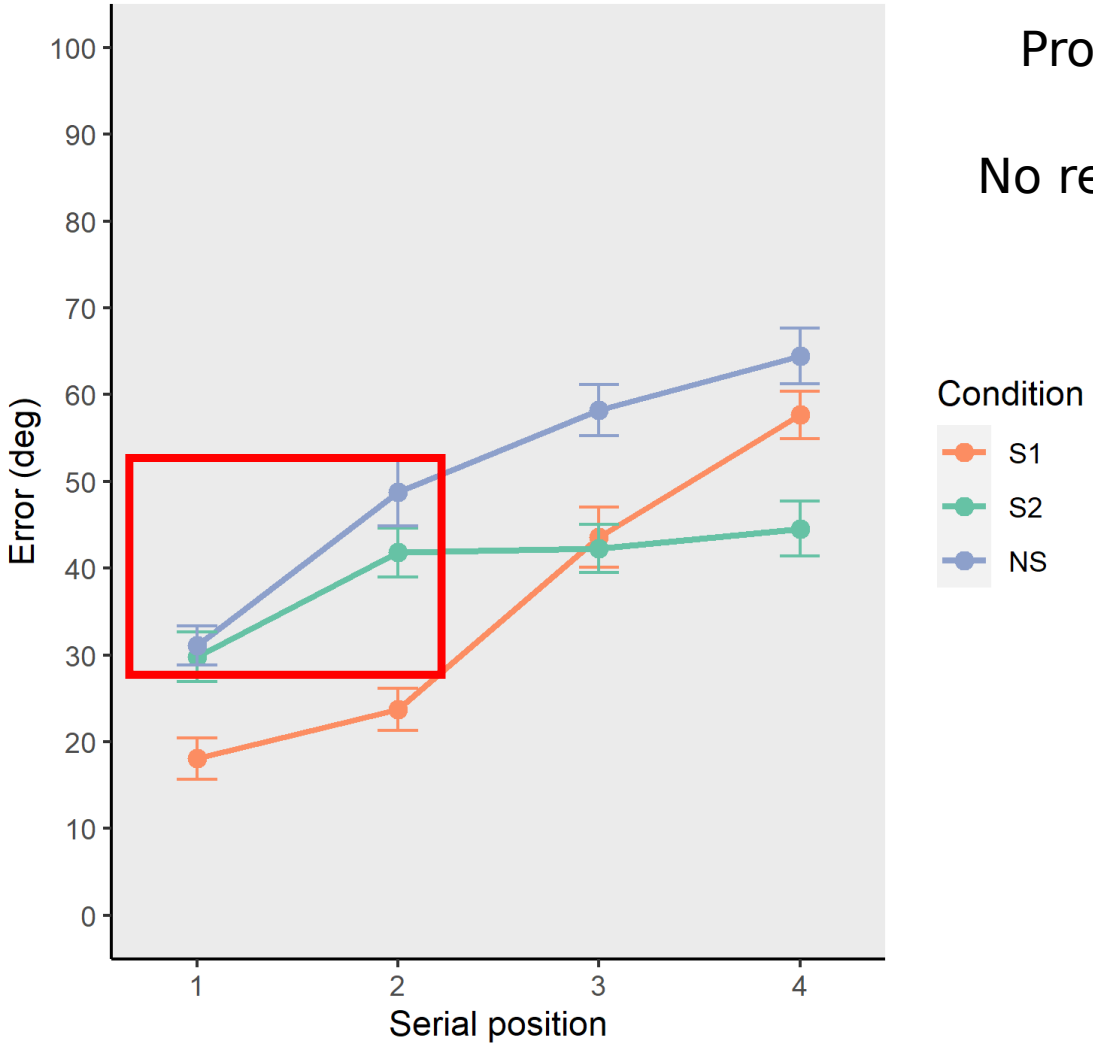
Results: visual domain



Results: visual domain



Results: visual domain



Proactive effect

No retroactive effect

Discussion

Between-item similarity enhances WM performance.

Critically, it also enhances WM performance for other, dissimilar items.

→ Free-up of WM capacity/resources

Discussion

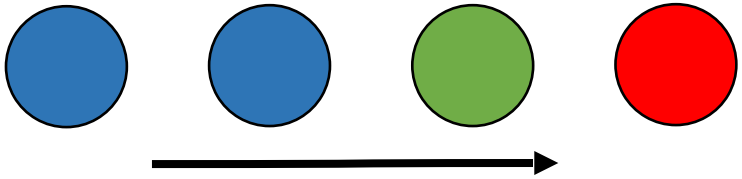
Between-item similarity enhances WM performance.

Compression
Summary statistics (Alvarez, 2011)

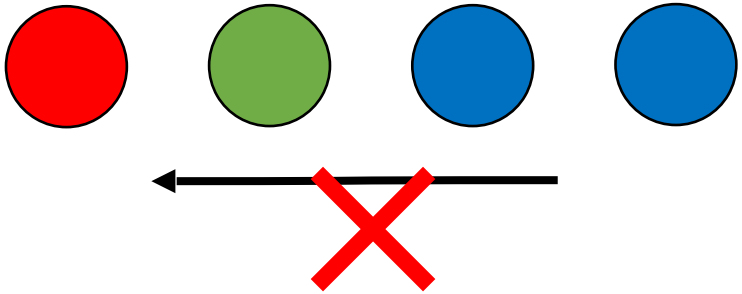
Discussion

Critical role of the temporal dynamics

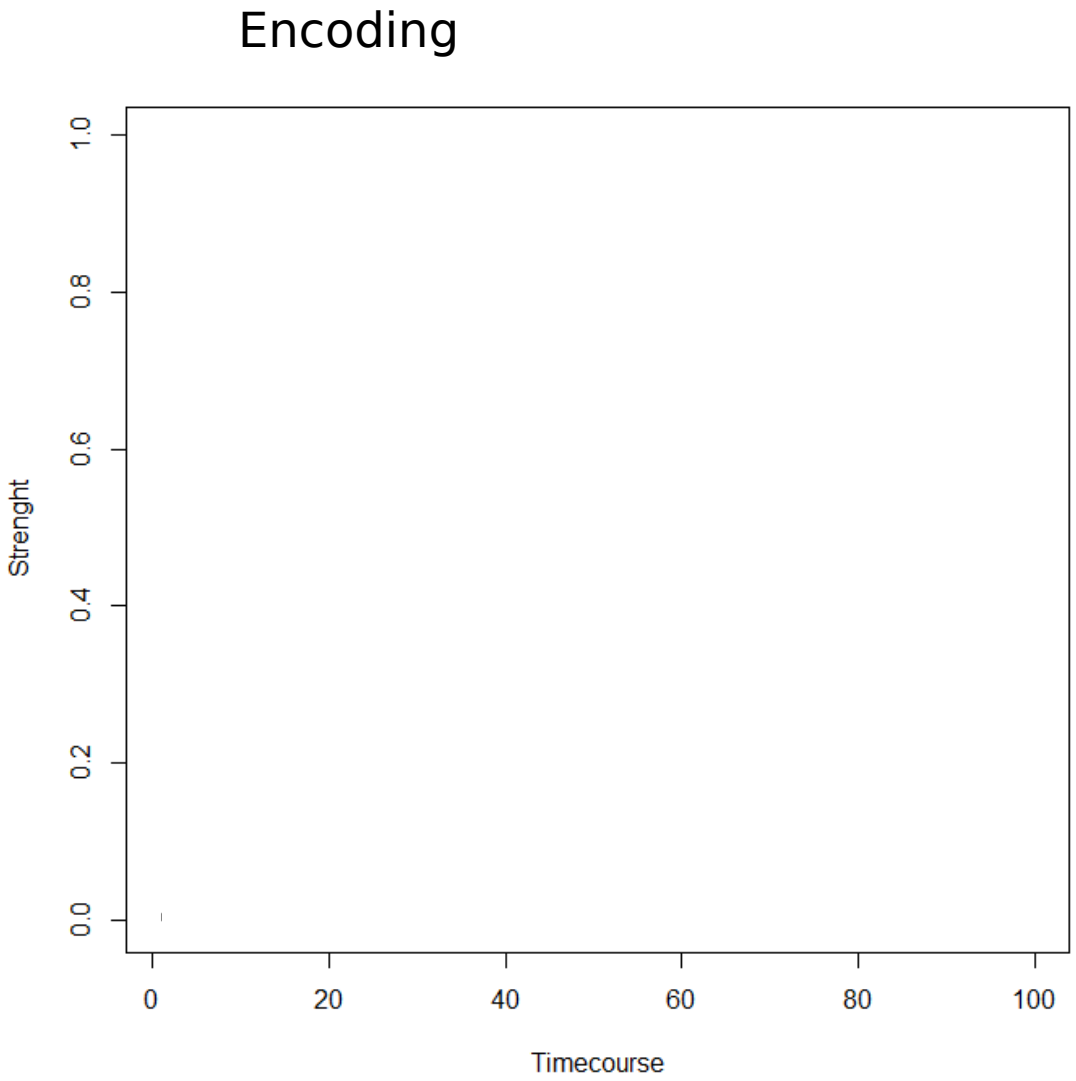
Proactive impact



No retroactive impact



Discussion


Encoding
Strenght
0.0
0.2
0.4
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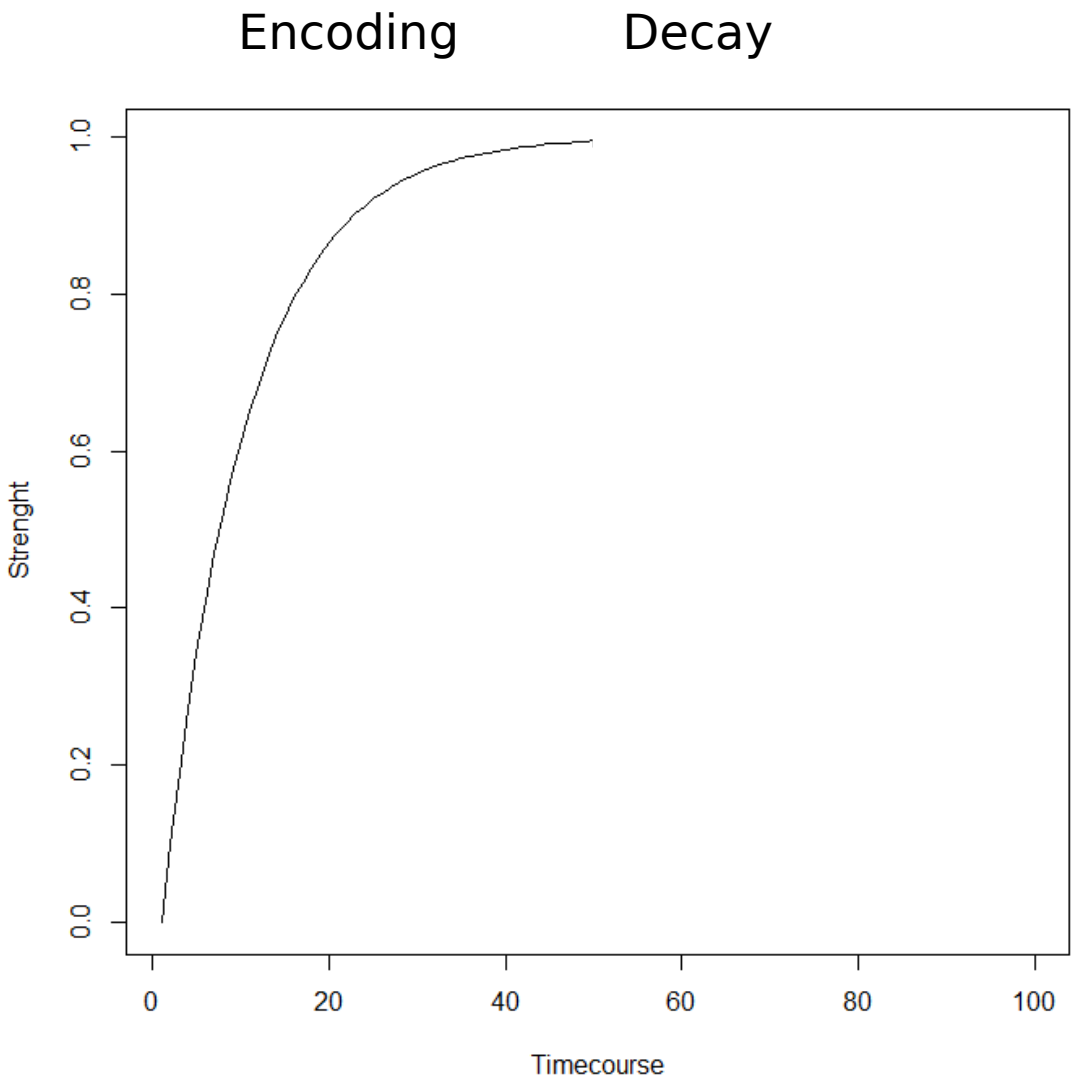
0.8
1.0
0
20
40
60
80
100
Timecourse

Discussion


Encoding
Decay
Strenght
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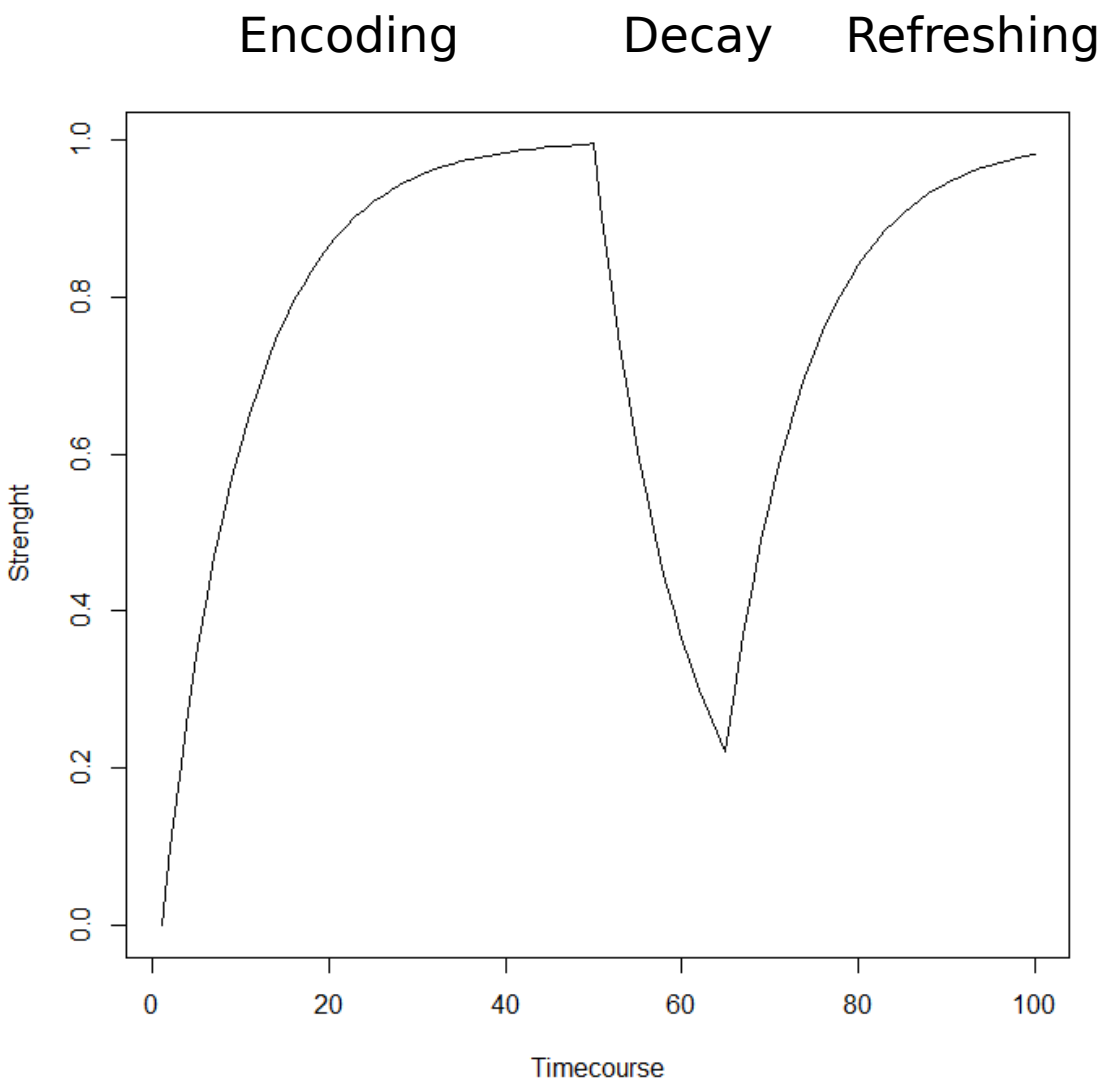
Timecourse

Discussion


Encoding
Decay
Refreshing
Strenght
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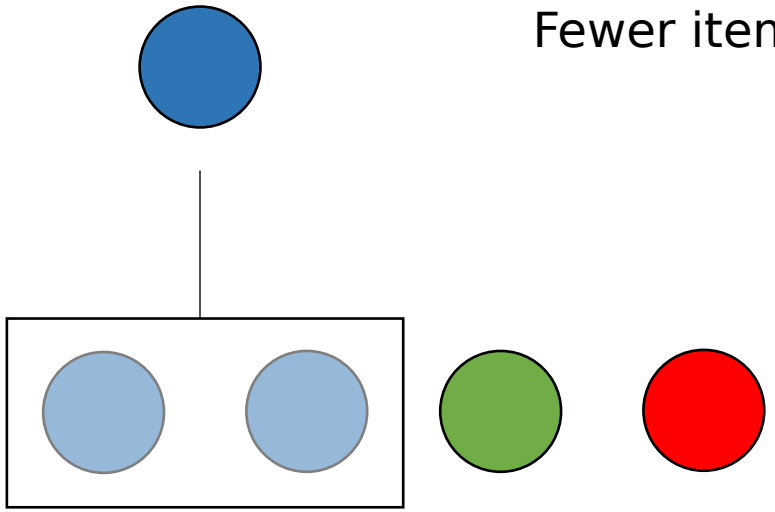
100
Timecourse

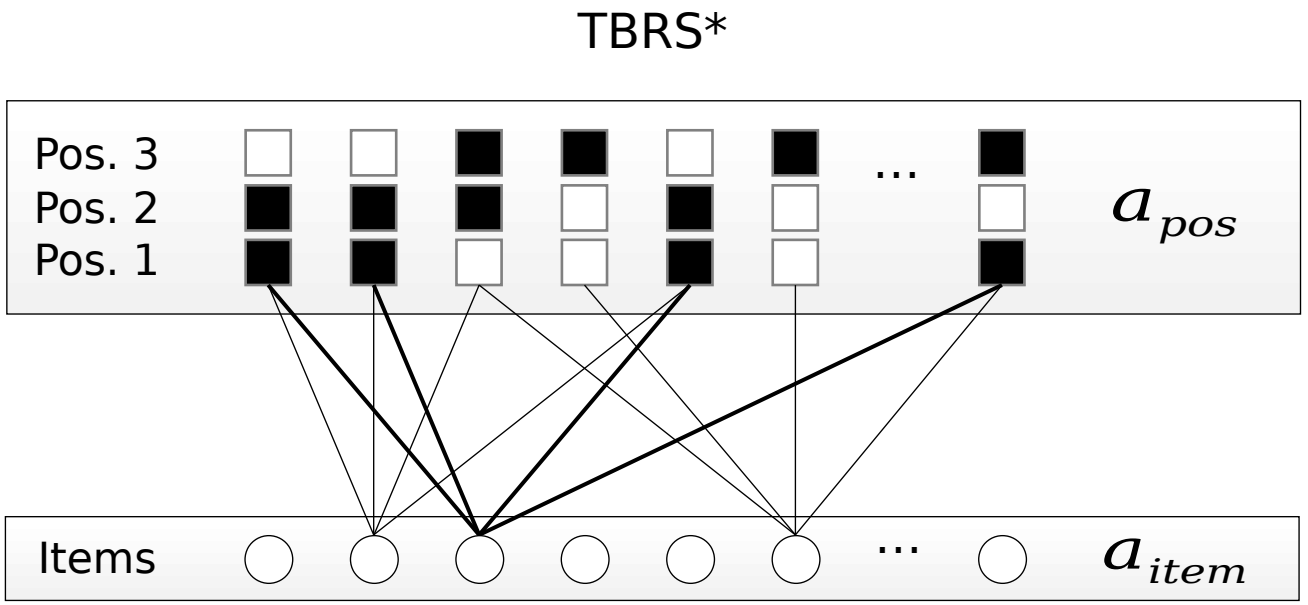
Discussion



Fewer items to refresh

Kowialiewski, Lemaire & Portrat (*submitted*)

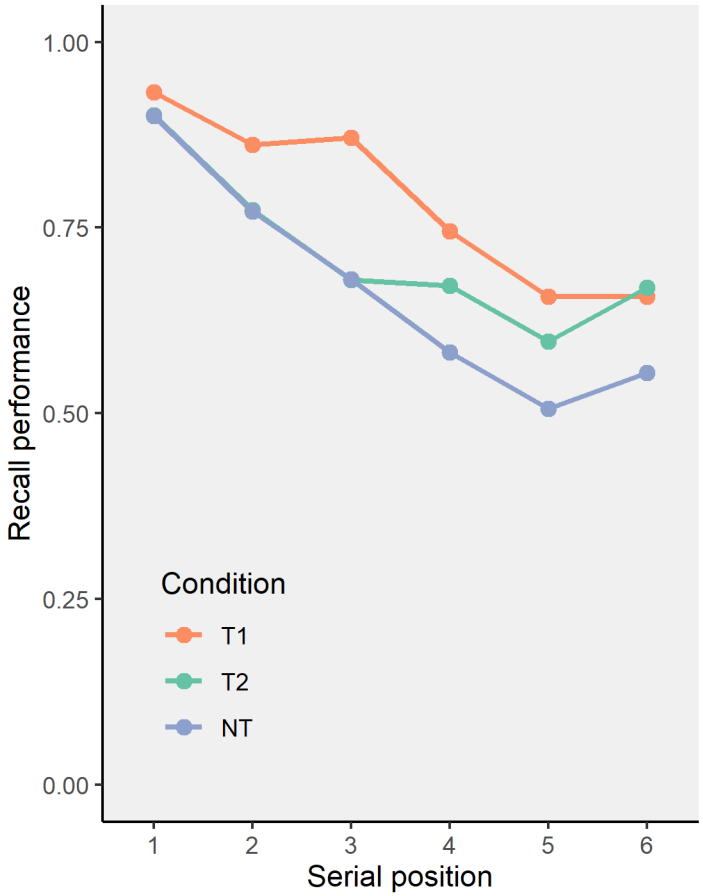
Discussion



Oberauer & Lewandowsky (2011)

Discussion

TBRS*C architecture



Kowialiewski, Lemaire & Portrat (*submitted*)

Domain-general property

Chunks (Thalmann et al., 2019)

Word frequency (Miller & Roodenrys, 2012)

Semantic relatedness (Kowialiewski et al., 2021)

Phonological similarity (Kowialiewski et al., *submitted*)

Time (Mizrak & Oberauer, 2021)

Discussion

Encoding-resource mechanism (Popov & Reder, 2020)

Chunks (Thalmann et al., 2019)

Word frequency (Miller & Roodenrys, 2012)

Semantic relatedness (Kowialiewski et al., 2021)

Phonological similarity (Kowialiewski et al., *submitted*)

Time (Mizrak & Oberauer, 2021)

Conclusion

Between-item similarity frees up WM capacity

Critical role of the temporal factors

The origin of this free-up effect remains to be formally established

Thank you for your attention

Dr. Sophie Portrat

Dr. Benoît Lemaire