Attention is Guided by a Range of Feature Values When Visually Similar Features are Held in Visual Working Memory

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Background

- Visual working memory (VWM) exerts a pertinent influence over the guidance of attention when a single feature is maintained.[1,2]
- When multiple features are held, the influence of VWM on attentional priority is less consistent. [3,4]
- However, in previous investigations of this matter, memoranda were prevented from resembling one another, leaving ambiguous the role of inter-item similarity on such guidance.

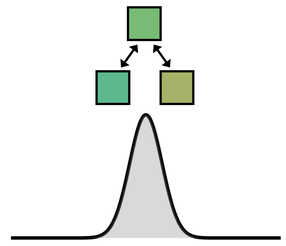
What is the nature of memory-driven guidance when visually similar items are held in VWM?

Hypotheses

Discrete Representations

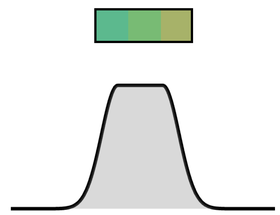
Memory-Matching Guidance *No Attentional Guidance*

Integrated Representation



Guidance by Feature-Mean

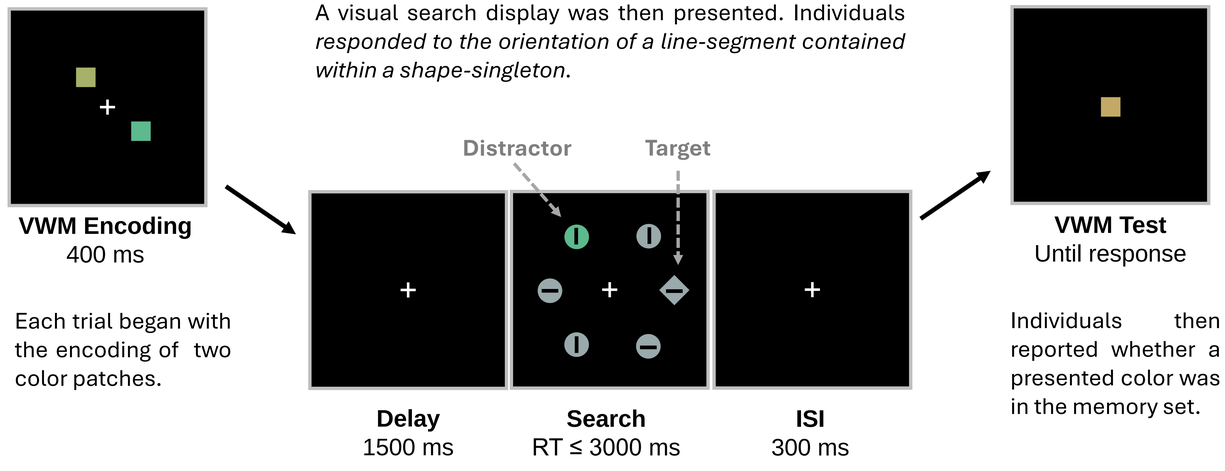
Banded Representation[5]



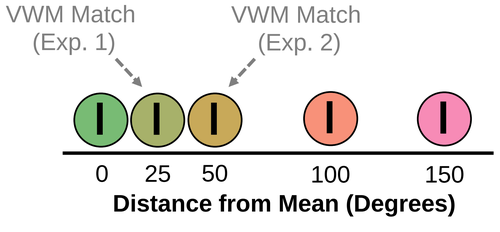
Guidance by Feature-Range

Method

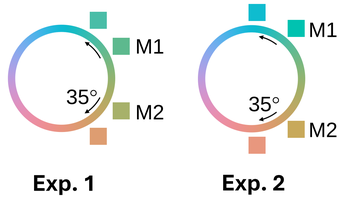
360 Total Trials (8 Blocks x 45 Trials)



Memorized colors were visually similar in Exp. 1 and visually dissimilar in Exp. 2.



The distracting, color-singleton varied systematically across trials and was defined according to the center value between the two memorized colors.

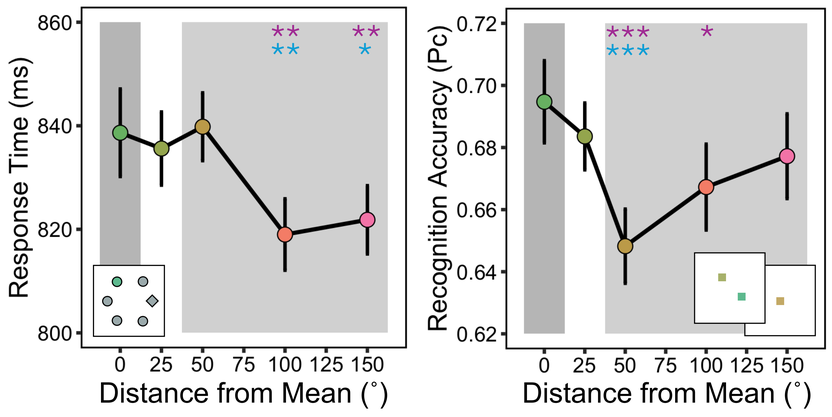


Foil items differed from one of the two colors by 35° (away from the center value).

Results

Experiment 1 *(Visually Similar) (N = 48)*

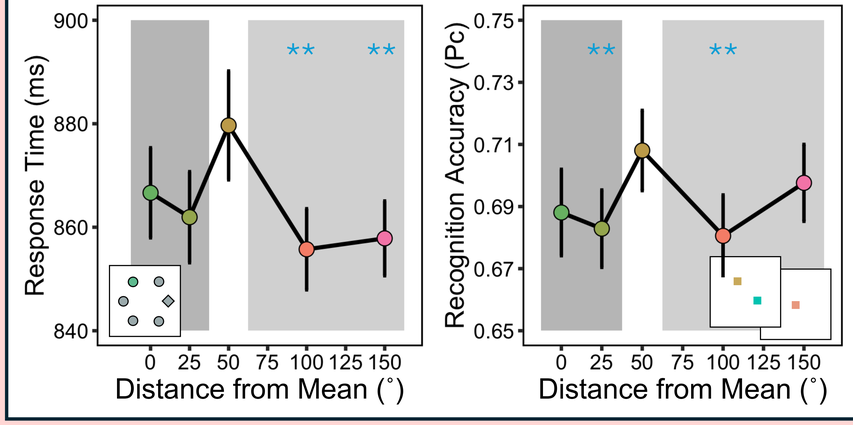
* < Innermost; * < Memory Match



Search: Stronger capture for innermost and VWM-match colors over outermost colors. No difference for VWM-match, innermost, and nearest outer color.

VWM: Presence of nearest outer color during search impaired recognition relative to innermost and VWM-match distractors.

Experiment 2 *(Visually Dissimilar) (N = 48)*



Search: Stronger capture for VWM-match colors relative to outermost colors. No difference for VWM-match and inner colors.

VWM: Higher recognition following presence of VWM-match distractors relative to adjacent distractors.

Takeaway: The influence of VWM on attentional priority is affected by the feature-similarity of items when multiple objects are maintained. When the items are dissimilar, attention is guided by discrete representations of the memorized features. When the items are visually similar, attention is guided uniformly by a banded range of features encompassing the memorized values.

[1] Soto, D., et al. (2005). *J. Exp. Psychol. Hum. Percept. Perform*, *31*(2). [2] Olivers, C., et al. (2006), *J. Exp. Psychol. Hum. Percept. Perform*, *32*(5). [3] van Moorselaar, D., et al. (2014). *J. Exp. Psychol. Hum. Percept. Perform*, 40(4). [4] Williams, J. R., et al. (2022). *J. Exp. Psychol. Hum. Percept. Perform*, *48*(3). [5] Stroud, M. J., et al. (2012). *J. Exp. Psychol. Hum. Percept. Perform*, *38*(1).