



Redundant Perceptual Inputs Modulate Visual Working Memory Representations Revealed by EEG Decoding

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Introduction

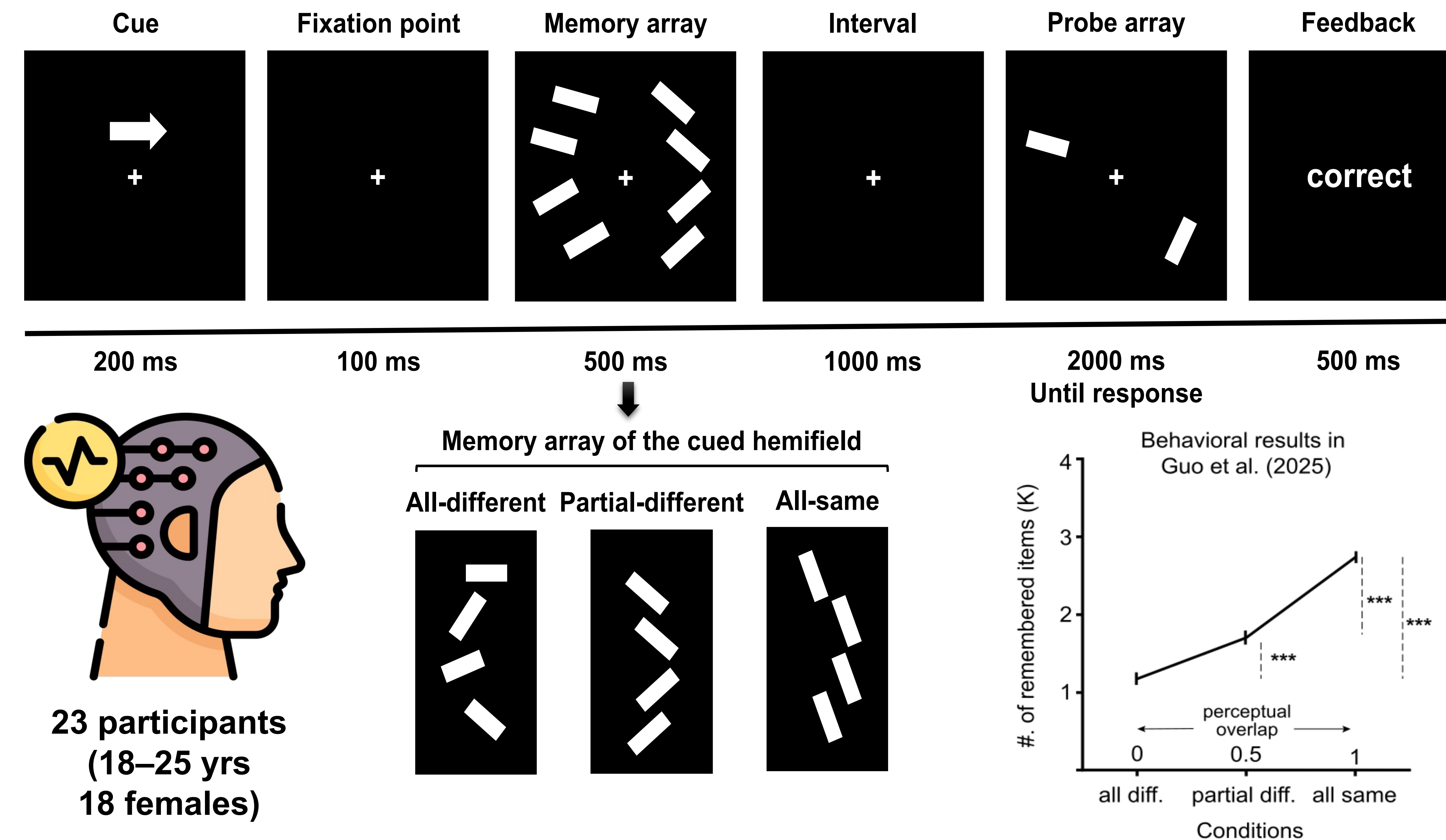
Background

- Visual working memory (VWM) has limited capacity, but perceptual grouping may improve memory efficiency by organizing identical or similar items into more efficient representations [1].
- Behavioral and neuroimaging studies show improved memory performance when items share features or form coherent structures [2].
- Our recent contralateral delay activity (CDA) work found late-stage neural differences primarily for all-same arrays [3], yet CDA mainly reflects maintenance-related activity and may not capture earlier encoding-related representations [4].
- To address this limitation, we applied multivariate pattern analysis (MVPA) to track condition-specific neural representations over time [5].

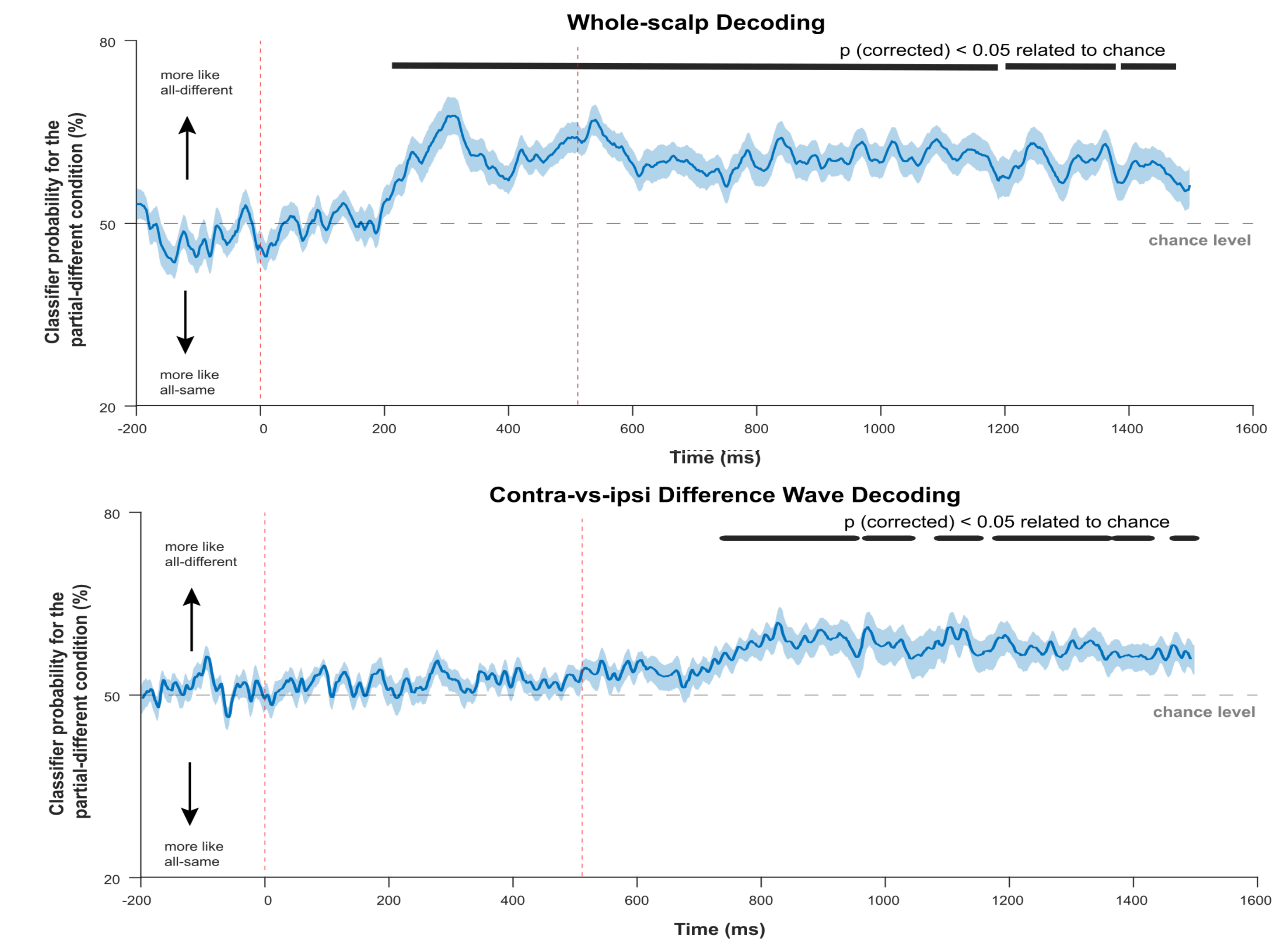
Question

How does perceptual redundancy shape neural representations in VWM?

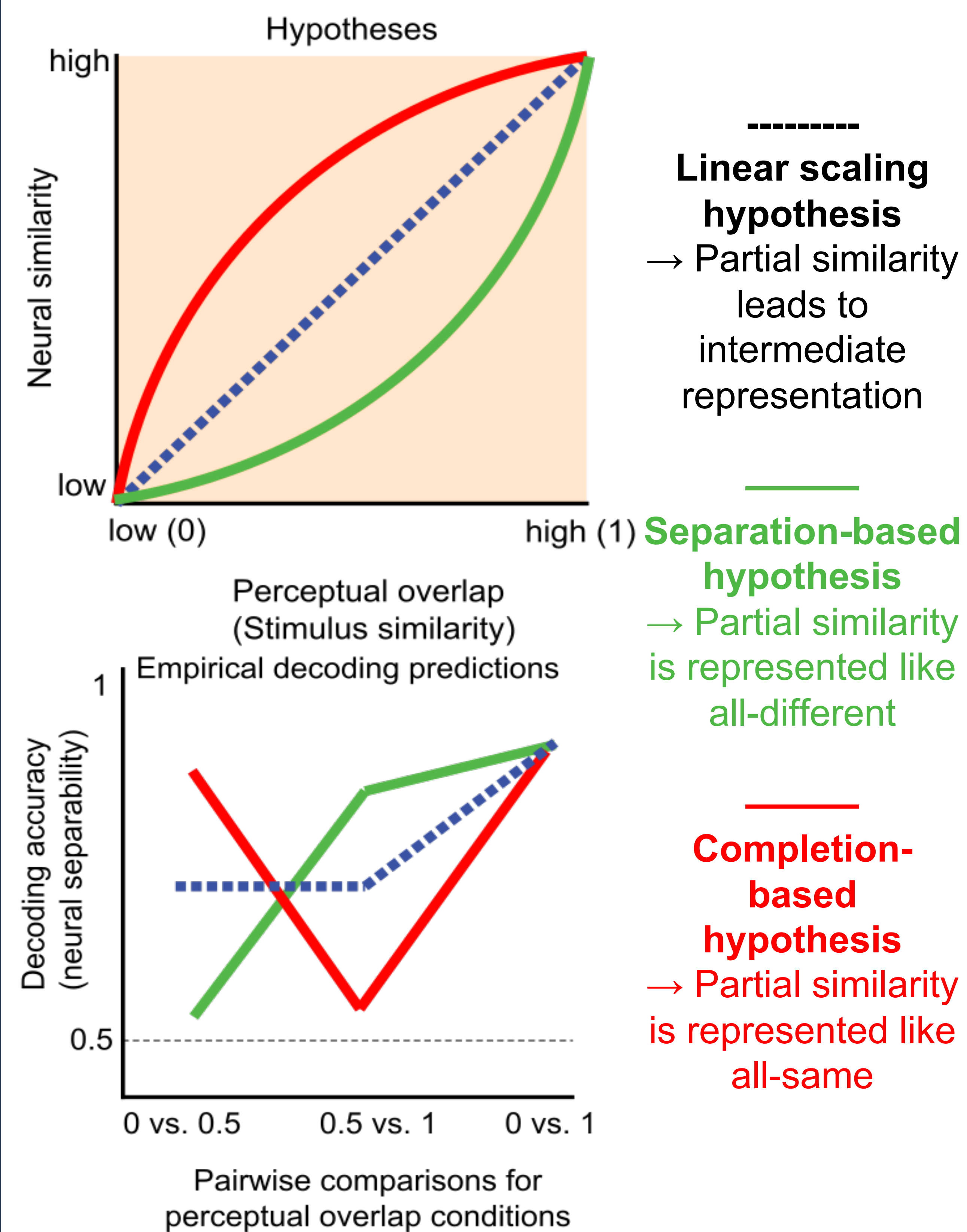
Methods and Results



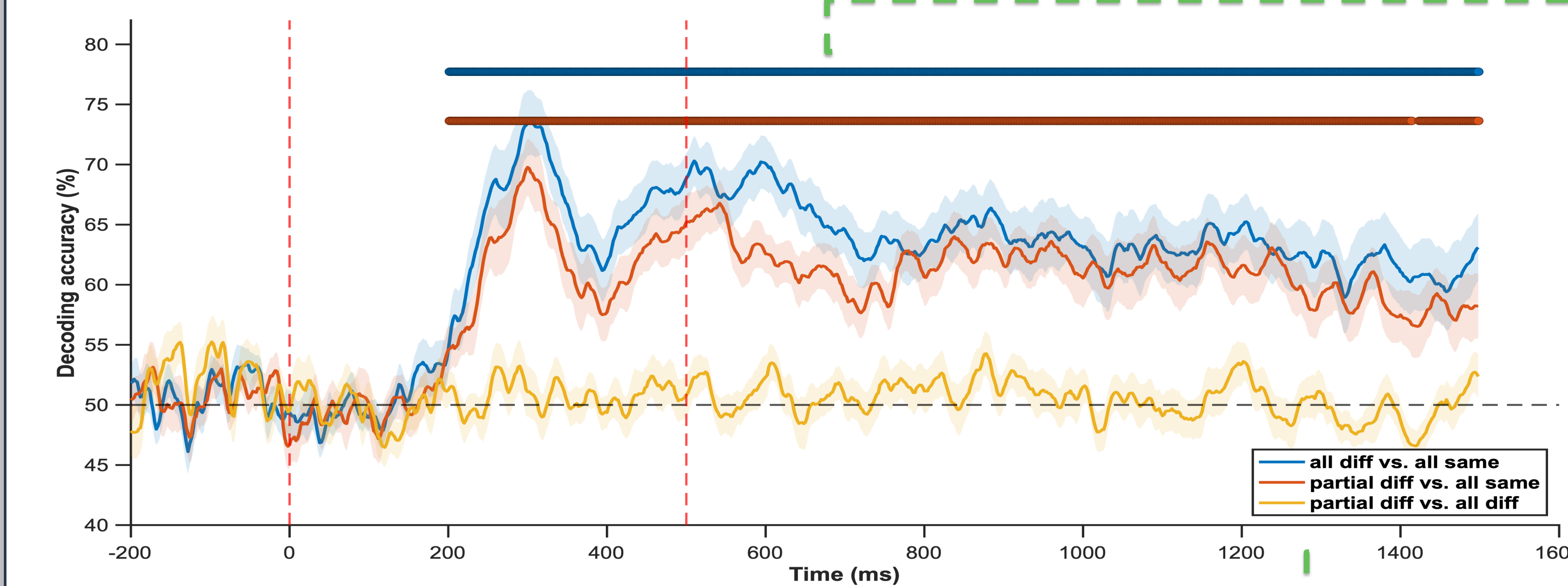
#3. Cross-condition decoding classified partially redundant arrays toward the all-different endpoint



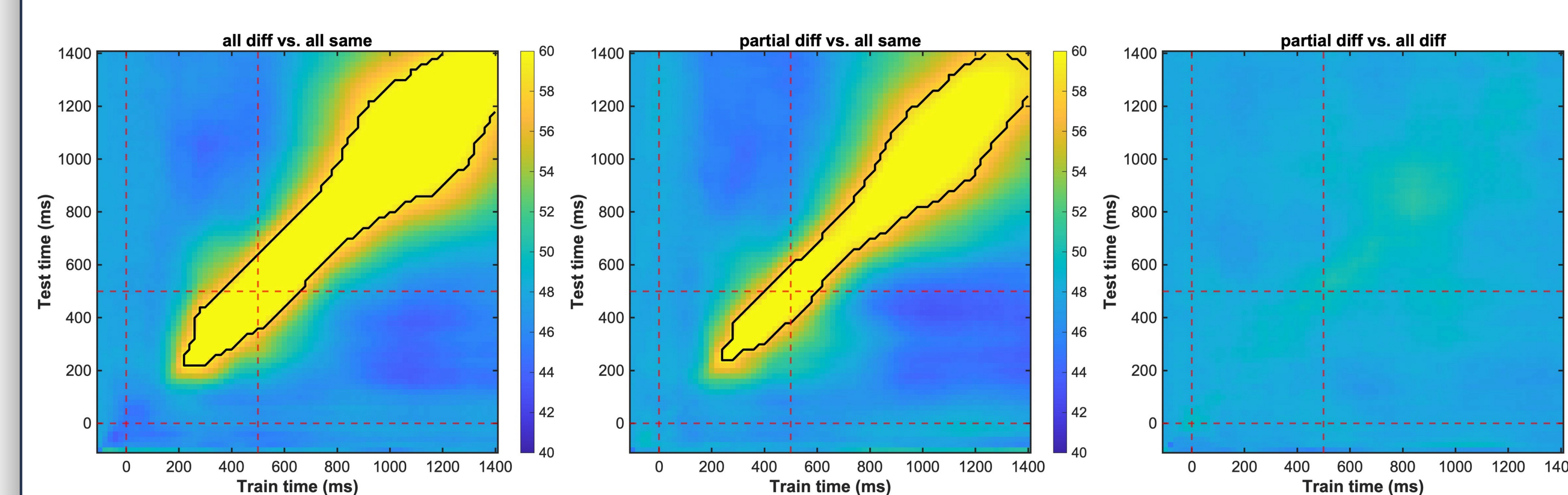
Hypotheses



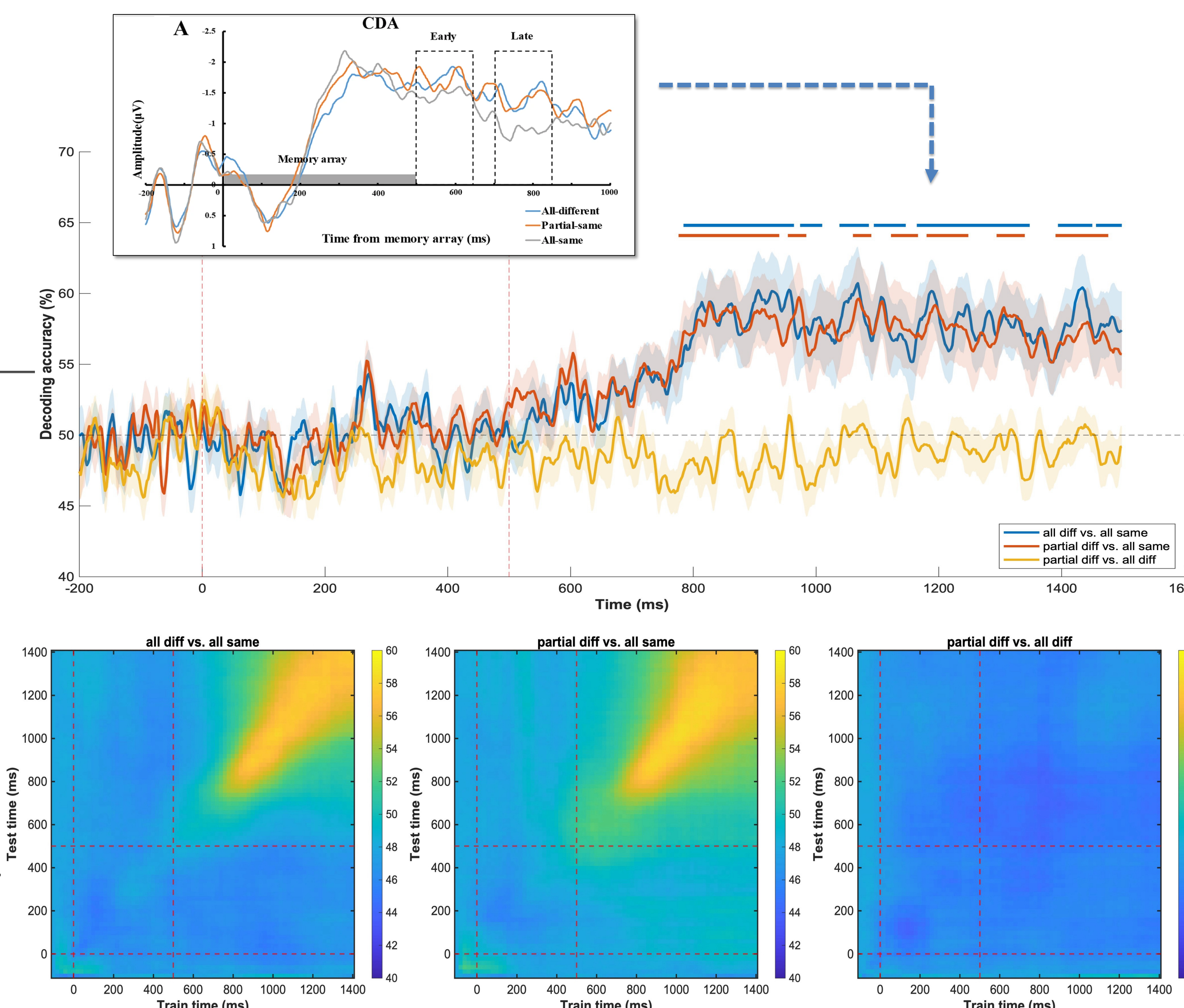
#1 Time-resolved decoding revealed early neural differentiation supporting a separation-based account



#2. Cross-temporal decoding showed limited generalization from encoding to maintenance



#4. Contra-vs-ipsi decoding revealed later maintenance-related differentiation resembling CDA findings



References

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 [4] Luria, R., Balaban, H., Awh, E., & Vogel, E. K. (2016). The contralateral delay activity as a neural measure of visual working memory. *Neuroscience & Biobehavioral Reviews*, 62, 100–108.
 [5] Grootswagers, T., Wardle, S. G., & Carlson, T. A. (2017). Decoding dynamic brain patterns from evoked responses: A tutorial on multivariate pattern analysis applied to time series neuroimaging data. *Journal of Cognitive Neuroscience*, 29(4), 677–697.

