Disentangling Memory Precision and Internal Attention Through Repeated Memory Storage Reveals That Memory-Guided Attention Relies on Internal Attention

M. Yaren Kaynar[1], Fatih Serin[1,2], Pelin Akbaş[1], Eren Günseli[1]
[1]Department of Psychology, Sabanci University, Istanbul, Turkey
[2]MRC Cognition and Brain Sciences Unit, University of Cambridge, United Kingdom
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MRC Cognition and Brain Sciences Unit

UNIVERSITY OF CAMBRIDGE

Günseli Memory, Attention, & Cognitive Control Lab

Sabancı Üniversitesi

Background

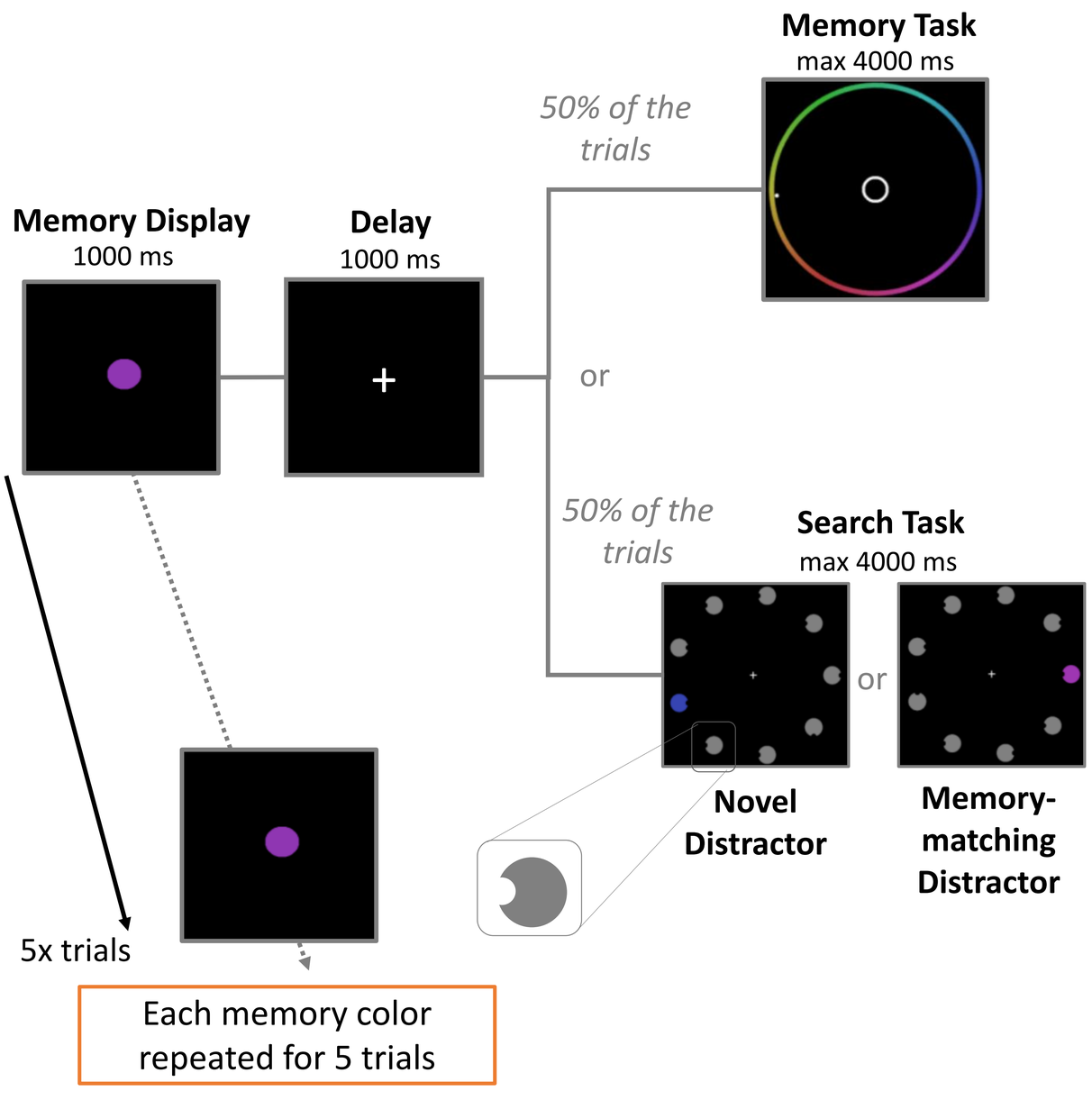
Humans use memories to guide attention in the external world, such as when looking for a friend in a crowded square.

Which aspect of memories determine whether they guide attention is under debate. Some studies suggest that items that are **internally attended** guide attention (e.g., Olivers et al., 2011), while a recent paper proposed that the **high precision** enables memories for attentional guidance (Williams et al., 2022).

Dissociating these theories is challenging given that precision is highest for internally attended memory items (Serin & Günseli, 2022).

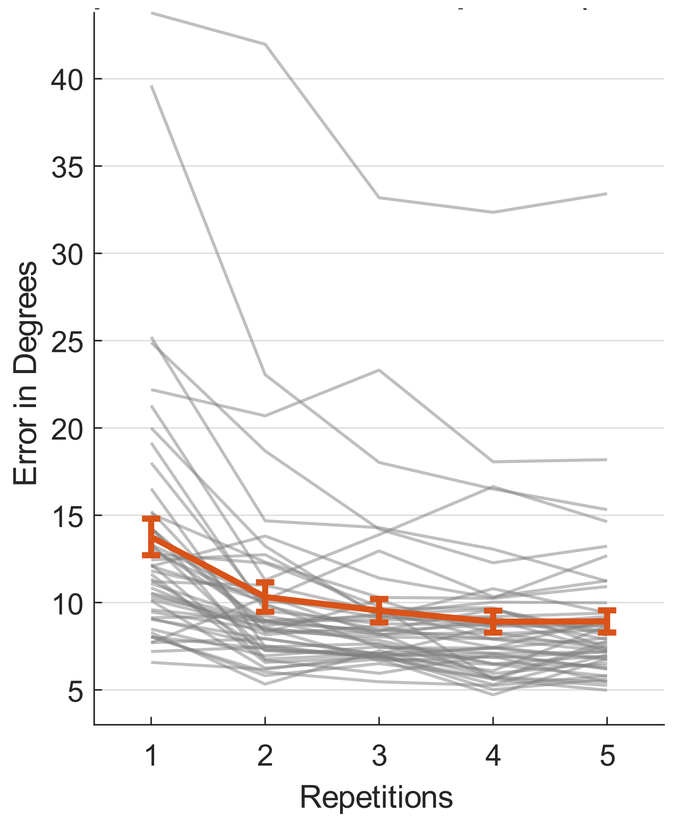
To overcome this challenge, we repeated the same memory item across trials, which is known to reduce the amount of internal attention (Gunseli et al., 2014a,b; Reinhart & Woodman, 2014) while increasing precision of the item. This allowed contrasting the effects of internal attention and precision in guiding attention.

Experimental procedure



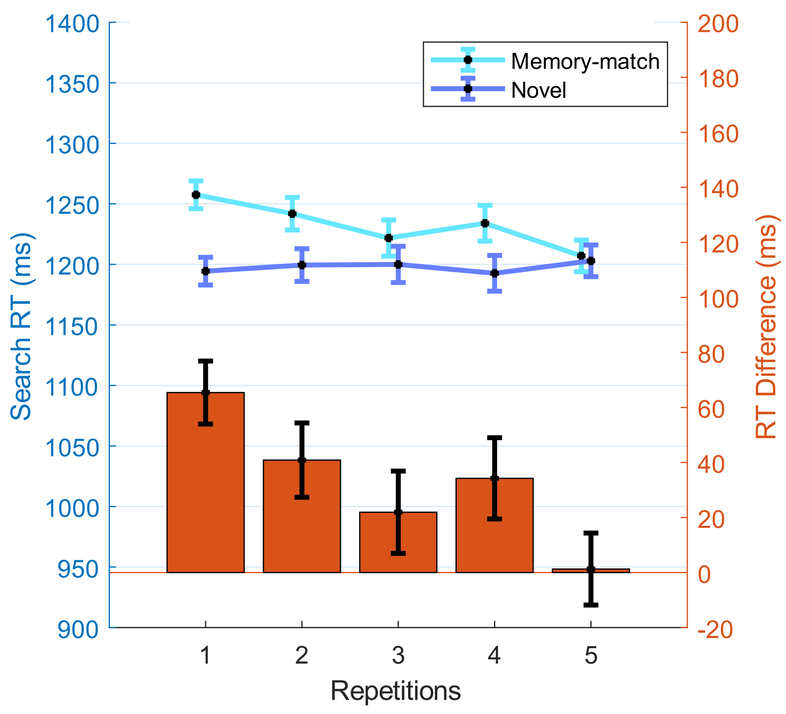
Results (N = 48)

Memory Task



Recall error decreased (i.e., precision increased) across repetitions of the same color (linear contrast $p < .001$)

Search Task



A novel color guided attention in the external world (BF_{10} =38519)

Attentional guidance decreased across repetitions of the same color (linear contrast p=.003)

Attentional guidance was absent in repetition 5 (BF_{01} =5.97)

Conclusions

Memory precision *improves* with repeated storage of the same item.

However, repeated storage results in *reduced* attentional guidance by this memory item.

Based on these, we suggest that memory-guided attention is driven mainly by internal attention rather than the precision of memories.

Our results highlight internal attention as the main aspect of memories that make them guide attention in the external world.

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