

Flexible reconfiguration of visual working memory across gaze shifts

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Question

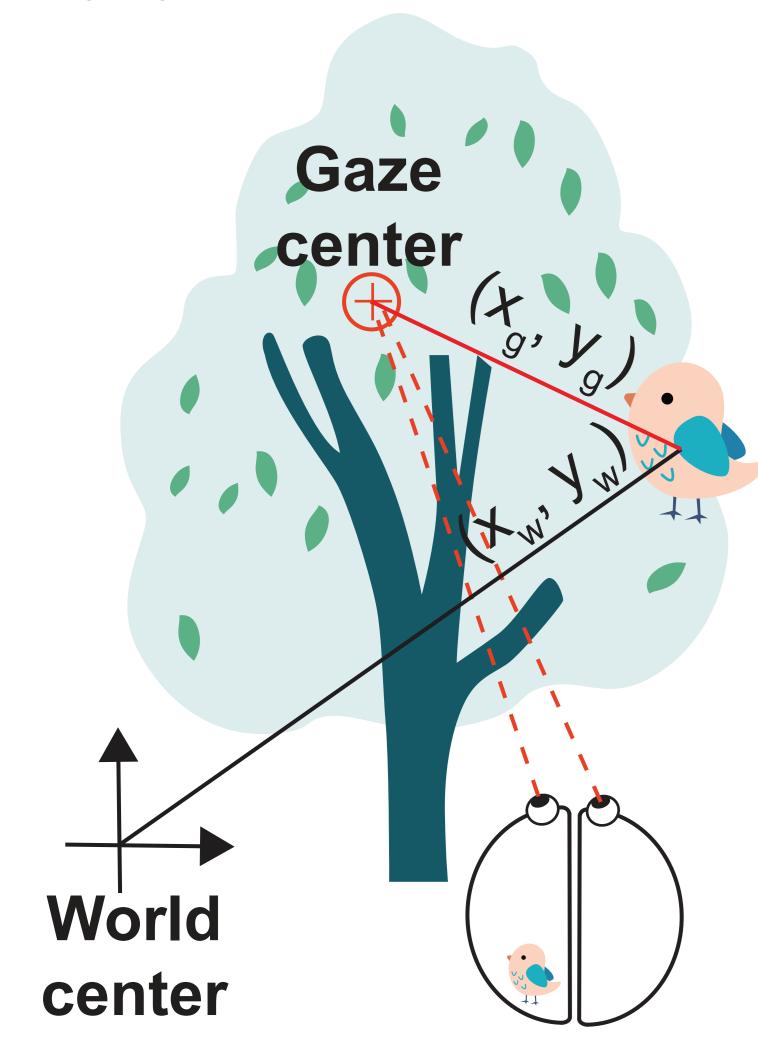
- 1. Visual working memory (VWM) is contralaterally stored, [1, 2, 3] similar to contralateral visual processing.
- 2. Ubiquitous gaze shifts (useful for sampling the visual space), may change the hemifield of the memorandum (remembered object).
- 3. Yet, VWM seems seamless and stable across gaze shifts.

Despite contralateral storage of VWM, how does VWM remain stable across gaze shifts?

More specifically, in which reference frame is the VWM stored?

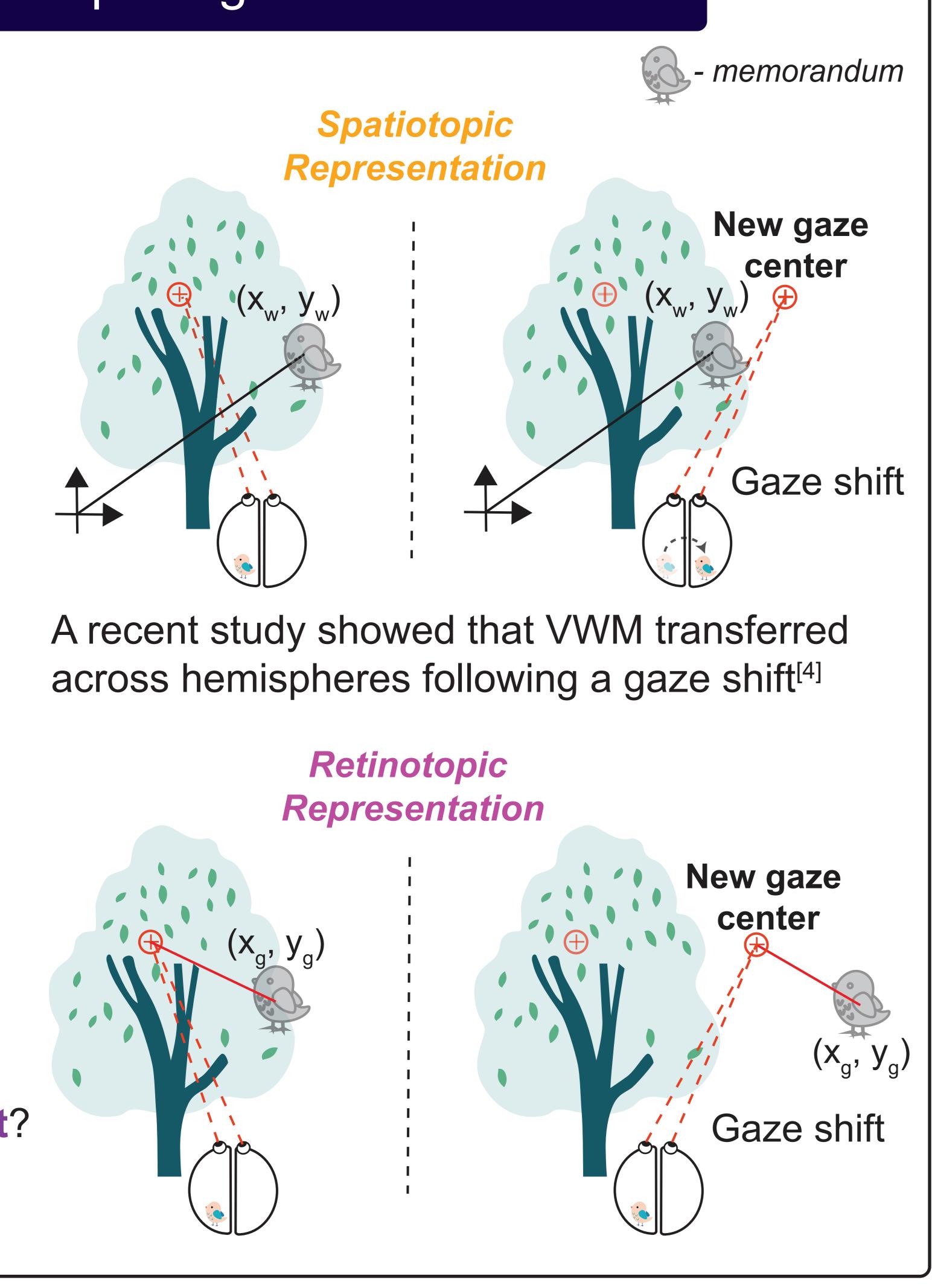
Spatiotopic and retinotopic organization of VWM

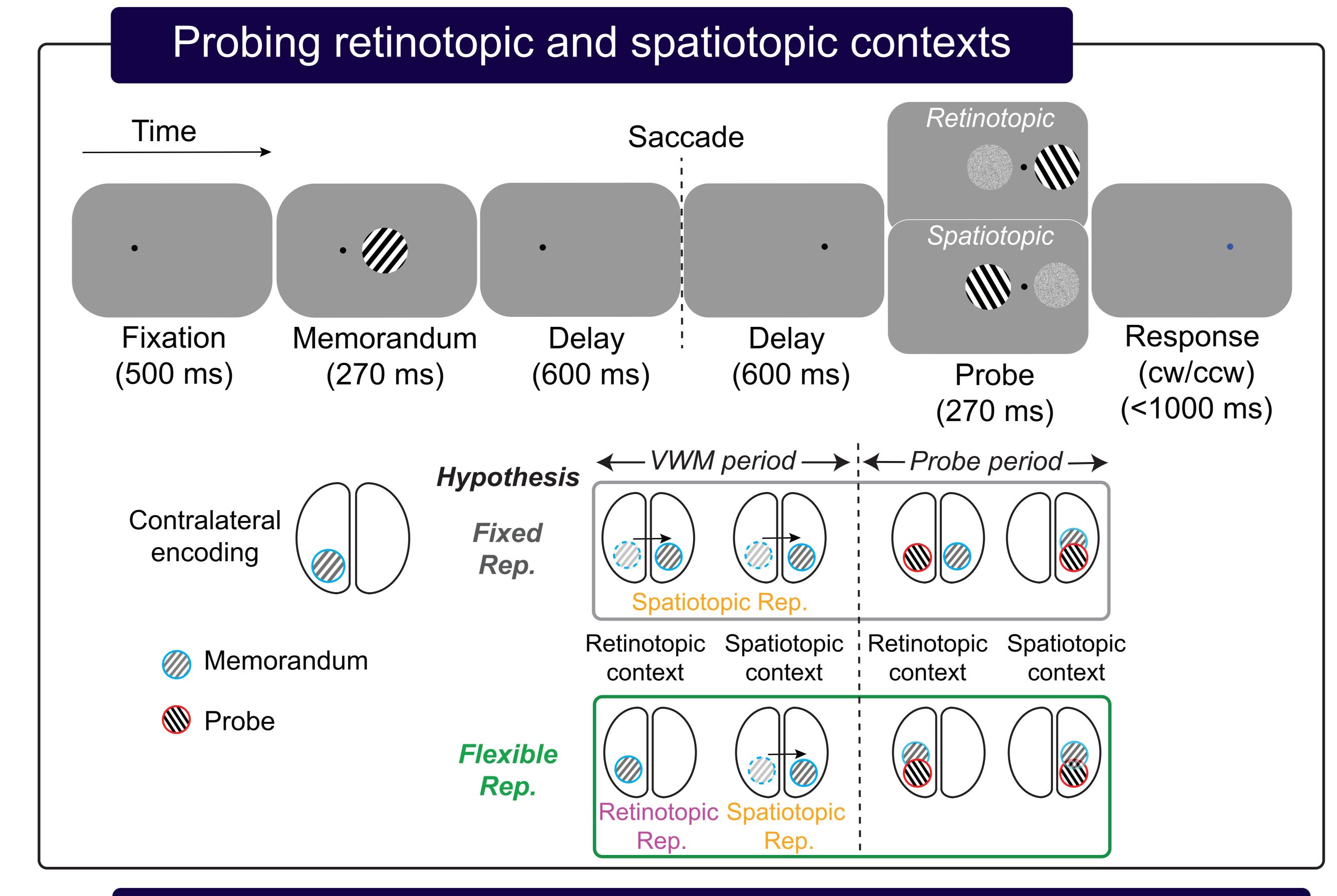
(x_w, y_w) - world centered coordinates (x_a, y_a) - gaze centered coordinates



Is VWM invariably stored in a spatiotopic reference frame?

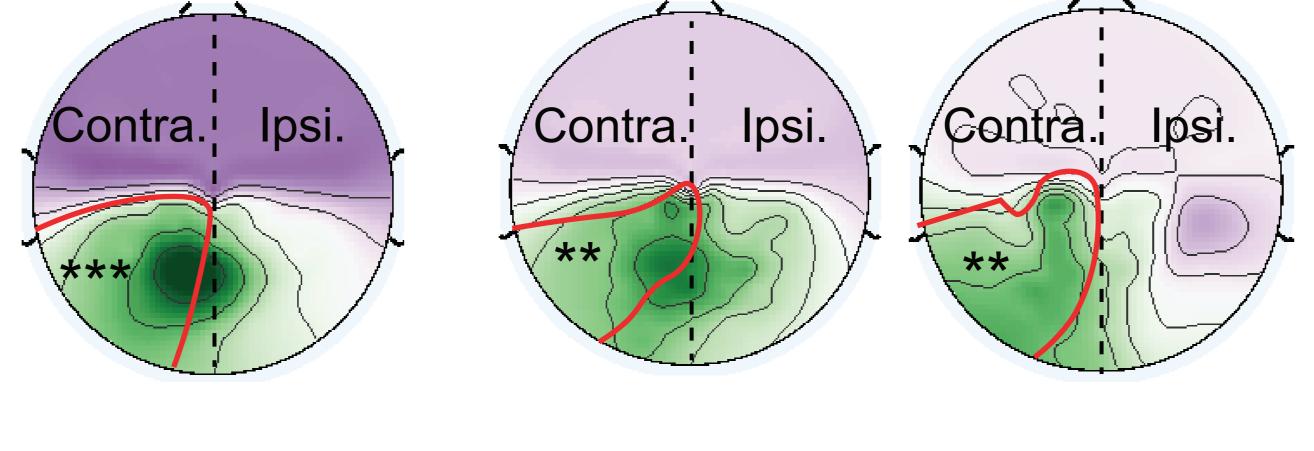
Can VWM be reconfigured flexibly based on task context?





Context dependent transfer of VWM across hemispheres

Memorandum's orientation was decoded from occipito-parietal EEG activity using Mahalanobis distance based decoder.[5]



Decodability (×10⁻³)

(*300ms - 600ms) (600ms - sacc. onset)

Late Delay

*time (ms) from mem. onset.

Decodability (×10⁻³)

Encoding

Retinotopic context

Decodability was largely limited to contralateral electrodes during all phases.



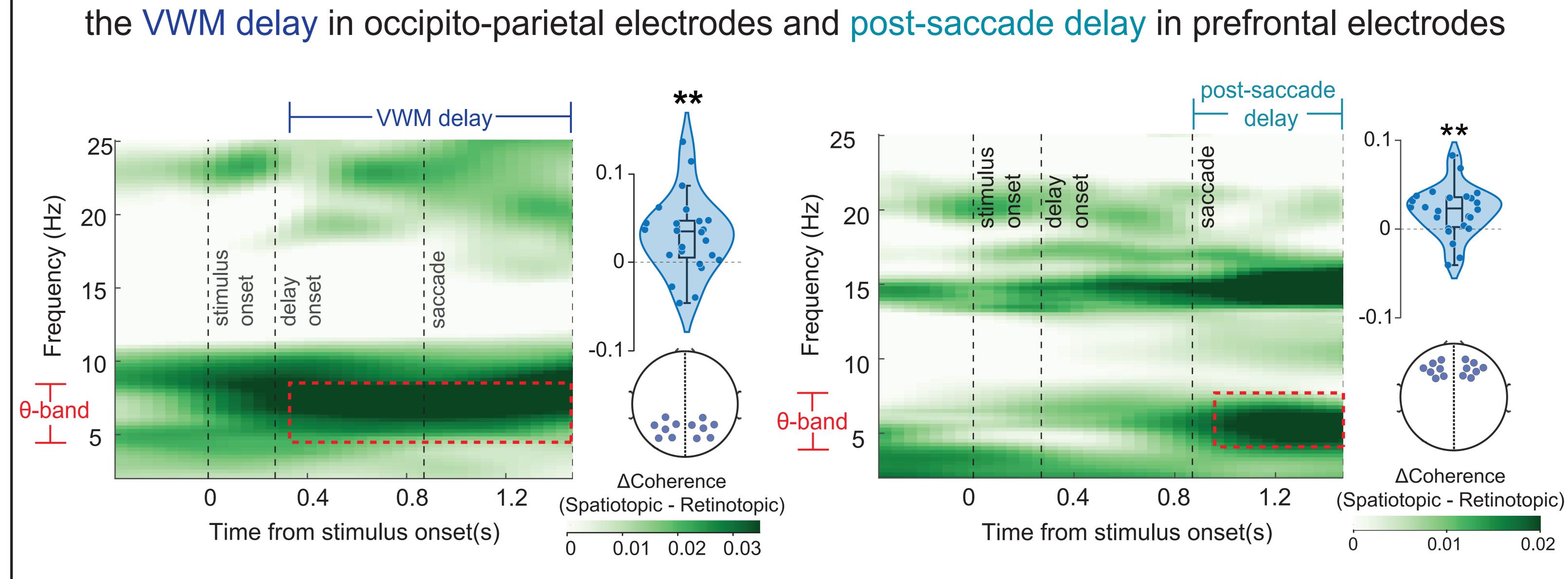
Spatiotopic context

Decodability shifts from contralateral electrodes.

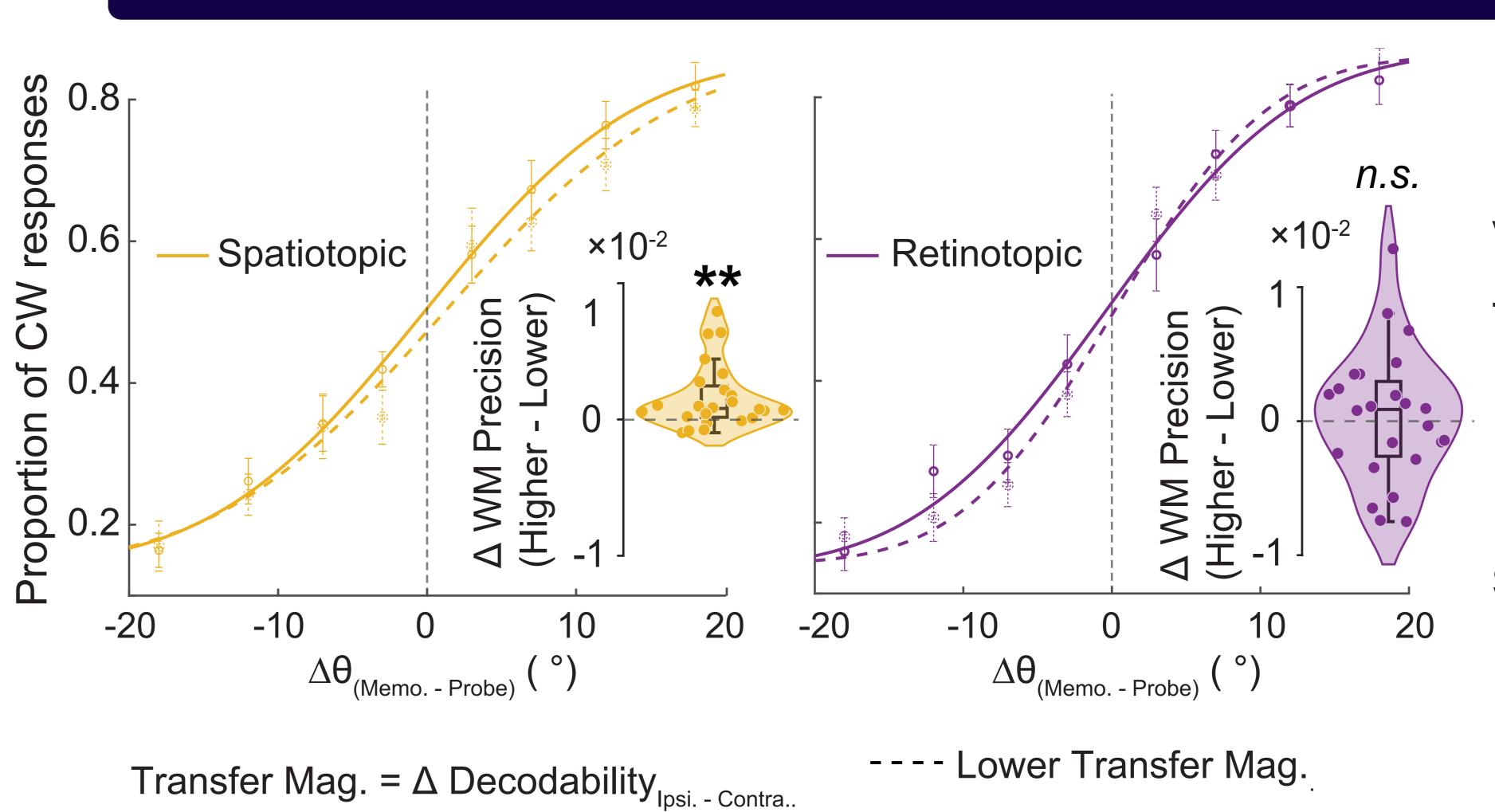
> Higher decodability implies better representation of VWM contents.

Cross-hemispheric interaction during transfer of VWM

A significant interhemispheric θ-band coherence was observed in spatiotopic context during







VWM precision^[5] is quantified as the slope of the psychometric curve.

Higher transfer magnitude trials showed VWM precision advantage in spatiotopic context alone.

References

- [1] Umemoto, Akina, et al. "A bilateral advantage for storage in visual working memory." Cognition (2010)
- [2] Buschman, Timothy J., et al. "Neural substrates of cognitive capacity limitations." PNAS (2011).
- [3] Golomb JD, Kanwisher N. "Higher level visual cortex represents retinotopic, not spatiotopic, object location." Cereb Cortex (2012)

— Higher Transfer Mag.

- [4] Brincat, Scott L., et al. "Interhemispheric transfer of working memories." Neuron (2021)
- [5] Wolff, Michael J., et al. "Dynamic hidden states underlying working-memory-guided behavior." Nature Neuroscience (2017)