

Background

- Detail and specificity of episodic memory declines with age¹.
- Older adults sometimes benefit from relying on prior knowledge², but it can also lead to false memories³.
- Neural pattern analyses have been used to index memory content⁴, but neural patterns can be less distinct in older adults⁵.

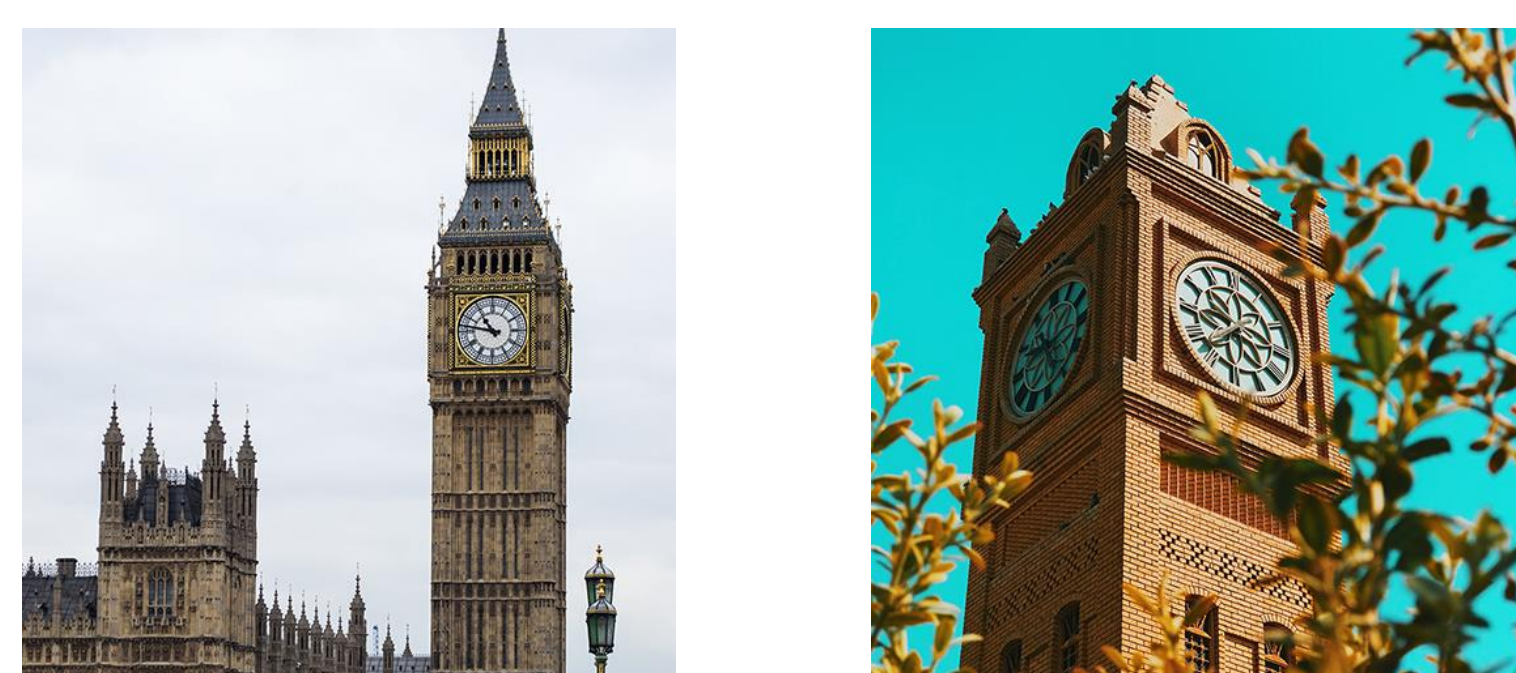
How does prior knowledge affect neural reinstatement in young and older adults?

Methods and behavioral results

Participants: 21 young (18-30) and 20 older (60-80) adults from Milwaukee area.

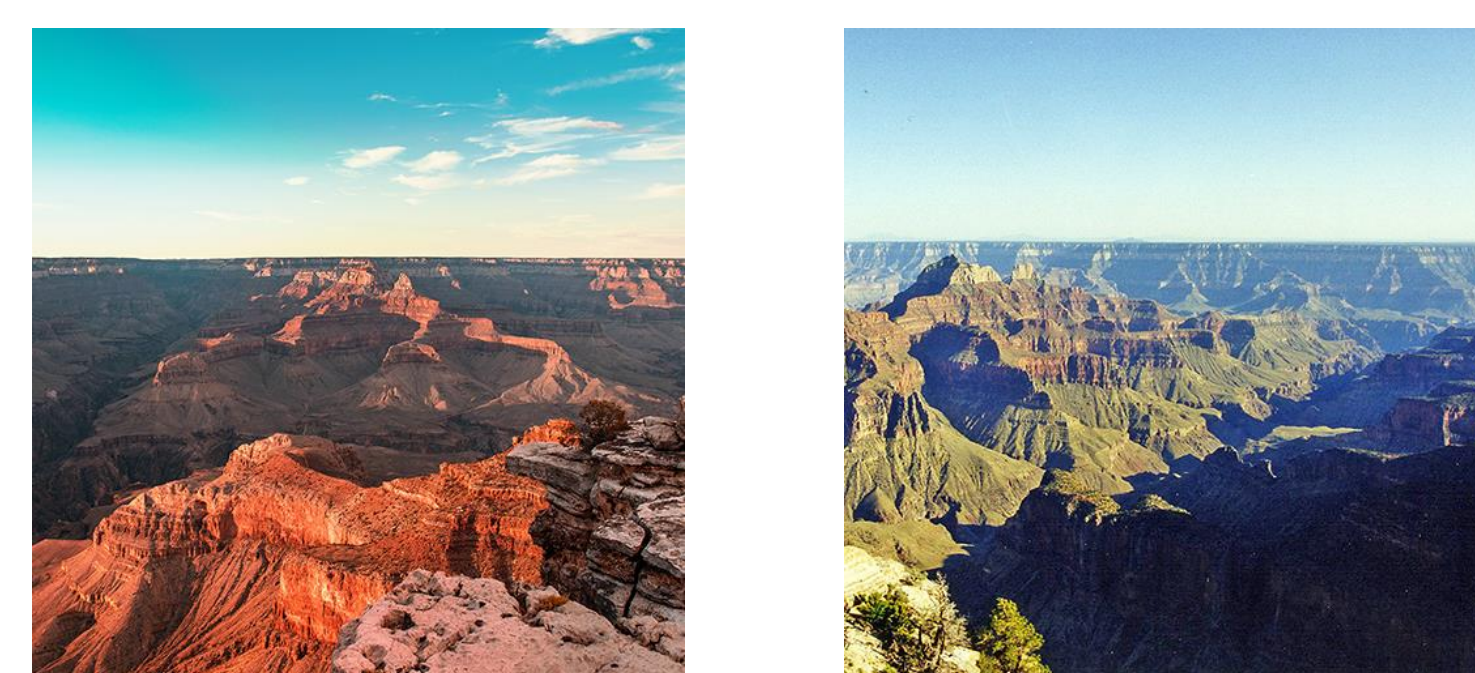
Prior knowledge evoked by images of famous locations

Scenes with man-made structures



Famous: Big Ben
Non-famous: Clock of Erbil

Natural landscapes



Famous: Grand Canyon
Non-famous: Copper Canyon

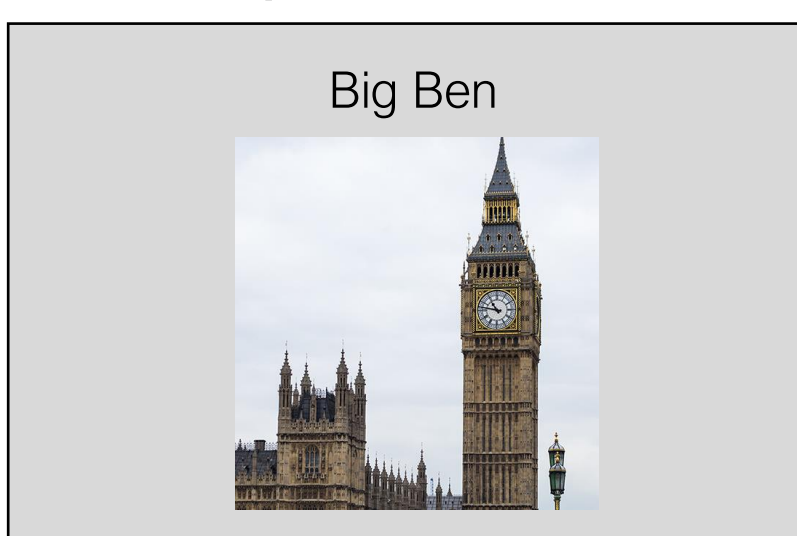
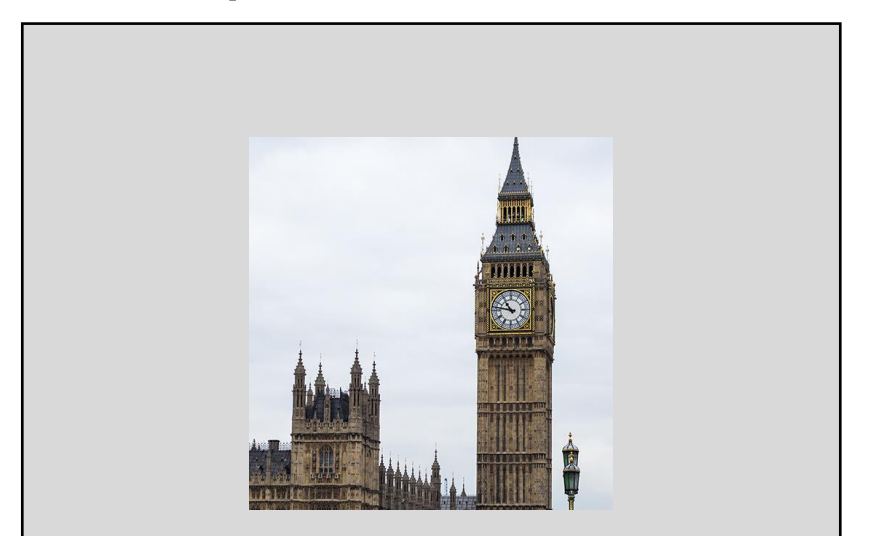
Total of 16 scenes (4 per condition)

fMRI scanning during scene perception and memory retrieval

Perception without labels

Perception with labels

Memory retrieval

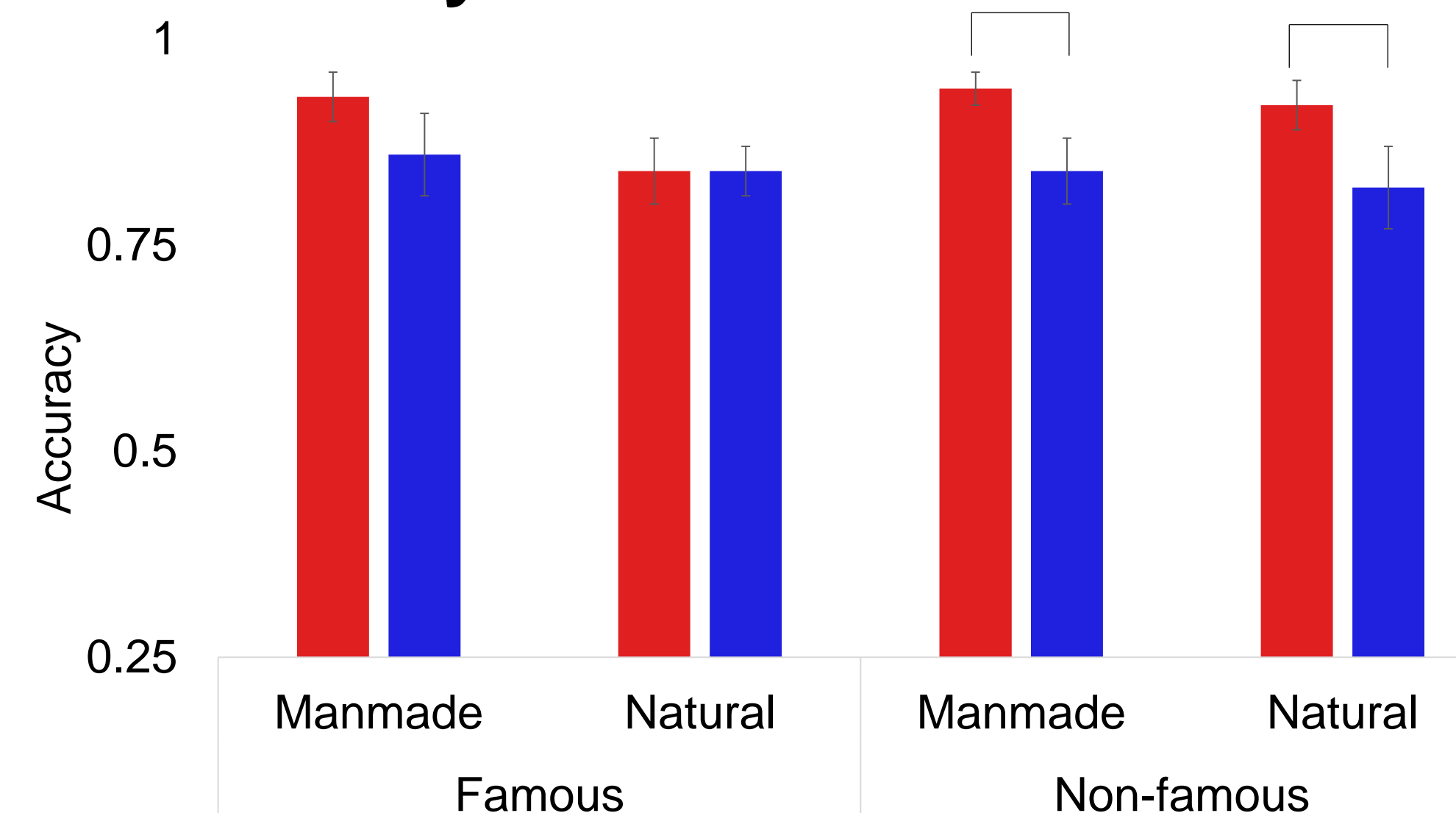


Order counterbalanced across subjects

2 runs of each type, each scene 3x per run

Slow event-related design: 4 s stimulus, 6 s fixation

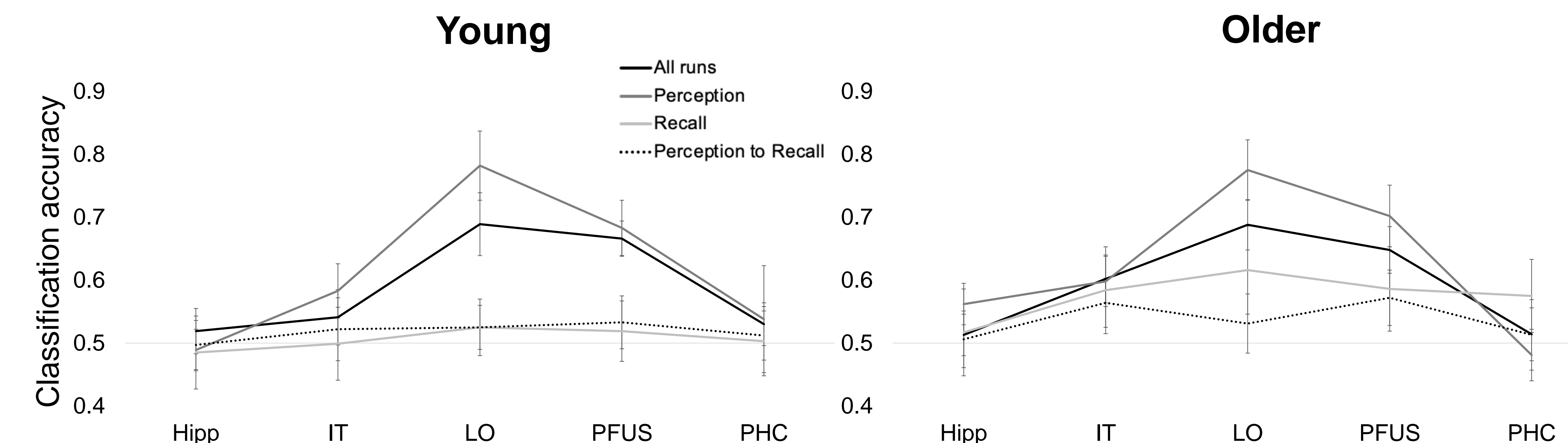
Post-scan evaluation of scene memory



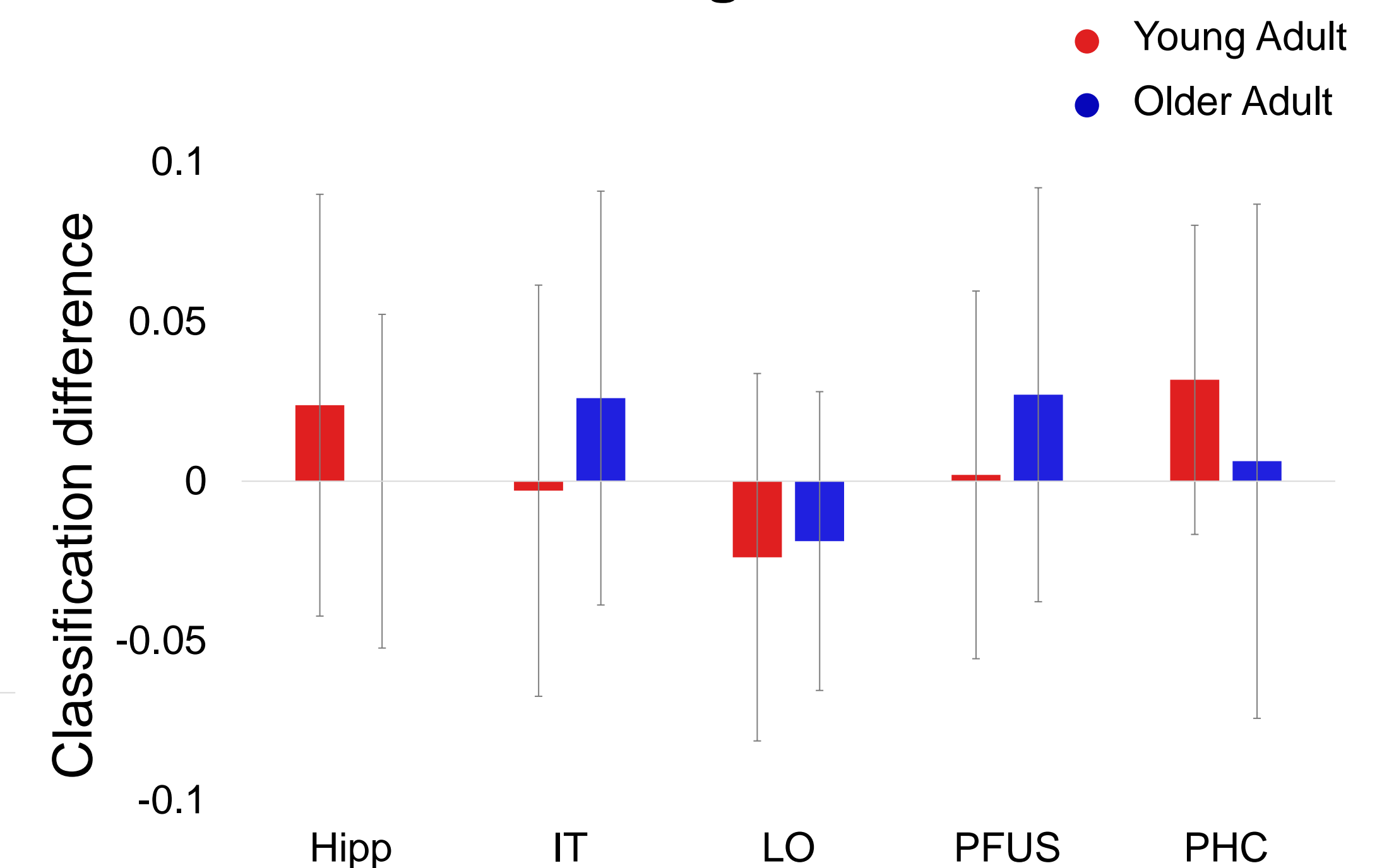
- Trend for overall age deficit ($p = .07$).
- Better memory for famous manmade vs. natural scenes in YA.
- Smaller age deficit for famous compared to non-famous scenes, but no memory differences across famous vs. non-famous in older adults.

Pattern Classification: Decoding manmade vs. natural scenes

Regions of interest (ROIs): Hippocampus (Hipp), Inferior temporal cortex (IT), Lateral occipital cortex (LO), Posterior fusiform gyrus (PFUS), Parahippocampal cortex (PHC)



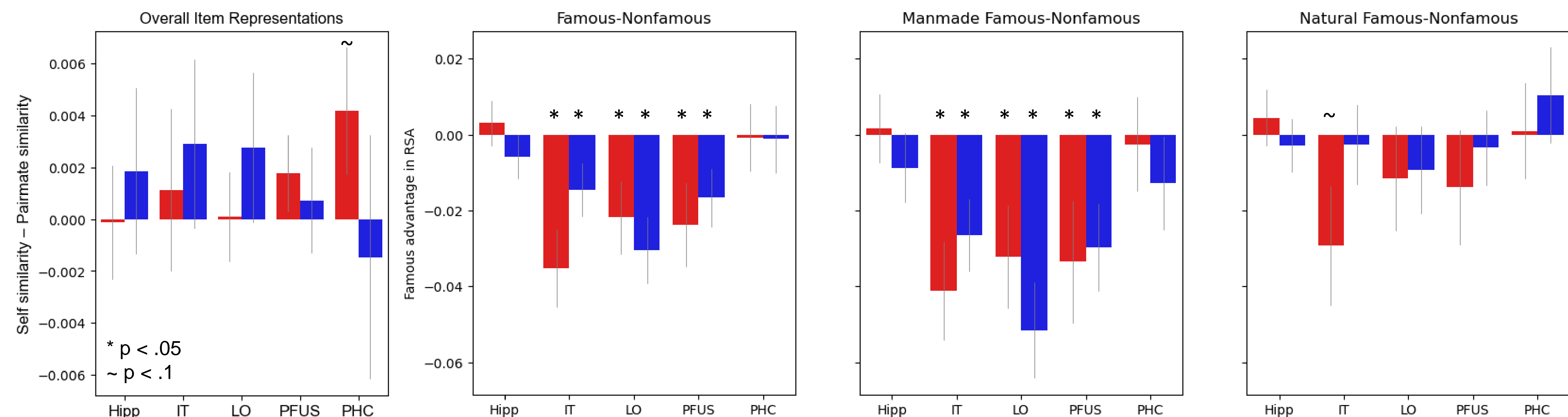
Classification advantage for famous scenes



- IT, LO, and PFUS generally show above-chance classification in perception, but not recall.
- Only older adults show above-chance classification during recall.

- No significant differences in classification based on prior knowledge of scene locations.

RSA: Item reinstatement from perception to recall



- Item reinstatement does not reach significance in any ROI
- Trend toward item reinstatement in PHC for young adults.

- Overall advantage for *non-famous* scenes in visual regions.
- Little to no advantage for non-famous natural scenes in visual regions for both age groups.
- Reduction in non-famous advantage between manmade and natural especially prominent for older adults.

Summary

- Older adults *do not* remember famous locations better than non-famous locations when recognition task probes specific scene details.
- Across age groups, visual regions represent scene category information during perception, but category information is much less prominent during recall.
 - Some sign of age-related increase in category information during recall.
- Item reinstatement is not yet significant in any ROI tested.
- No famous vs. non-famous difference in category-level representations, but both young and older adults show more item-level reactivation for non-famous compared to famous scenes.

References

1. Greene & Naveh-Benjamin. (2023) *Psychology and Aging*.
2. Ryan et al. (2015) *Hippocampus*
3. Koutstaal & Schacter. (1997) *J. Memory and Language*
4. Polyn et al. (2005) *Science*
5. Koen & Rugg (2019) *Trends in Cognitive Science*

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