

The role of working memory for mental operations on information in long-term memory

Duygu Yücel^{1*}, Betül Türk^{2*}, & Eren Günseli¹

¹Department of Psychology, Sabancı University, Istanbul, Turkey

²Department of Psychology, Cankaya University, Ankara, Turkey

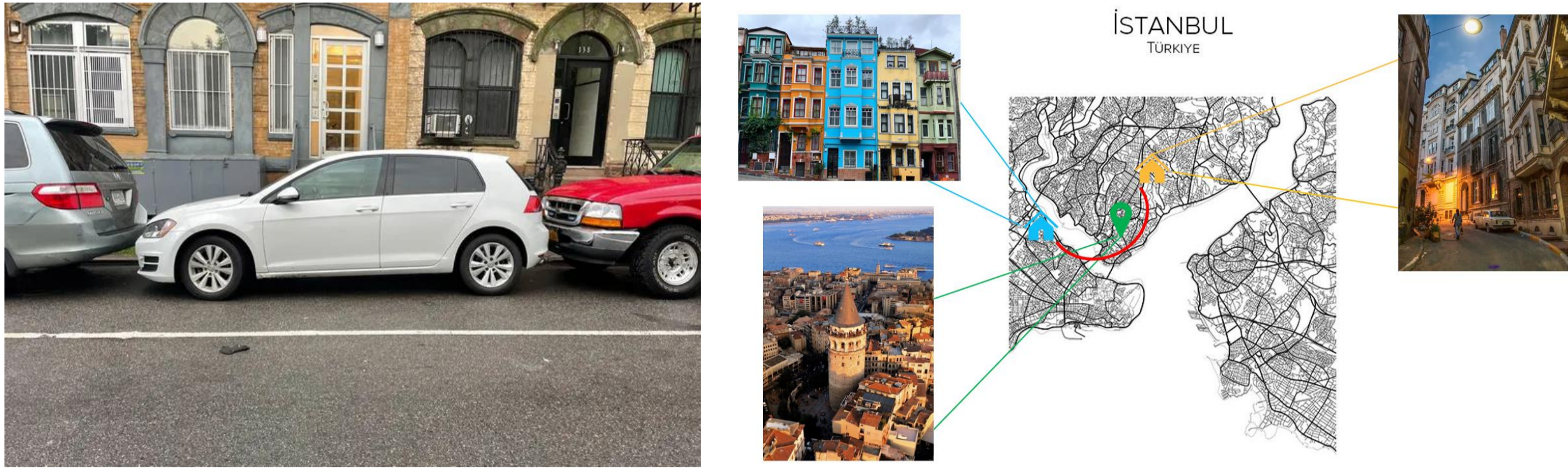
This project was funded by the Scientific and Technological Research Council of Turkey (Tübitak) 3501 grant (#122K700) awarded to Eren Günseli.

Günseli
Memory, Attention, &
Cognitive Control Lab

Sabancı
Universitesi



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).

These studies provided novel information on each trial, necessitating WM involvement. However, in daily life we often operate on existing long-term memory (LTM) information.

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

How can we behaviorally index reactivation of LTM in WM?

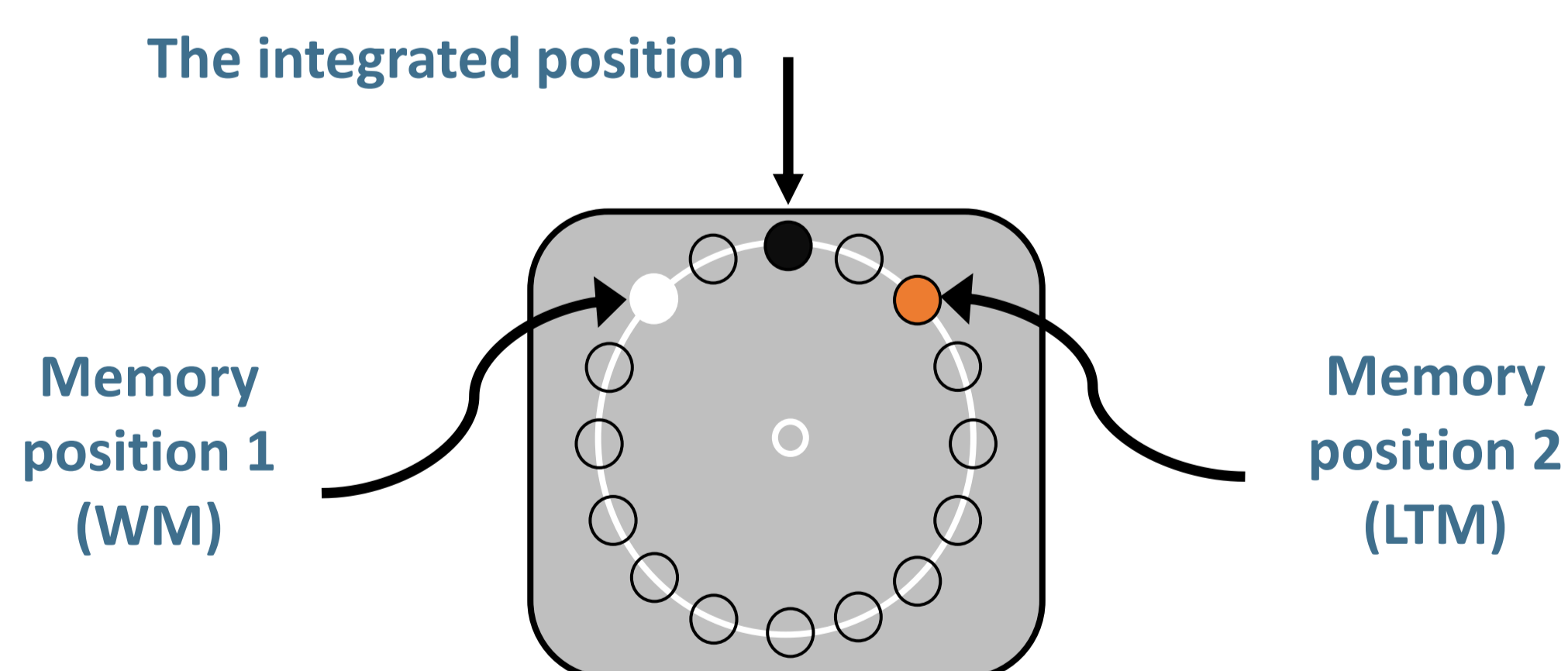
Perceptual discrimination is enhanced at positions stored in WM (Awh & Jonides, 1998, Downing, 2000).

We embedded a perceptual discrimination task in the retention interval after a retrieval cue.

WM reactivation → better perceptual discrimination

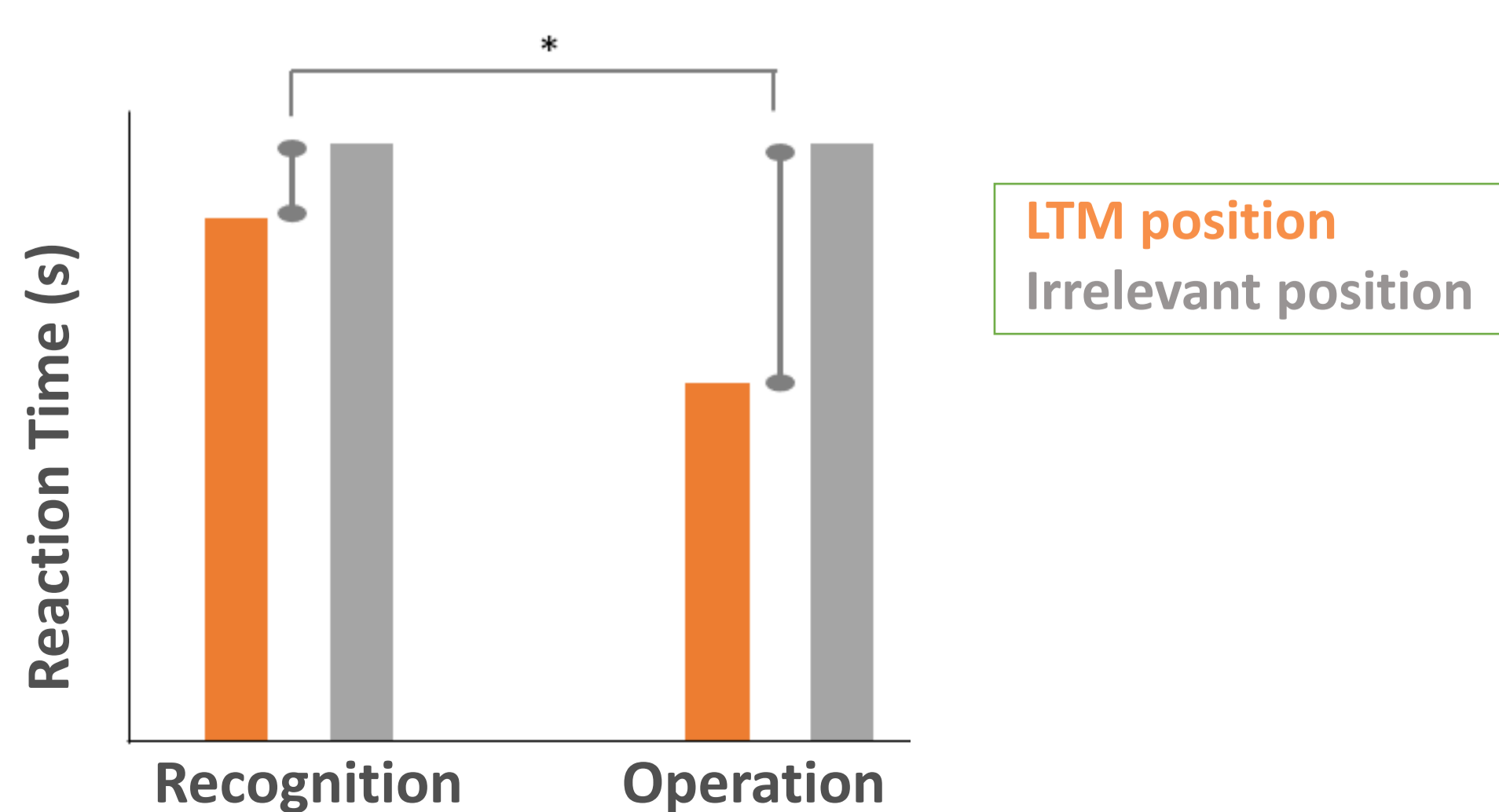
Hypothesis: Perceptual discrimination benefits should be larger for mental operations compared to recognition if WM is particularly critical for mental operations.

Mental Operation Task



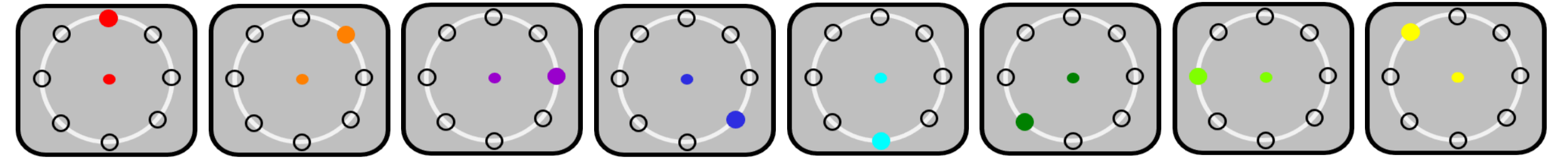
Expected Findings

Larger perceptual facilitation at LTM positions for mental operations



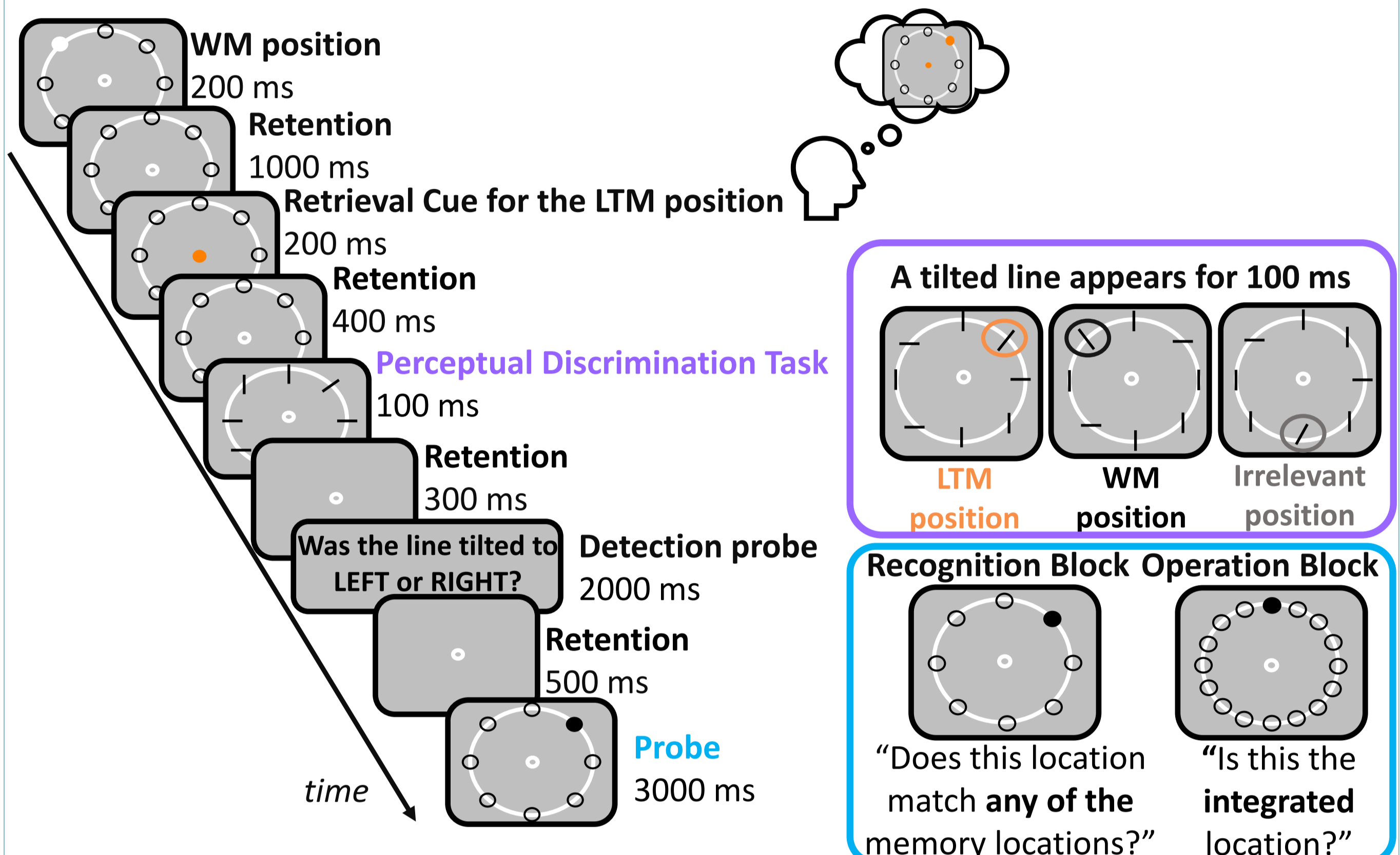
Methods

Phase 1 | Learn color-location associations



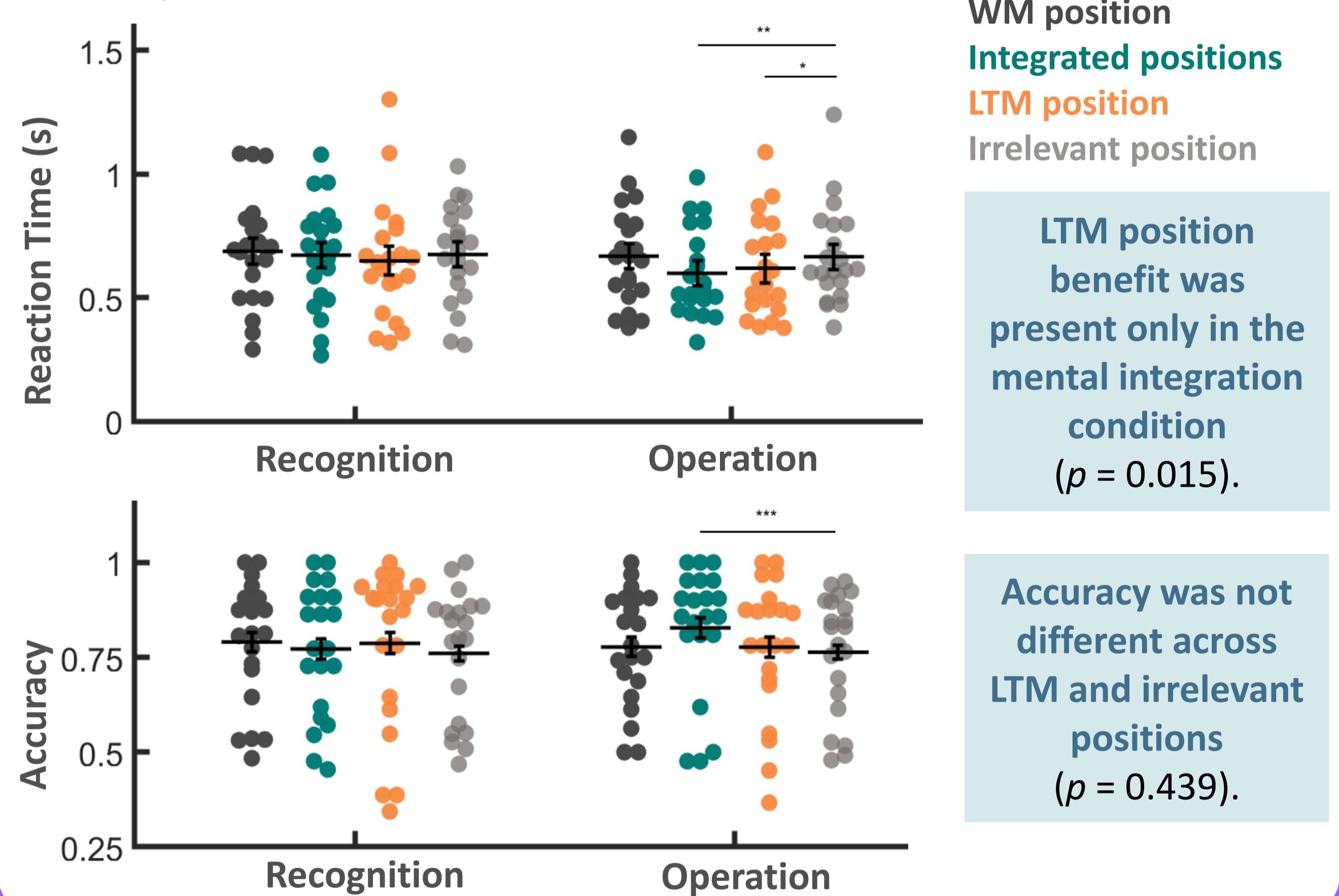
Participants see each association for 4 times

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

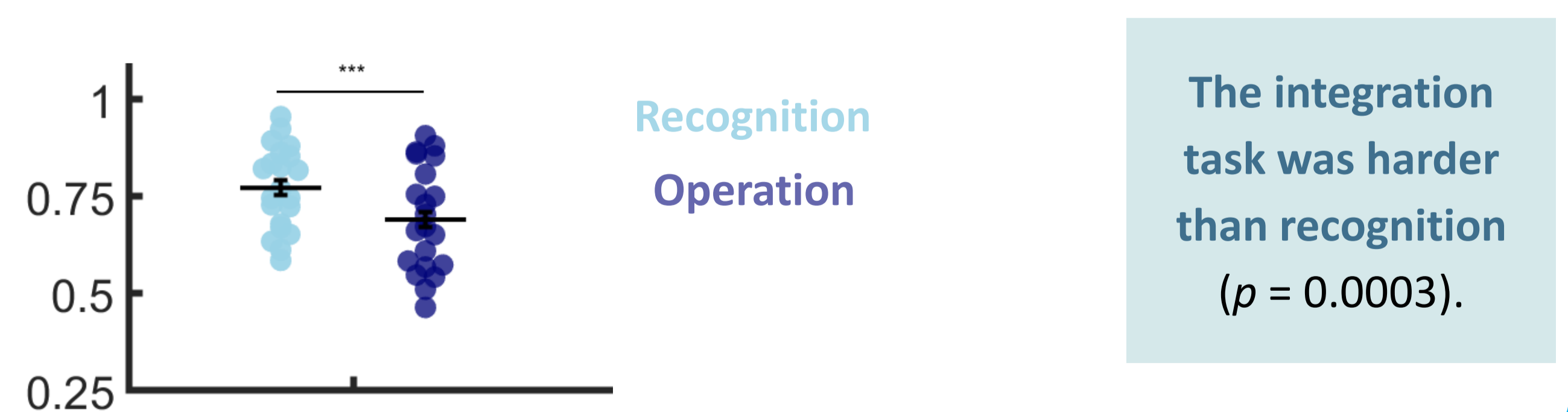


Results

Perceptual Discrimination Task Performance



Main Task Performance



Conclusions and Future Directions

Information in LTM is reactivated in WM particularly for mental operations as opposed to recognition.

Enhanced perceptual discrimination can be used to track memory reactivation.

We will match the difficulty of each task to eliminate the difficulty confound.

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

Scan for
references

