THE ROLE OF WORKING MEMORY FOR MENTAL OPERATIONS ON INFORMATION IN LONG-TERM MEMORY

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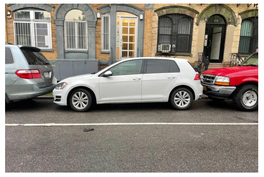
Introduction



WM is claimed to be critical for mental operations.

While performing a mental operation task, an additional working memory (WM) task disrupts performance (Hyun & Luck, 2007; Logie et al., 1994).

Dorsolateral prefrontal cortex, a region associated with WM, is involved in mental operation tasks (D'Esposito et al., 1999; Glahn et al., 2002).

However, these studies provided novel information on each trial, necessitating WM involvement.

What is the function of WM for mental operations on LTM information?

How can we behaviorally index WM reactivation of LTM?

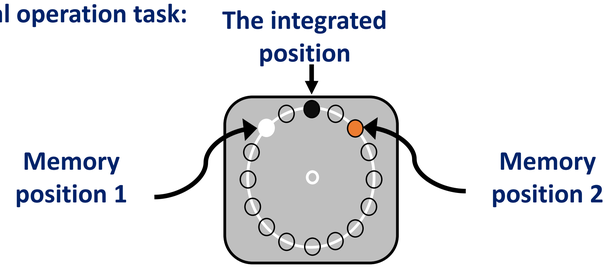
Perceptual discrimination is enhanced at positions stored in WM (Awh & Jonides, 1998, Downing, 2000).

We embedded a perceptual discrimination task during the retention interval of a recognition task and a mental operation.

WM reactivation→ better perceptual discrimination

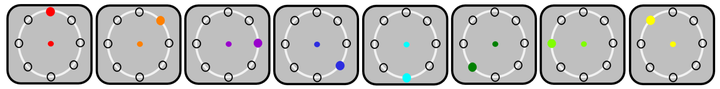
Perceptual discrimination benefits should be larger for mental operations if WM is particularly critical for it compared to recognition.

Mental operation task:



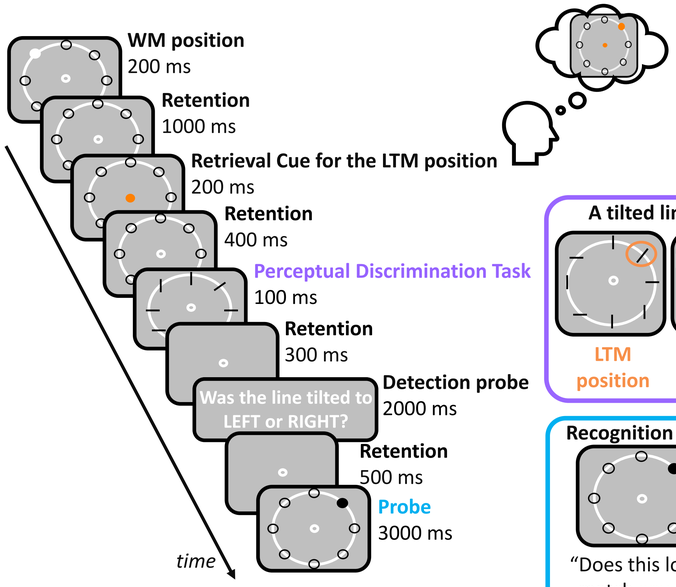
Procedure

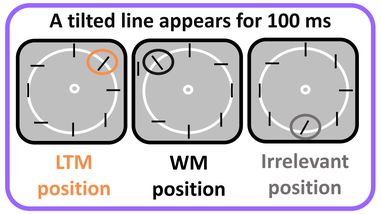
Phase 1 | Learn color-location associations

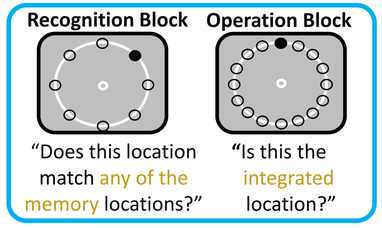


Participants see each association for 4 times

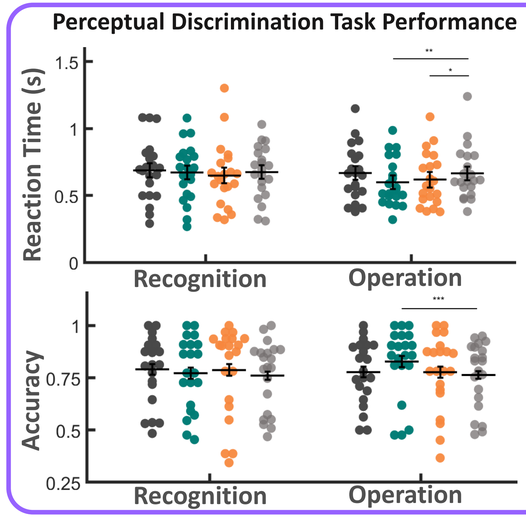
Phase 2 | Use color-location associations for mental operation or recognition







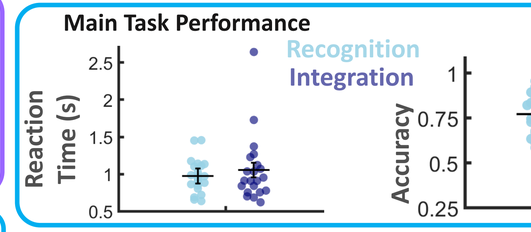
Results



LTM position benefit was present only in the mental integration condition.

This was not due to a speed-accuracy tradeoff.

Thus, we conclude that LTM was reactivated in WM particularly for mental operations.



The integration task was harder than recognition.

Conclusions and Future Directions

WM is particularly important for mental operations as opposed to mere remembering even when it operates on LTM.

Enhanced perceptual discrimination can be used to track memory reactivation.

We will test if task difficulty was a confound.

We will test non-spatial memory forms (e.g., color).