Retrospective Searching for Feature Binding of Color and Letter from within Visual Working Memory Representations

Ya-Ping Chen[1,2], Jun Saiki[3], Bo-Cheng Kuo[1]

[1] Department of Psychology, National Taiwan University; [2] Centre for Cognitive Neuroscience, University of Salzburg
[3] Graduate School of Human and Environmental Studies, Kyoto University

Contact Info: ya-ping.chen@sbg.ac.at

Background and Aims

- Feature-bound object representations are formed in visual working memory (WM) and changes in objects' location may have an influence on access to the memory representations (Kahneman, Treisman, & Gibbs, 1992; Saiki, 2018).
- The neural dynamics of retrospective search for location-(un)shared and feature-(un)bound representations in visual WM was not fully understood.
- Here we address this issue in a redundant feature reviewing WM task (Saiki, 2016) with a modified redundancy-gain paradigm and a visual localizer task using race model inequality (RMI) modeling and magnetoencephalograhy (MEG).
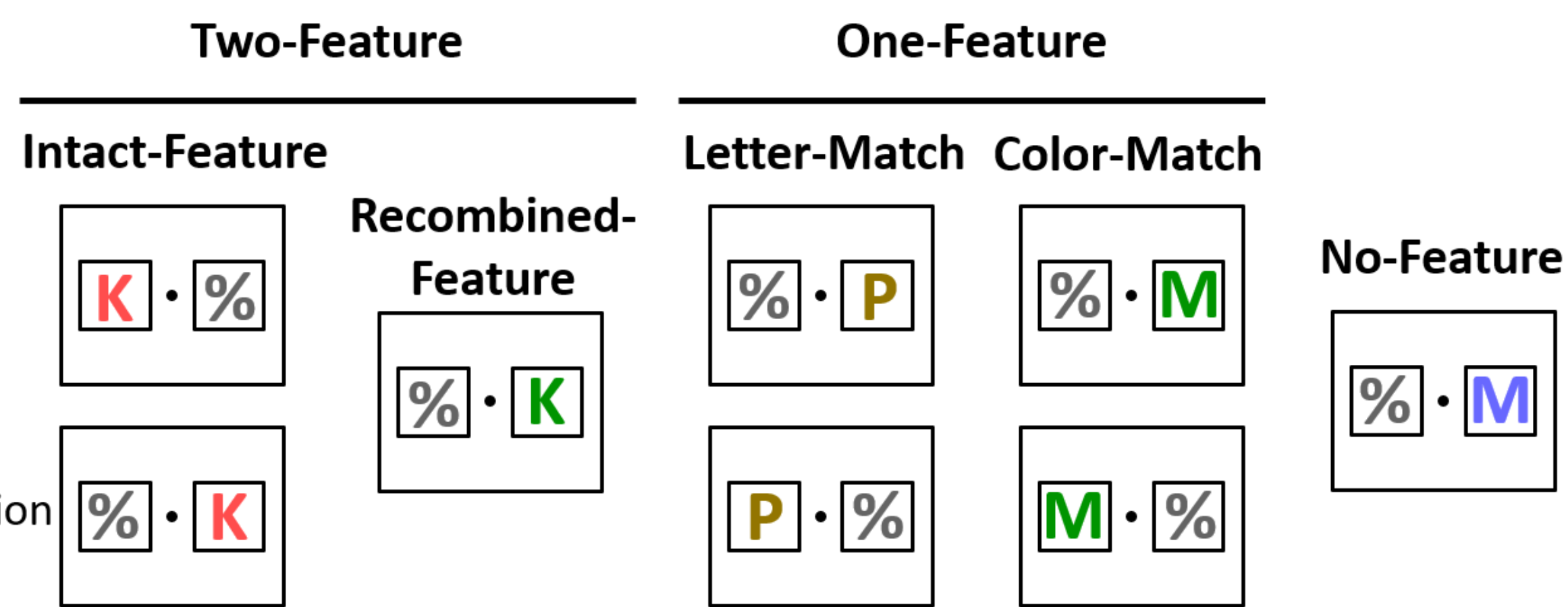
Methods

- Participants (N = 17) performed a WM task in which they viewed two types of feature (colors and letters) in a two-object memory display, following a short delay, and a single object probe with a non-target percentage sign.
- Participants were required to indicate whether the probe item contained any feature in the memory display, regardless of its location.
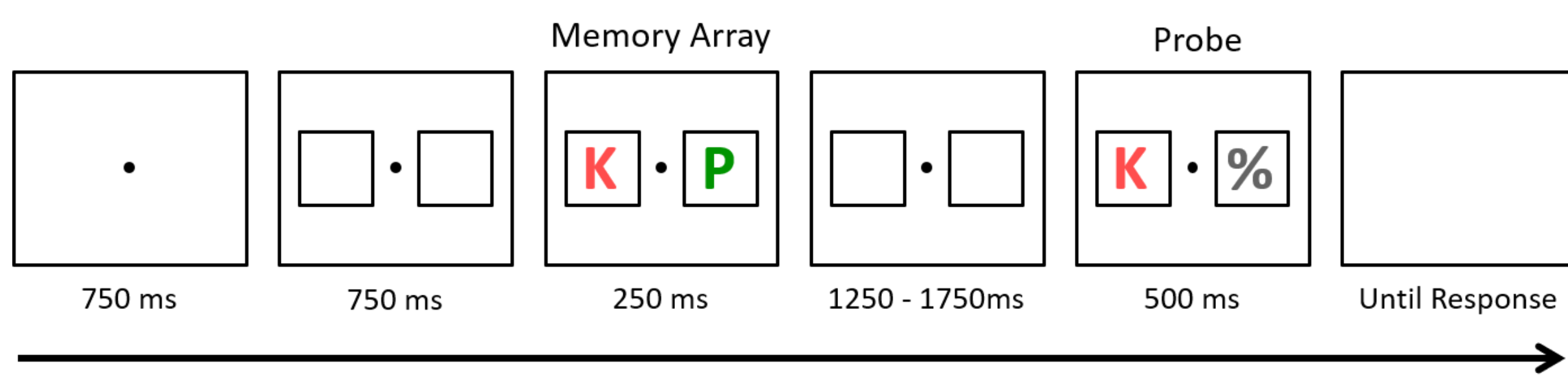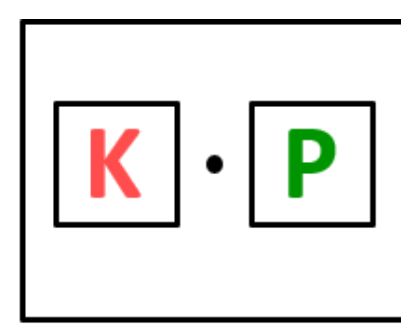
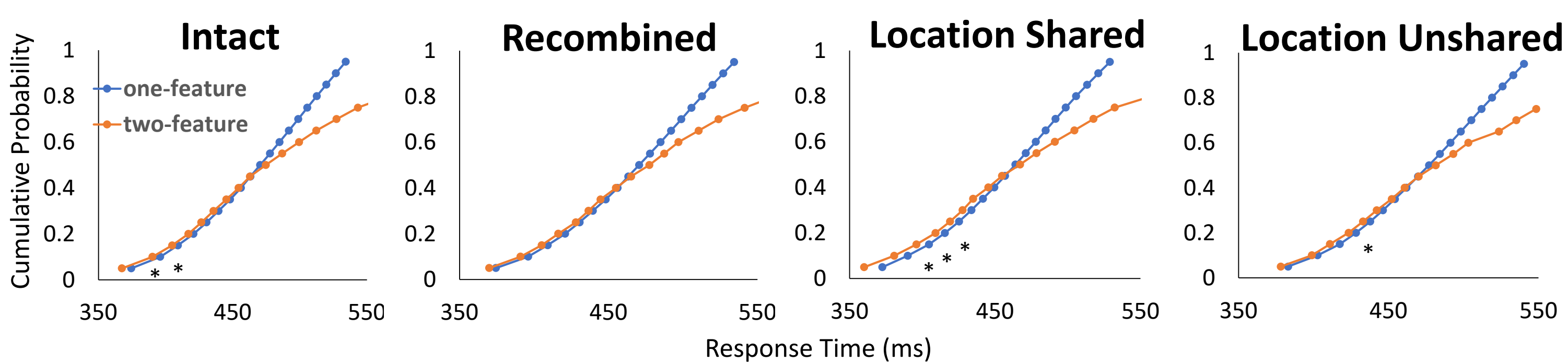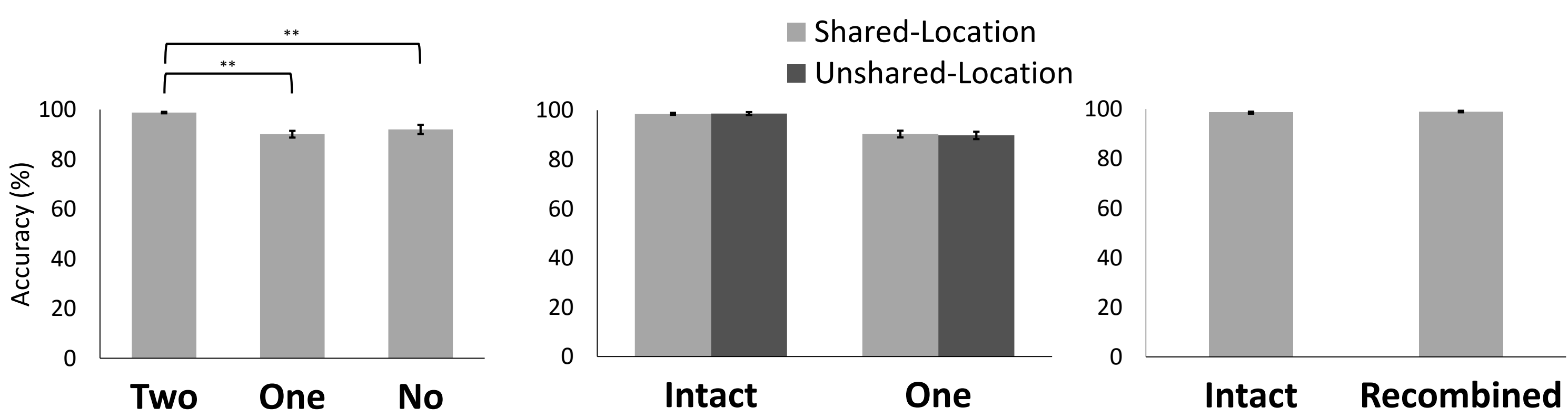## Behavioral Performance

Race-Model Inequality

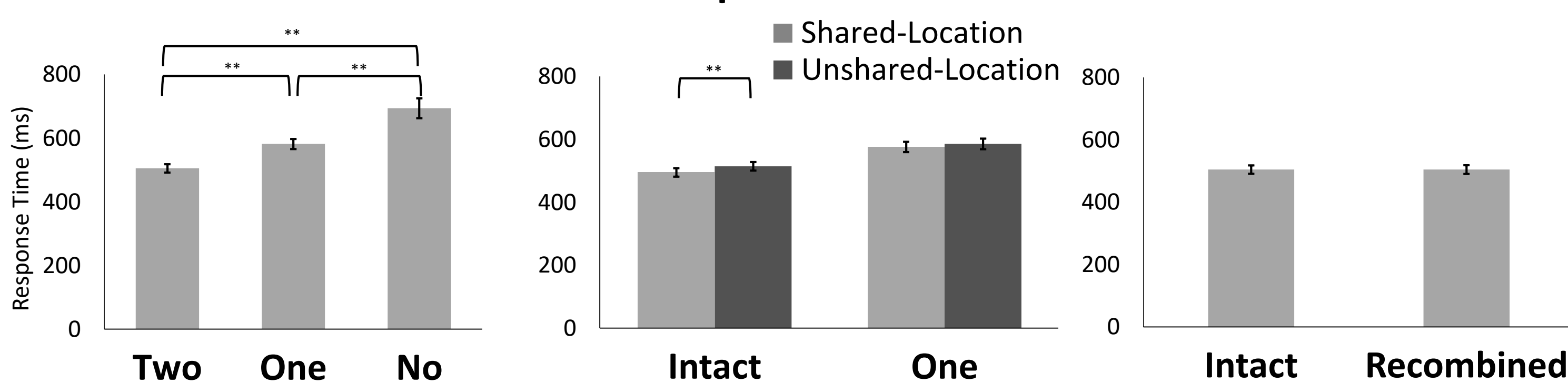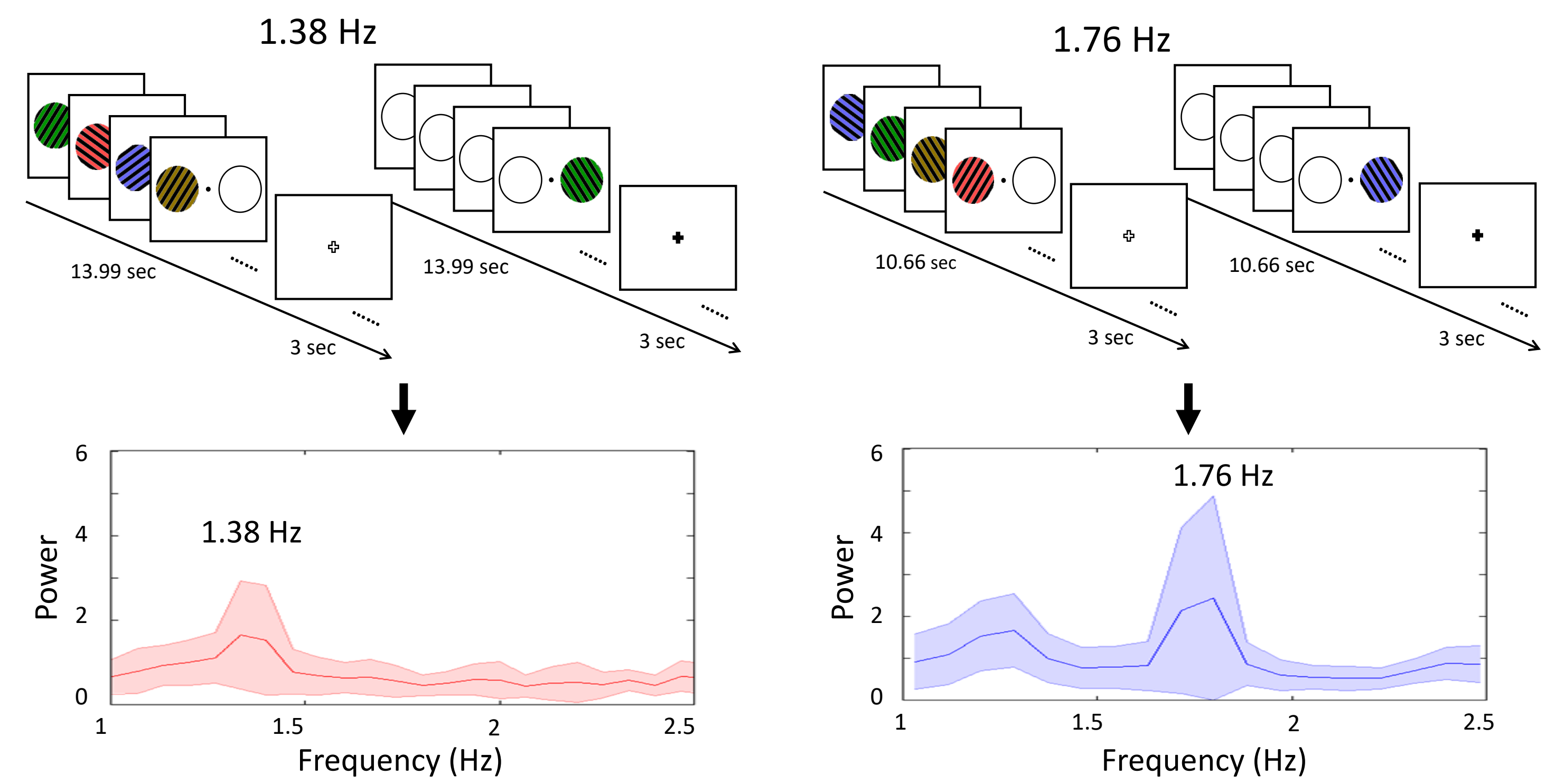$$p\,(RT < t \mid F_1\ \text{and}\ F_2) \leq p\,(RT < t \mid F_1) + p\,(RT < t \mid F_2)$$

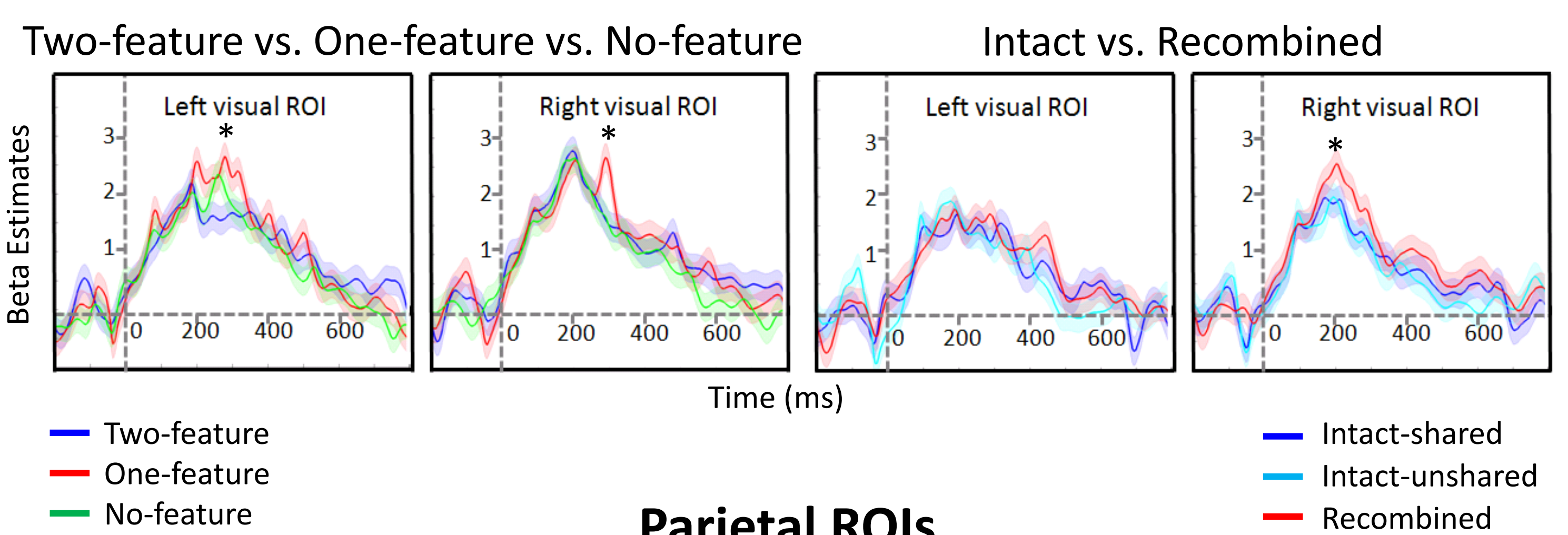## MEG Sensor-Space Results
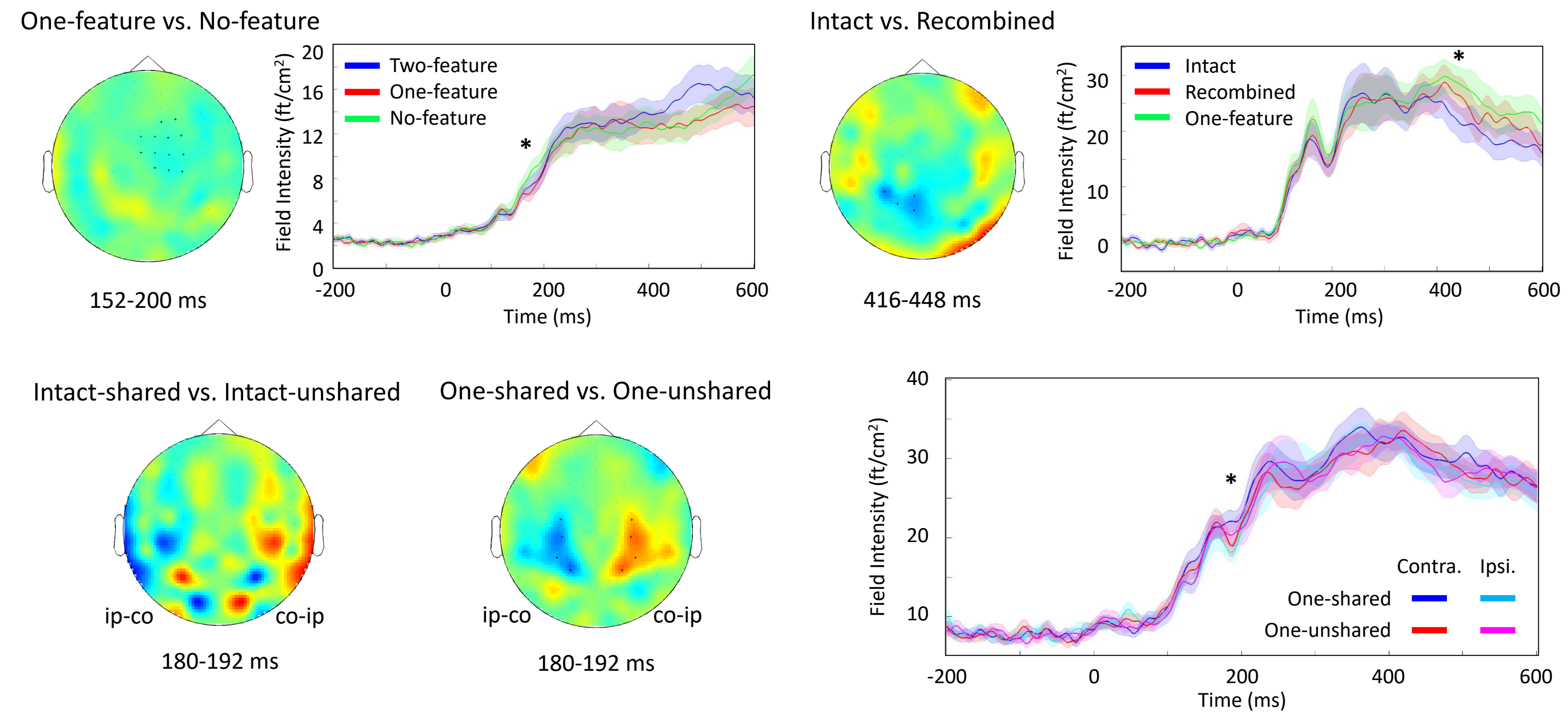
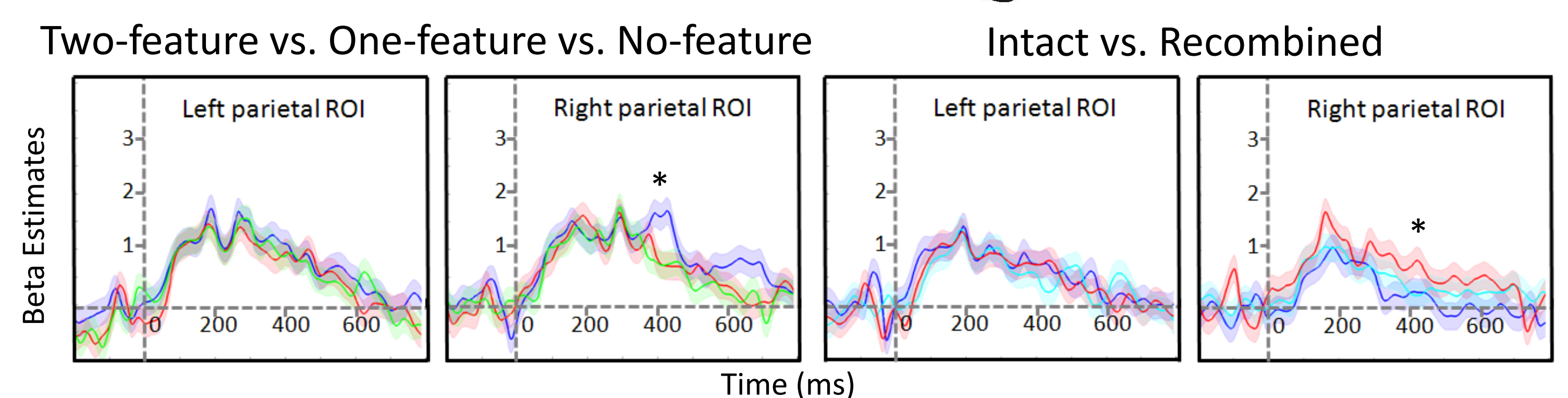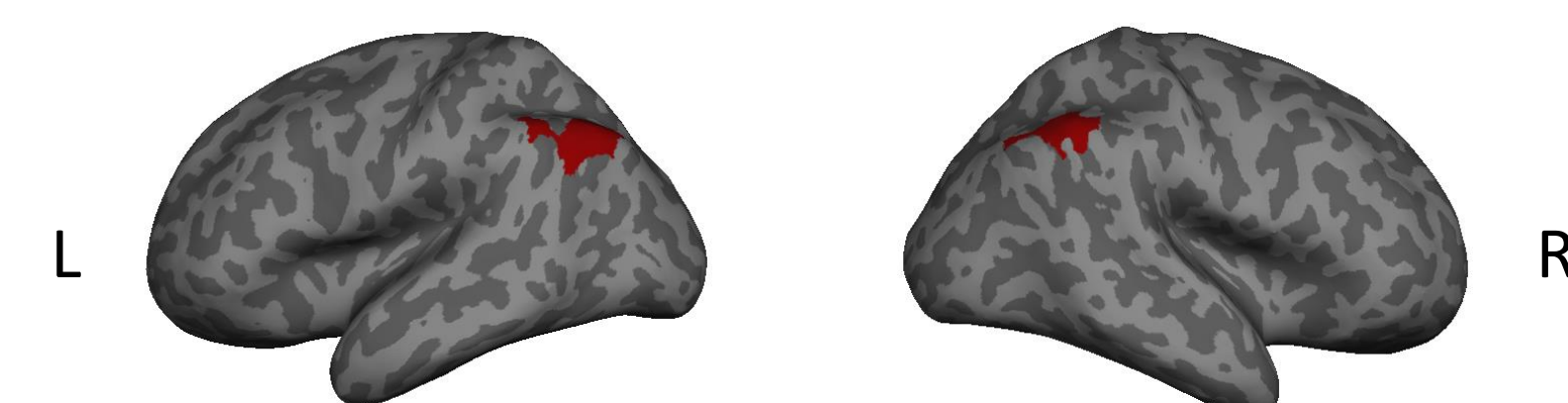## MEG Source-Space Results

Functional localisers for visual ROIs

Visual ROIs

Parietal ROIs

Conclusions

- Numbers of feature and changes of location can influence the early stage of retrospective search from within visual WM.
- At late search stage, feature-bound representations can be independent to object location.

Reference:
Kuo, B. C., Rao, A., Lepsien, J., & Nobre, A. C. (2009). Searching for targets within the spatial layout of visual short-term memory. *The Journal of Neuroscience, 29*(25), 8032-8038.
Saiki, J. (2016). Location-unbound color-shape binding representations in visual working memory. *Psychological Science, 27*(2), 178-190.