



# A Memory Computational Basis for the Other-Race Effect

Jessie L. Yaros<sup>1,3</sup>, Diana A. Salama<sup>2</sup>, Derek Delisle<sup>3</sup>, Myra S. Larson<sup>3</sup>, Blake A. Miranda<sup>3</sup>, Bethany A. Houalla<sup>1</sup>, Guanqiao Yu<sup>6</sup>, Michael A. Yassa, Ph.D.<sup>1,3-5</sup>



**YASSALAB**

Translational Neurobiology Laboratory

1. Department of Neurobiology and Behavior, School of Biological Sciences; 2. Department of Population Health and Disease Prevention, Program in Public Health; 3. Center for the Neurobiology of Learning and Memory 4. Department of Neurology, School of Medicine; 5. Department of Psychiatry and Human Behavior, School of Medicine; 6. Department Psychology and Social Behavior, School of Social Ecology, University of California, Irvine;

## Background

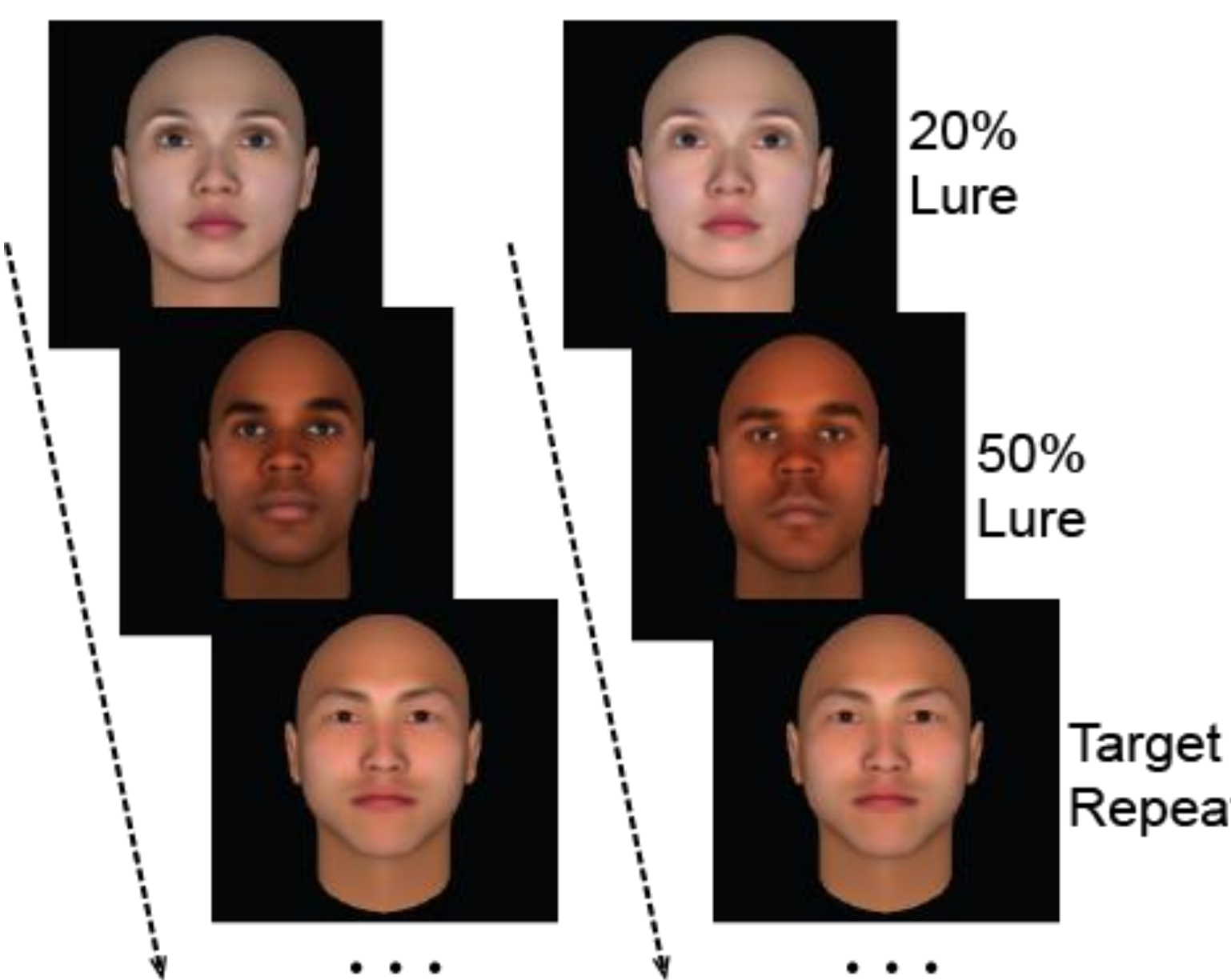
- The other-race effect (ORE) is the tendency to recognize and remember faces within one's own race more easily than those in other races.
- Prior work suggests differences in perceptual and attentional encoding contribute to the ORE in recognition memory<sup>1</sup>
- Considering the ORE is a memory effect, we set out to more thoroughly characterize the contributions of memory mechanisms in generating the ORE.
- To this end, we developed a task informed by computational models of medial temporal lobe (MTL) contributions to episodic memory<sup>2-3</sup> to test MTL involvement in traditional face recognition as well as mnemonic discrimination (MD) of faces. MD supports the ability to reject lure distractors in the presence of mnemonic interference from prior similar presentations.<sup>(REF)</sup>
- In addition to the fusiform face area, we test the involvement of the perirhinal cortex and medial temporal lobes in the generation of the effect.

## Methods

### Task Design

- Encoding phase for same-race (SR) and other-race (OR) faces followed by an old/new recognition test phase.
- 8 blocks in total. 22 faces shown per phase.
- Trial Types during Test/Retrieval Phase:
  - Target Repeats (TR):** Exact repeat of encoded face. Correct answer 'Yes, seen before'
  - Lure Distractor (LD):** Similar-looking to an encoded face. Correct answer 'No, not seen before'
- Lures varied in parametric similarity to encoded/1st presentation
- Using FaceGen Randomness tool, lure distractors were generated to vary 20 – 50% in parametric similarity 20-50% from parent faces.
- Presentation order was counterbalanced across study and test

### Mnemonic Discrimination Task



### MRI Methods

#### fMRI scan sample

Sample size: 21: 10 females, 11 Males  
Demographics: 12 South-East Asian  
9 East-Asian

#### Localizer scan

- 2 run, block design
- counterbalanced blocks of:
  - Same-Race (SR) faces
  - Other-Race (OR) faces
  - Every-day objects
  - Phase-scrambled SR & OR faces

#### Experimental Scan

- 4 runs, even-related design
- Per run, 2 blocks of interleaved study/test phases of the Mnemonic Discrimination task.

#### Preliminary Analysis

##### ROI Definition

- Subject-specific **Fusiform Face area (FFA)** ROI created with localizer scan, using contrast of: **Faces > Objects and Scrambled faces** thresholded at  $p = .0001$
- Perirhinal Cortex (PrC)** and **Hippocampus (Hipp)** created using in-house hand-drawn ROI template

##### Univariate Analysis

- Modeled 16 regressors of interest across
  - Task Phase (Encoding/Retrieval),
  - Trial Type (Target/Lure Pair)
  - Stimulus Race (SR or OR)
- Extracted beta estimates from left and right FFA, PrC, and Hipp

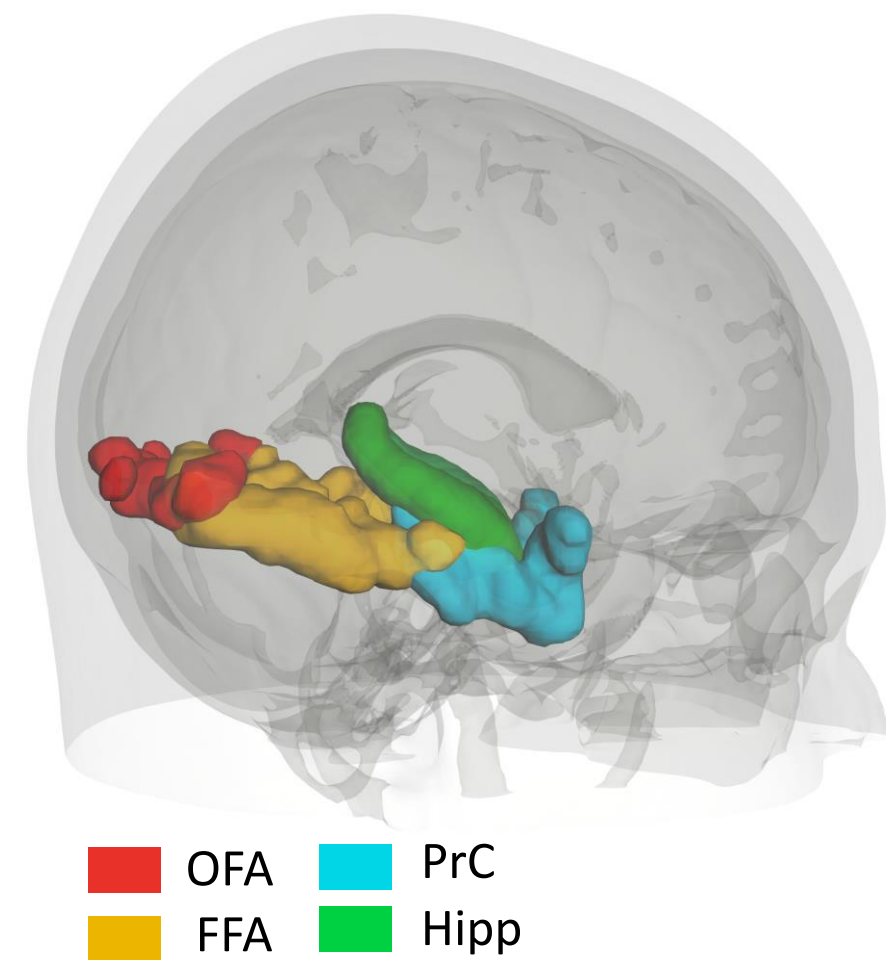
## Legend

- Same Race Stimulus
- Other Race Stimulus

- Interaction
- Main Effect
- Post-hoc Effect, after MC Correction
- Trending

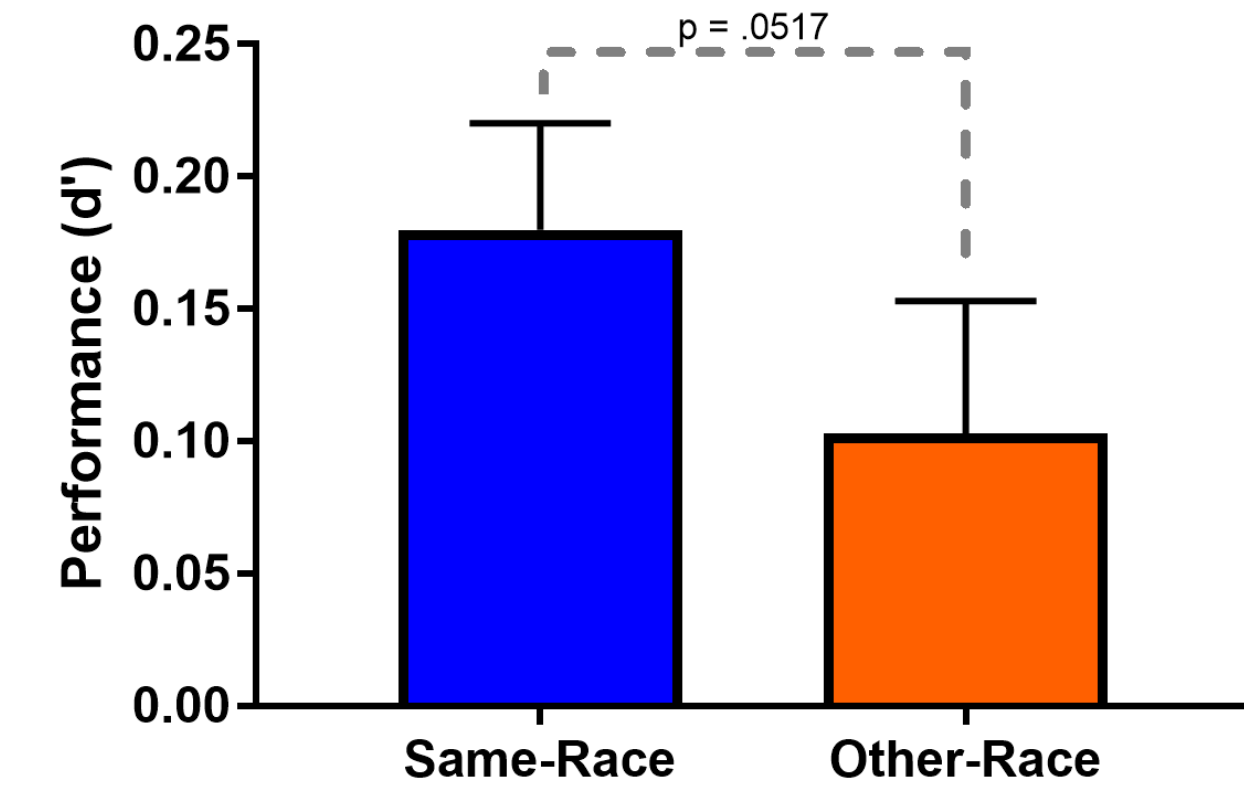
### Figure Abbreviations

- Enc. Encoding
- FFA Fusiform Face Area
- Hipp Hippocampus
- LCR Lure-Distractor Correct Rejection
- LFA Lure-Distractor False Alarm
- PrC Perirhinal Cortex
- Subs. Subsequent
- Stim. Stimulus
- TH Target-Repeat Hit
- TM Target-Repeat Miss



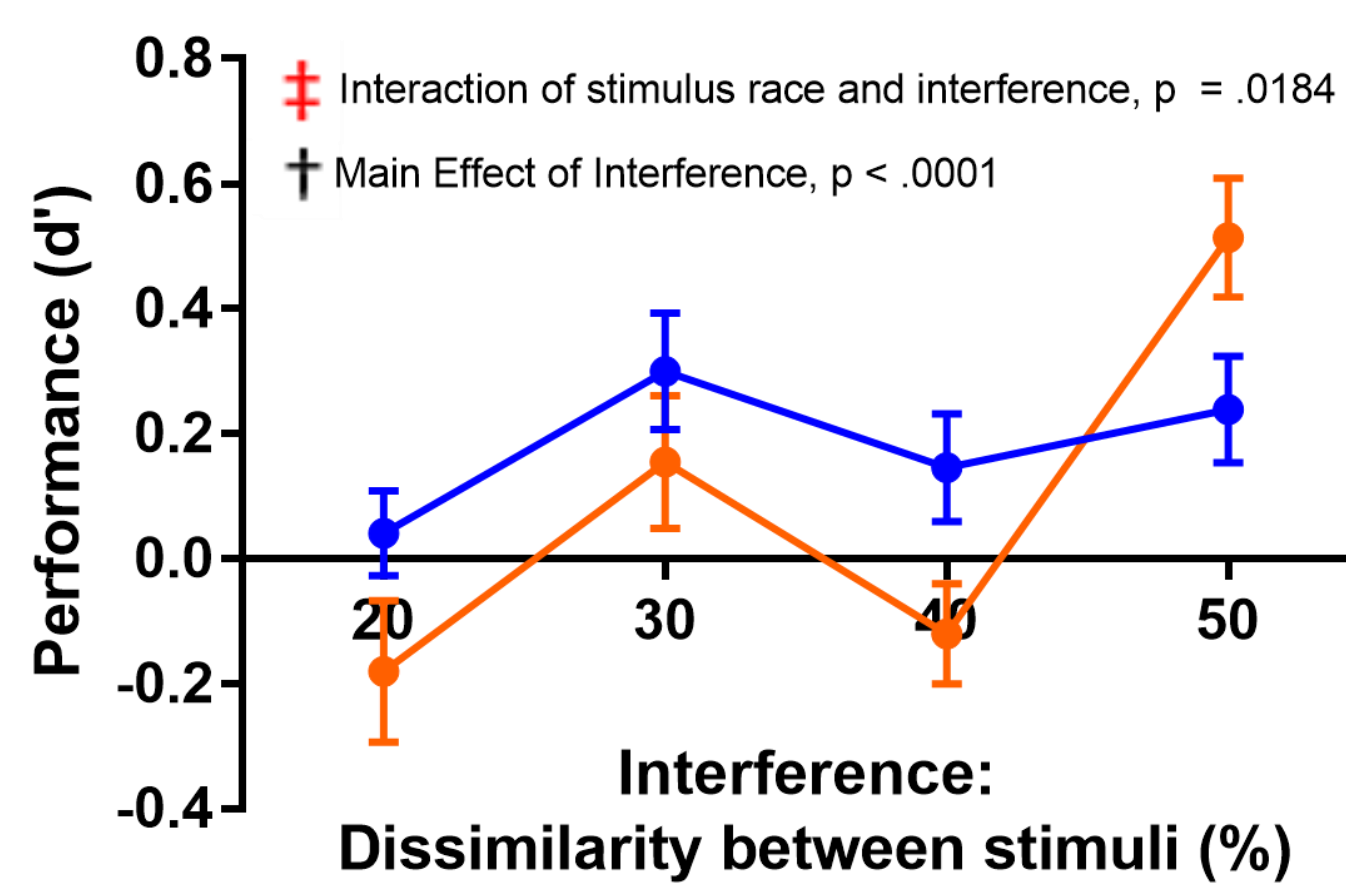
## A. Behavioral Results

### Face Recognition Performance Differences Across Race



Current sample size of 21 is only 78% powered to detect the above effect, based on a priori power analysis of our previously published results<sup>(REF)</sup>. With larger sample (n = 75) on same task,  $p < .0001$

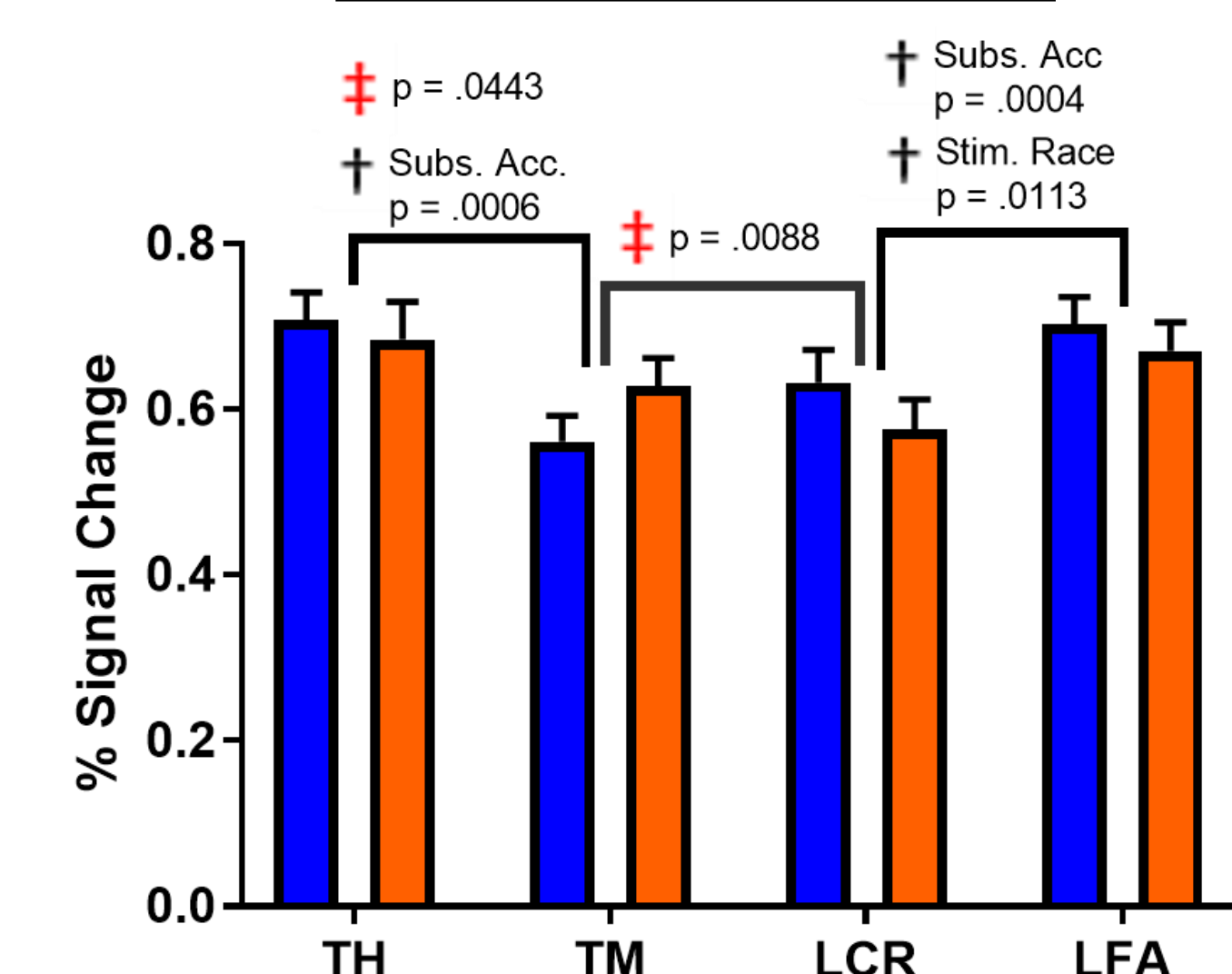
### Performance as a function of Stimulus Race and Interference



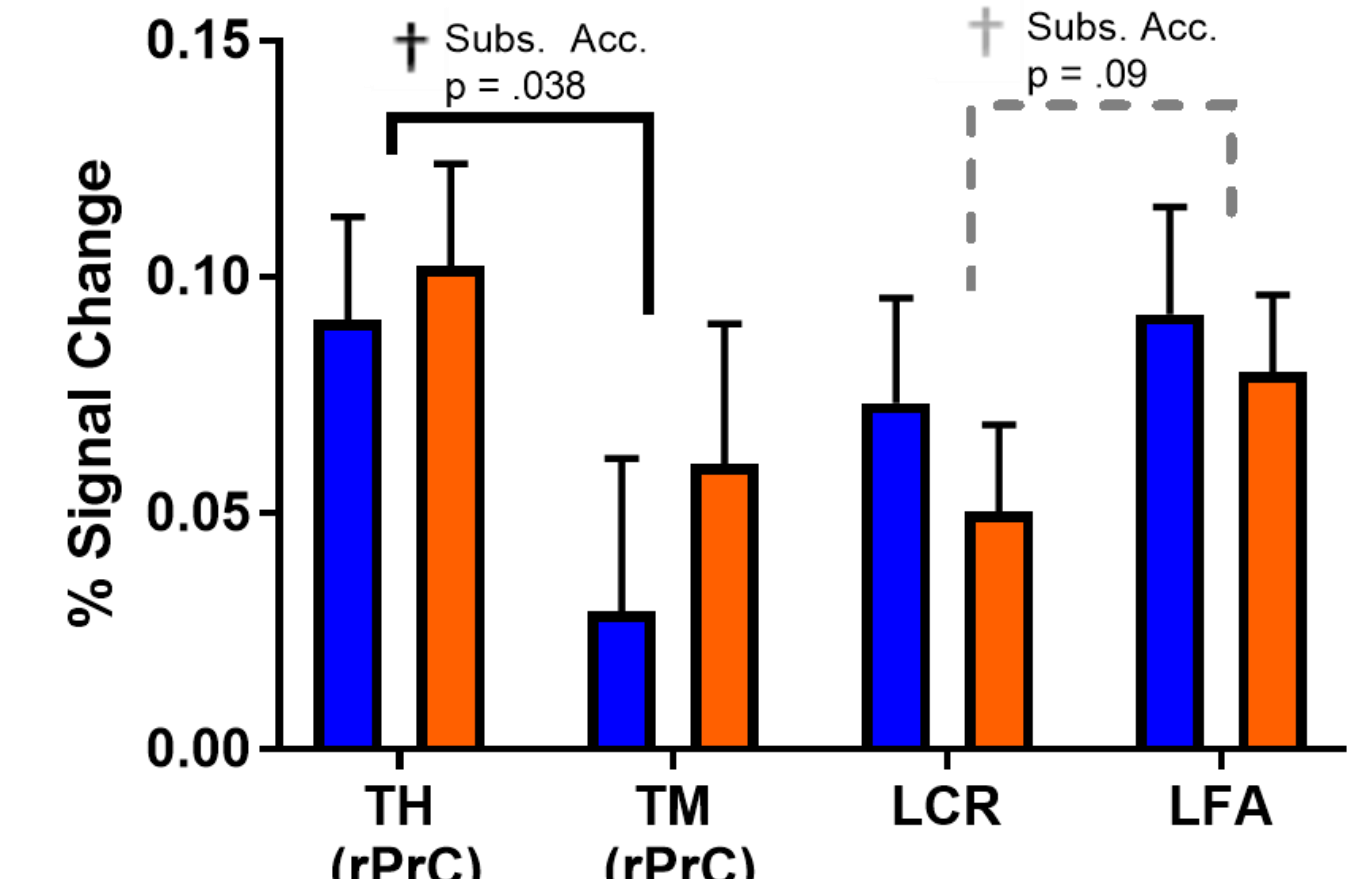
Same-race recognition is higher at high and intermediate levels of interference between face-pairs. Other-race recognition is superior when faces are maximally distinct from one another within this paradigm.

## B. Encoding Activity Ordered by Subsequent Performance

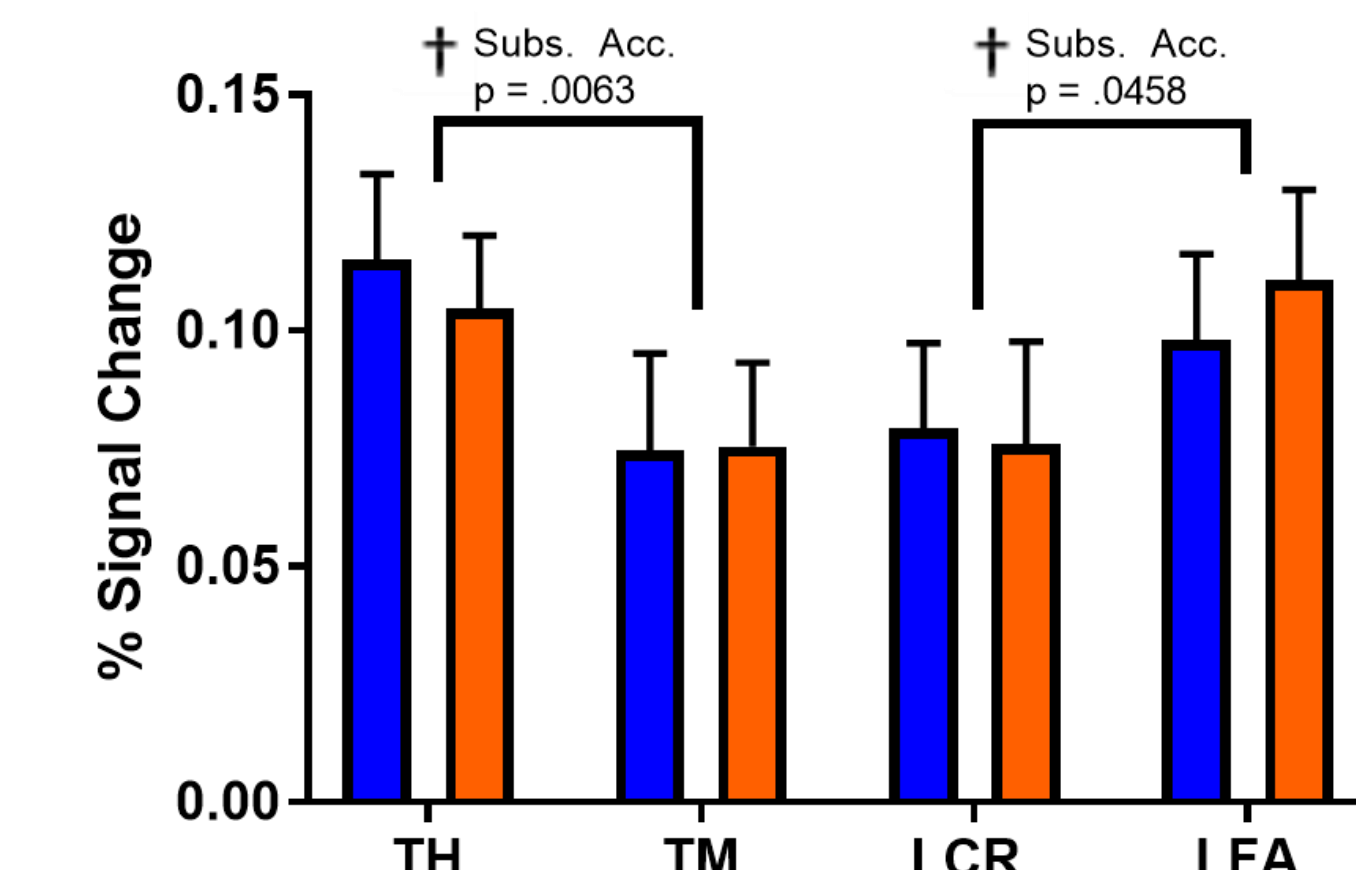
### Fusiform Face Area



### Perirhinal Cortex

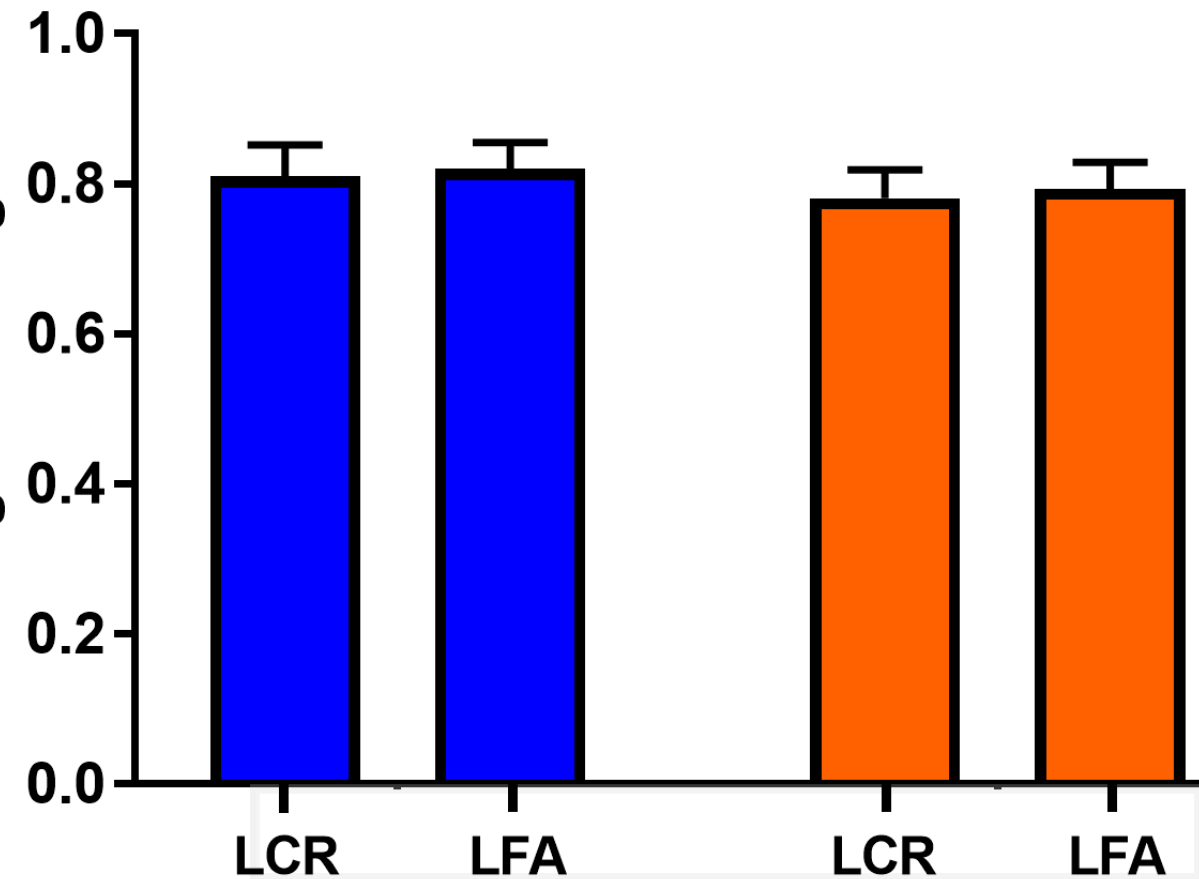


### Hippocampus

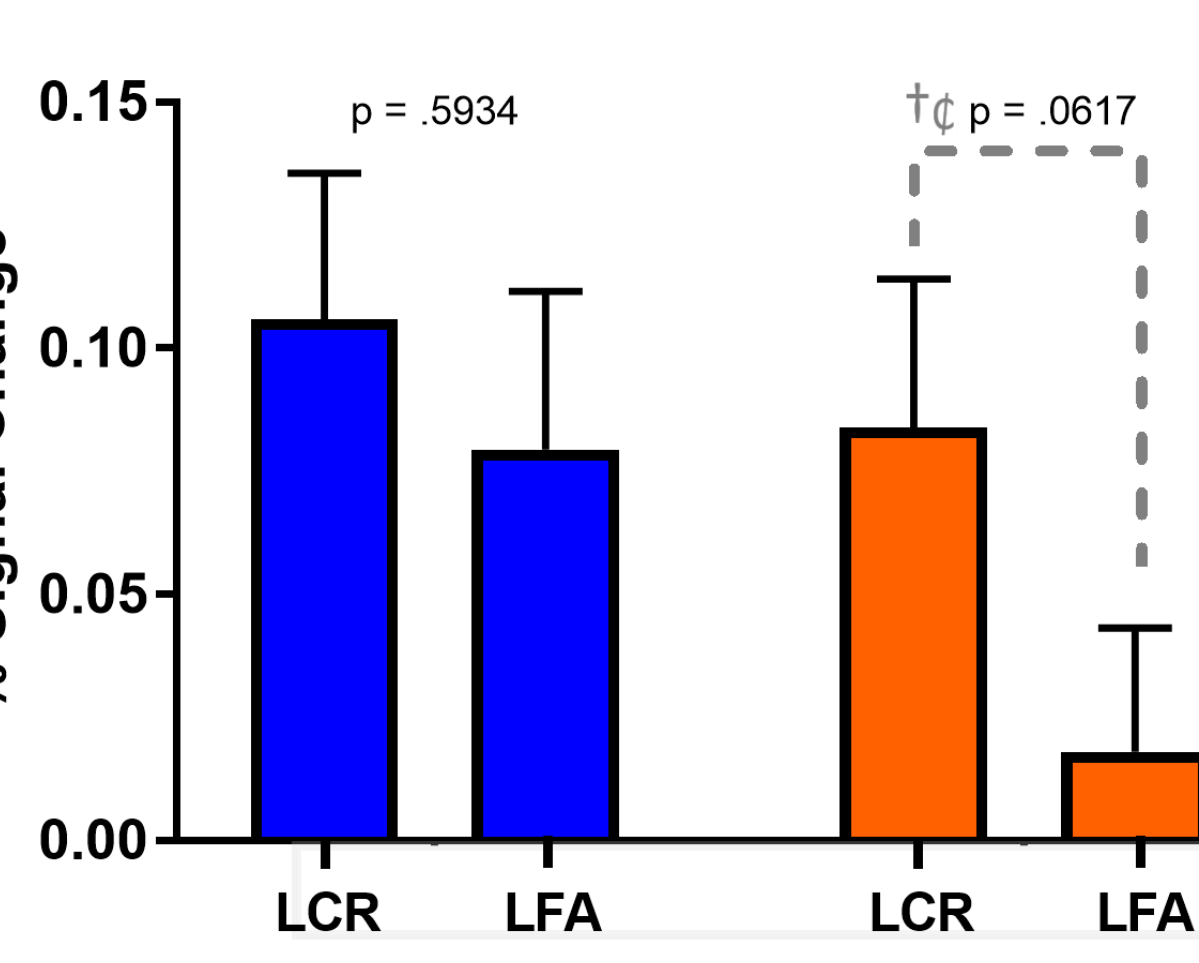


## C. Retrieval Activity – Potential Differences between FFA and PrC

### Fusiform Face Area



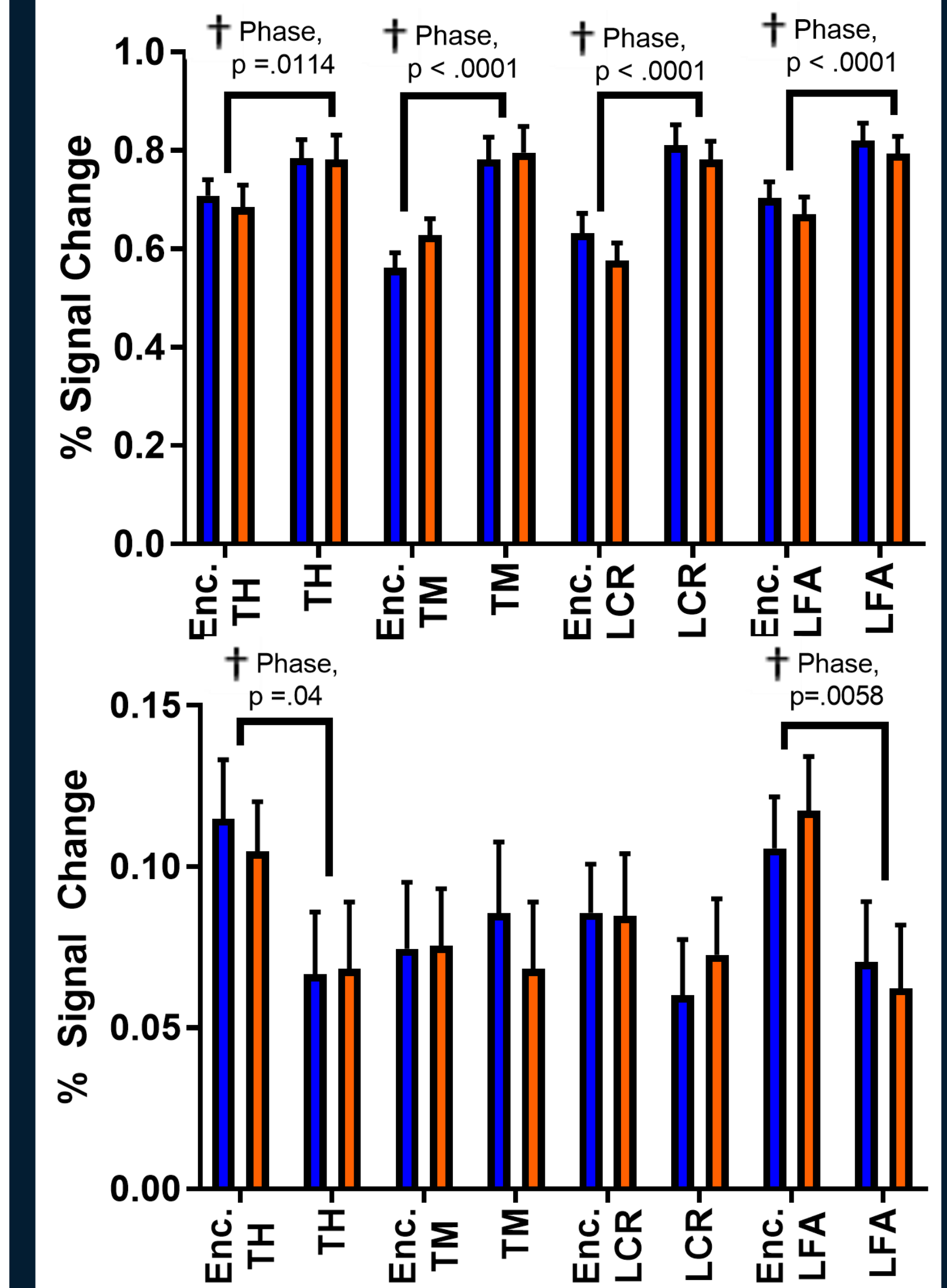
### Perirhinal Cortex



### Accuracy of Response to Lure Distractors

## D. Encoding/Retrieval Repetition Facilitation or Suppression Dependent on ROI

### Fusiform Face Area



### Corresponding Encoding- and Retrieval-Trial Face Pairings

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