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Similarity effects in visuospatial working memory

R. REMOUCHAMPS [a], B. KOWIALIEWSKI [a,b,c] and S. MAJERUS [a,b,c]
[a] ULiège, Belgium
[b] Psychology and Neuroscience of Cognition Research Unit (PsyNCog) , Belgium
[c] Fund for Scientific Research - FNRS, Belgium

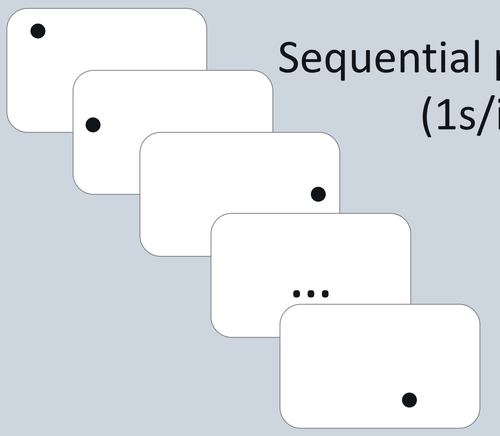
Introduction

Between-item similarity strongly impacts working memory (WM) performance (Gupta et al., 2005; Lin & Luck, 2009), increasing item memory while also decreasing order memory. Despite the importance of similarity for theories of WM (Baddeley & Hitch, 1994), the way it impacts WM performance in the visuospatial domain remains poorly understood. Furthermore, some uncertainty remains regarding the factors that have been controlled to manipulate similarity in visuo-spatial WM (Parmentier et al. 2005). In this study, we investigate the impact of visuospatial similarity on both memory for item and order information.

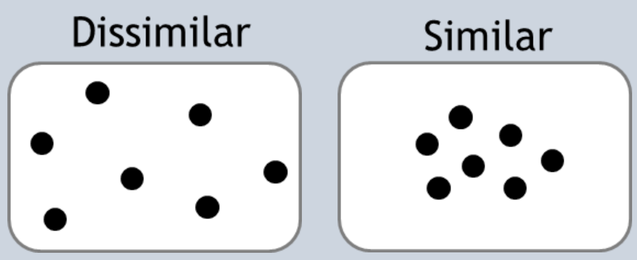
Methods

Thirty adults aged 18-25 years were asked to perform a visuospatial WM test. The participants were asked to encode and recall lists composed of sequentially presented locations.

Encoding



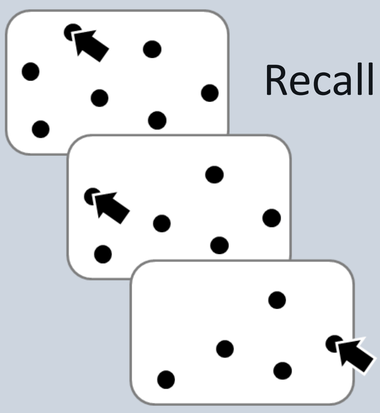
The similar sequences were created by shrinking the dissimilar ones.



All conditions (similarity and retrieval test) were randomly presented.

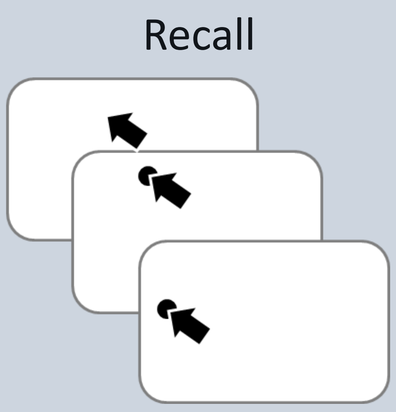
Retrieval

Order reconstruction



Participants were asked to select the locations in their presentation order. The memoranda were available at retrieval.

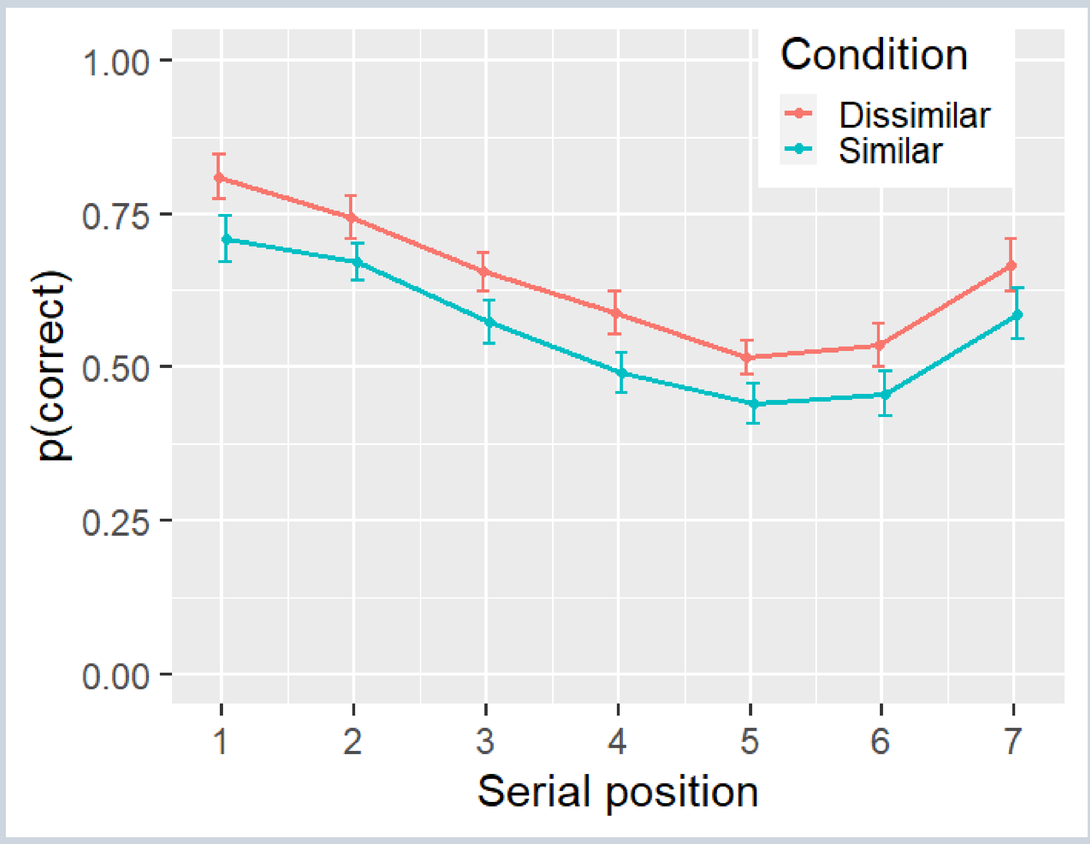
Item recall



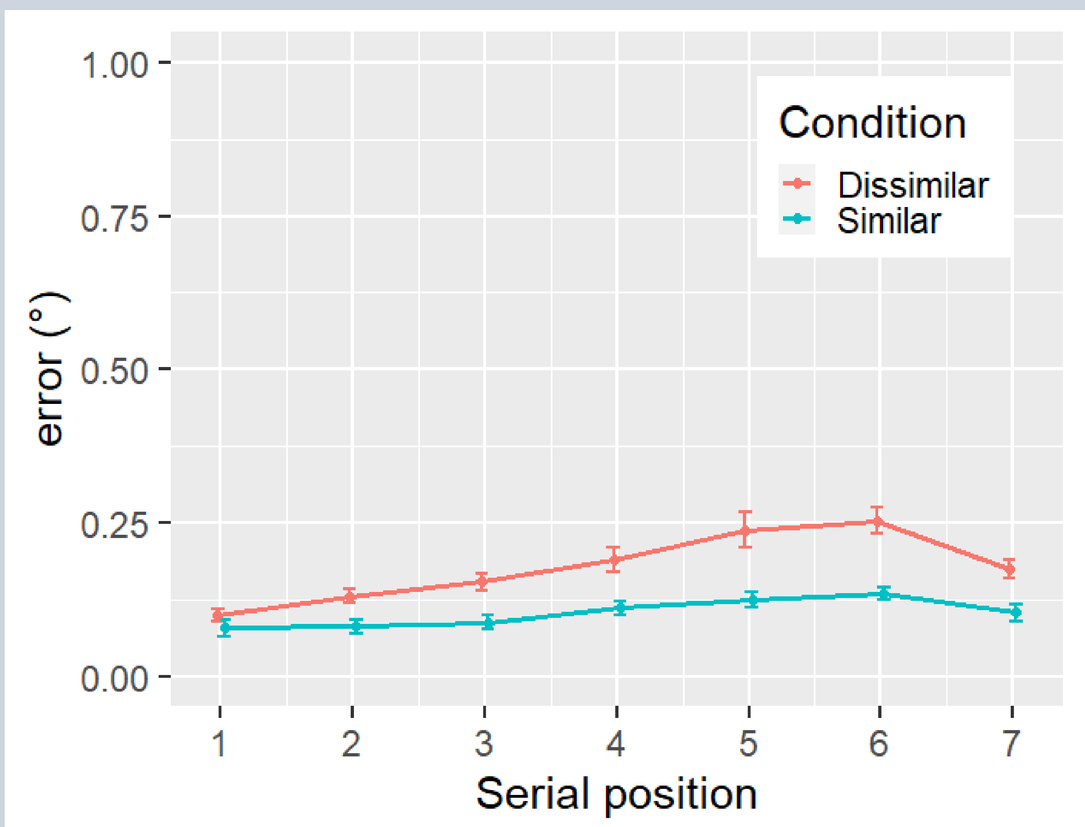
Participants had to recall the locations from memory. The memoranda were not available at retrieval.

Results

Order reconstruction test



Item recall test



	Similarity	Serial position	Similarity x Position
Order reconstruction	$F(1, 29) = 43.04$ $p < .001$, $\eta_p^2 = .60$	$F(3.08, 89.37) = 48.67$ $p < .001$, $\eta_p^2 = .63$	$F(3.59, 104.01) = 0.44$ $p < .76$, $\eta_p^2 = .015$
Item recall	$F(1, 29) = 88.29$ $p < .001$, $\eta_p^2 = .75$	$F(2.78, 80.61) = 44.68$ $p < .001$, $\eta_p^2 = .61$	$F(3.76, 109.08) = 20.61$ $p < .001$, $\eta_p^2 = .42$

Discussion

These findings reproduce the typical similarity effect as observed in other domains. They refine our understanding of the way similarity impacts visuospatial WM performance compared to previous investigations (Parmentier et al. 2005). These results support theories considering that visuospatial and verbal WM are characterized by the same representational properties.

References

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Gupta, P., Lipinski, J., & Aktunc, E. (2005). Reexamining the phonological similarity effect in immediate serial recall: The roles of type of similarity, category cuing, and item recall. Memory & Cognition, 33(6), 1001-1016.
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