Repulsion of hippocampal representations is time-locked to resolution of memory interference

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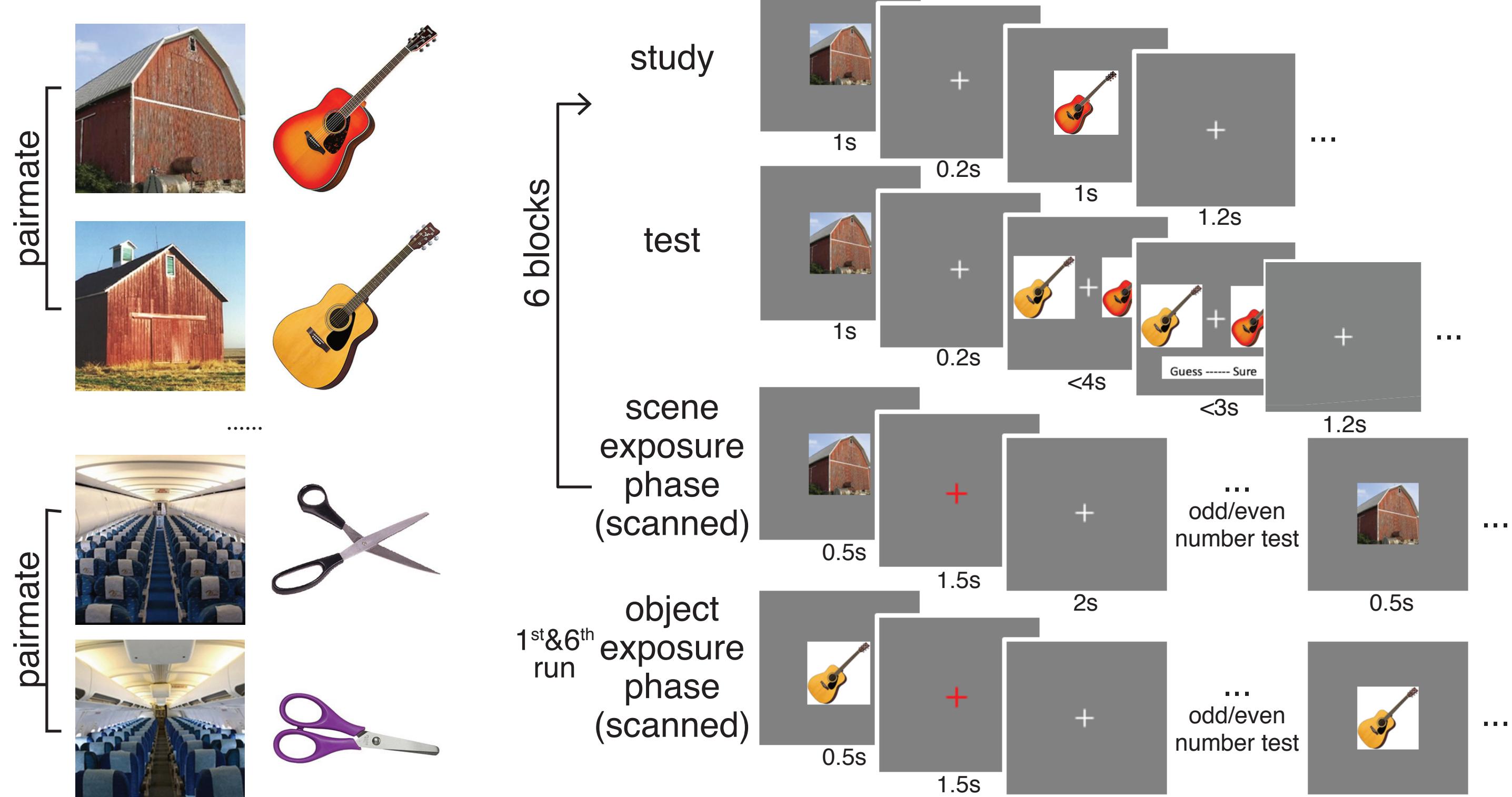1. Psychology Dept., Univ. of Oregon, Eugene, OR; 2. Psychology, New York Univ., New York, NY
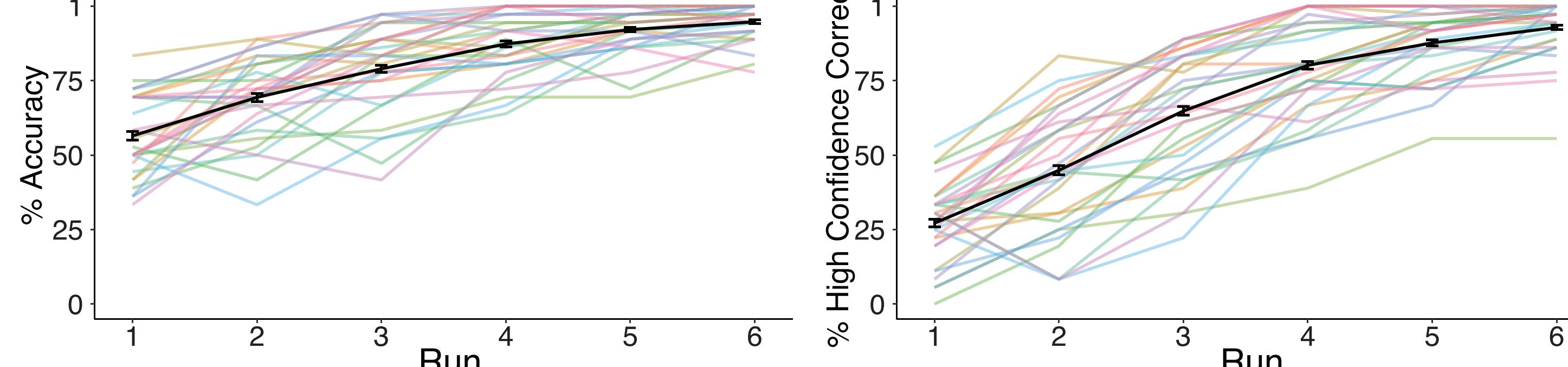
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SCAN ME

INTRODUCTION

- Overlap among hippocampal representations can create memory interference[1][2][3].
- Similarity between memories can trigger repulsion of hippocampal activity patterns[4][5][6].
  - Repulsion has specifically been observed in CA2/3/Dentate Gyrus(CA23DG)[7][8].
- Repulsion of hippocampal representations is thought to protect against memory interference[5][9].
- **Current Study: Does repulsion of overlapping CA23DG representations predict the resolution of memory interfernce?**
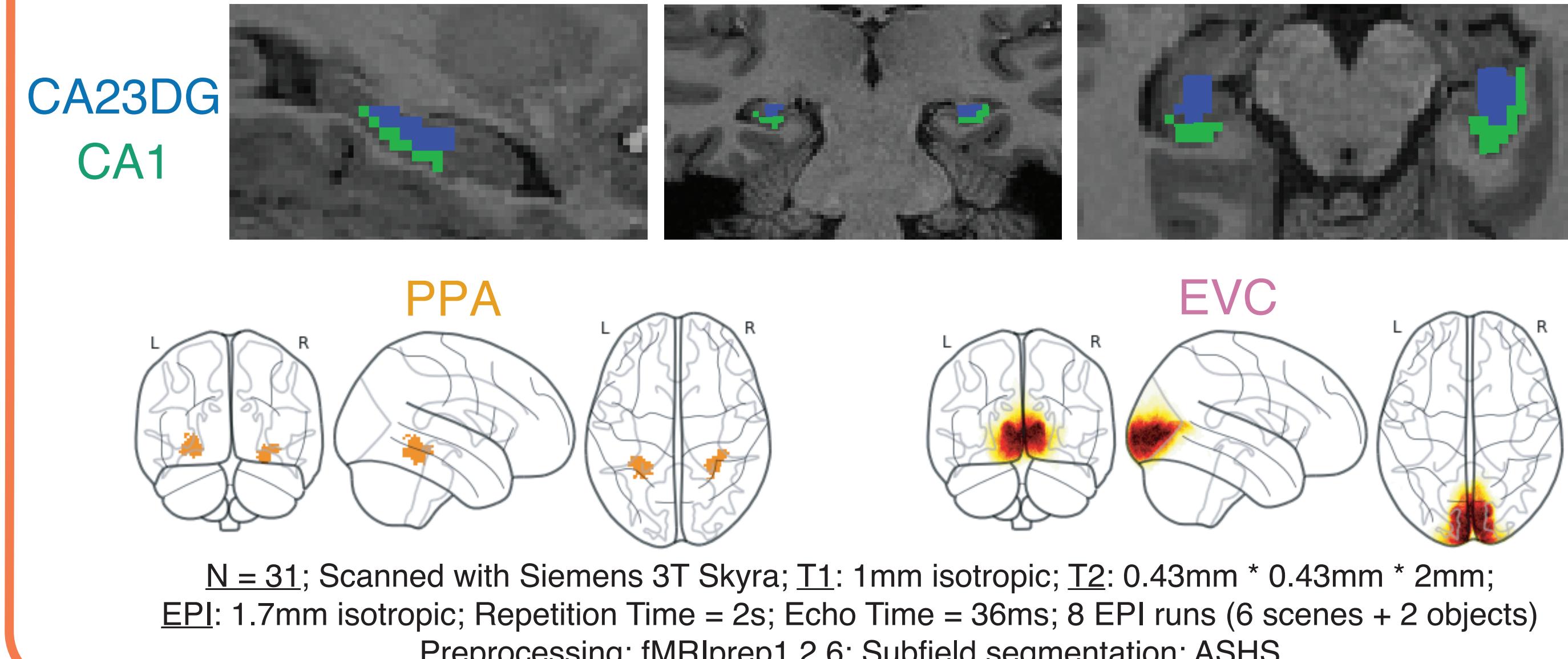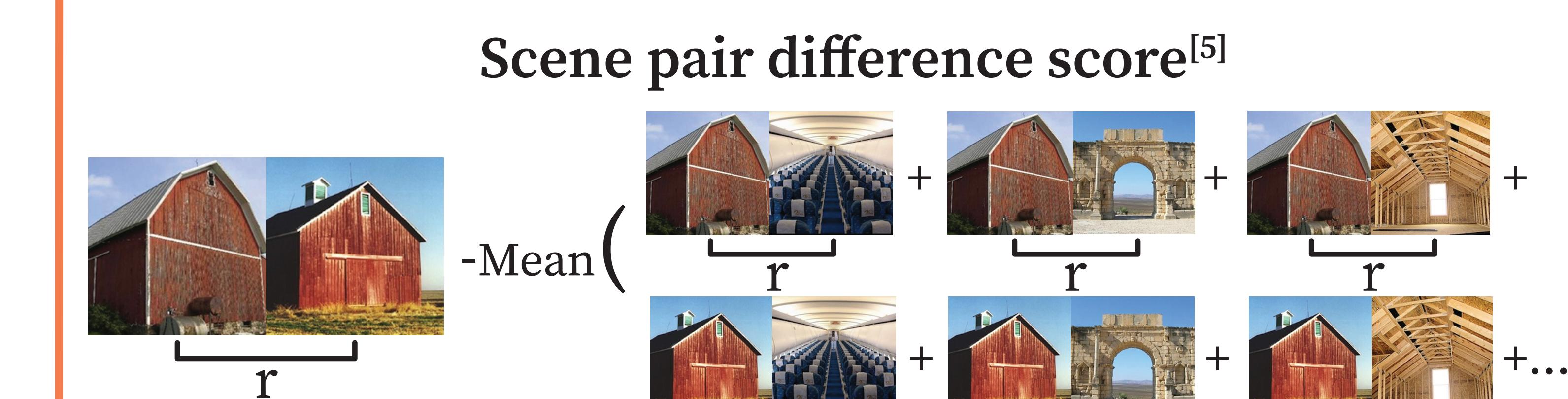
TASK DESIGN AND BEHAVIORAL RESULTS
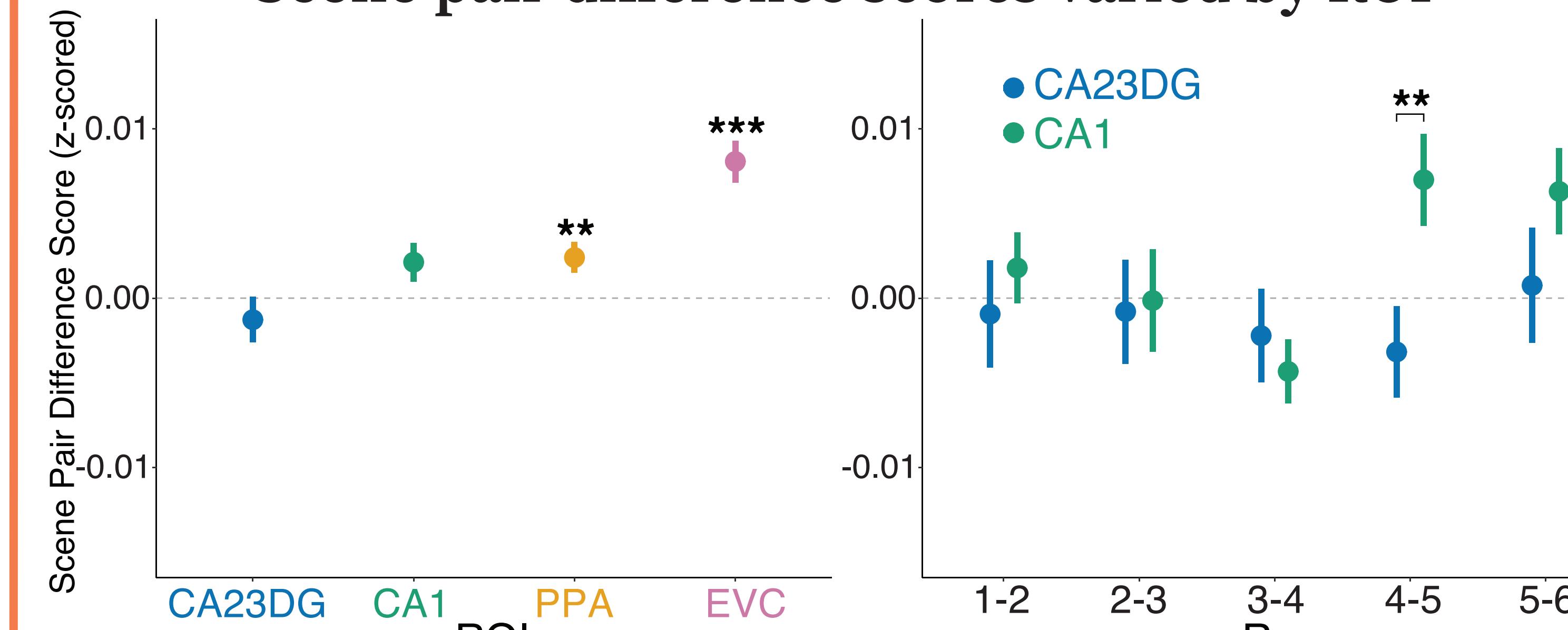

Associative memory improved across runs

REGIONS OF INTERESTS

N = 31; Scanned with Siemens 3T Skyra; T1: 1mm isotropic; T2: 0.43mm * 0.43mm * 2mm;
EPI: 1.7mm isotropic; Repetition Time = 2s; Echo Time = 36ms; 8 EPI runs (6 scenes + 2 objects)
Preprocessing: fMRIprep1.2.6; Subfield segmentation: ASHS

MEASURING NEURAL SIMILARITY

Scene pair difference score[5]
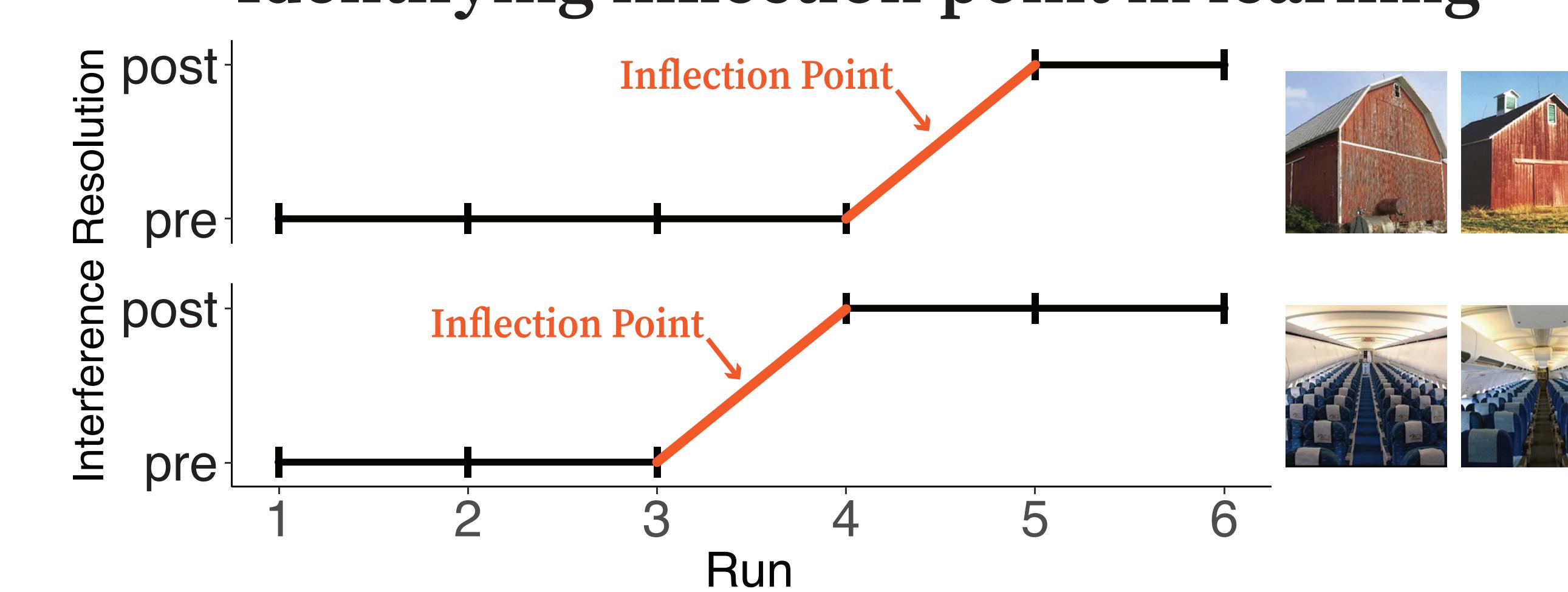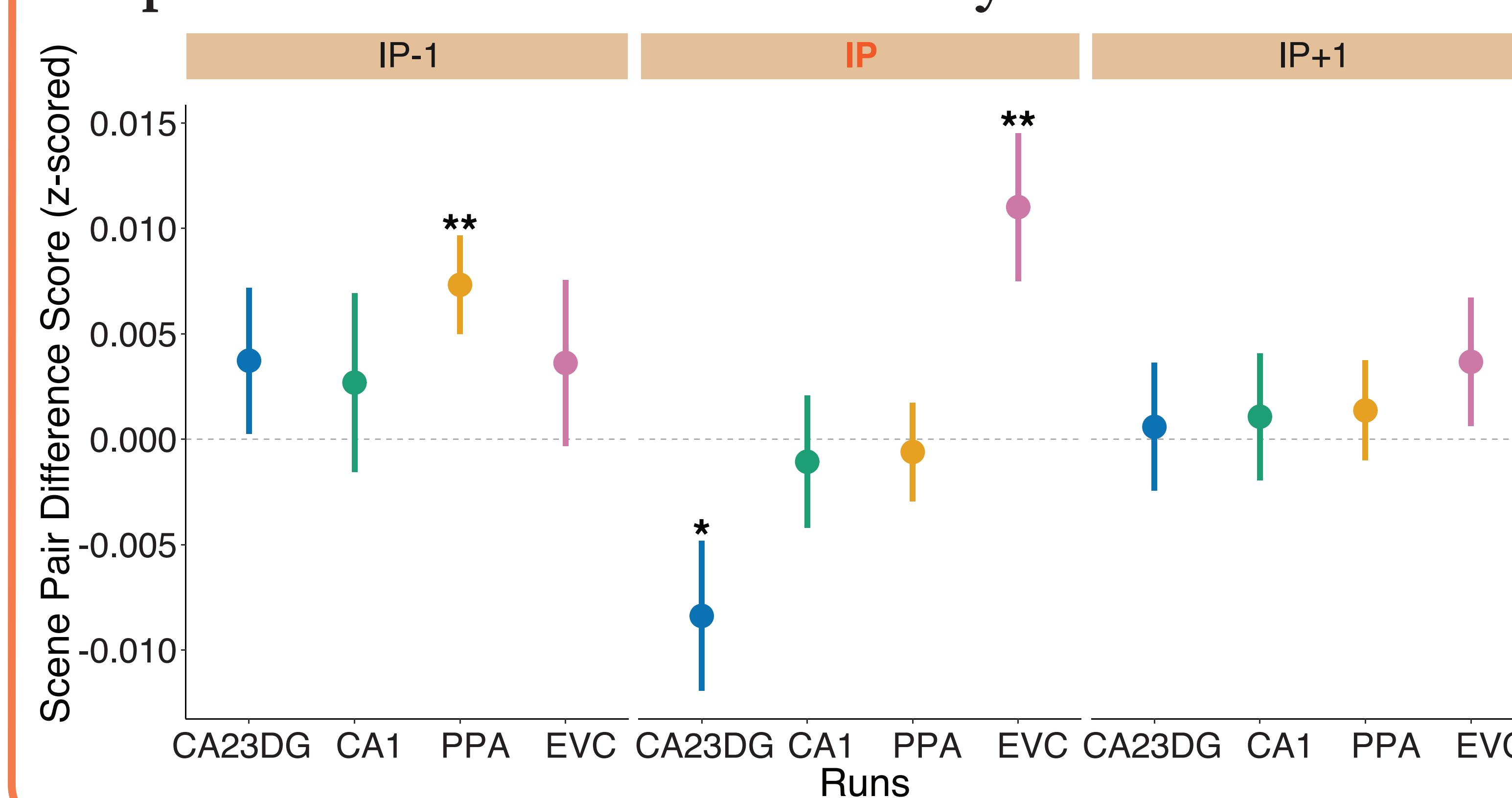

Scene pair difference scores varied by ROI
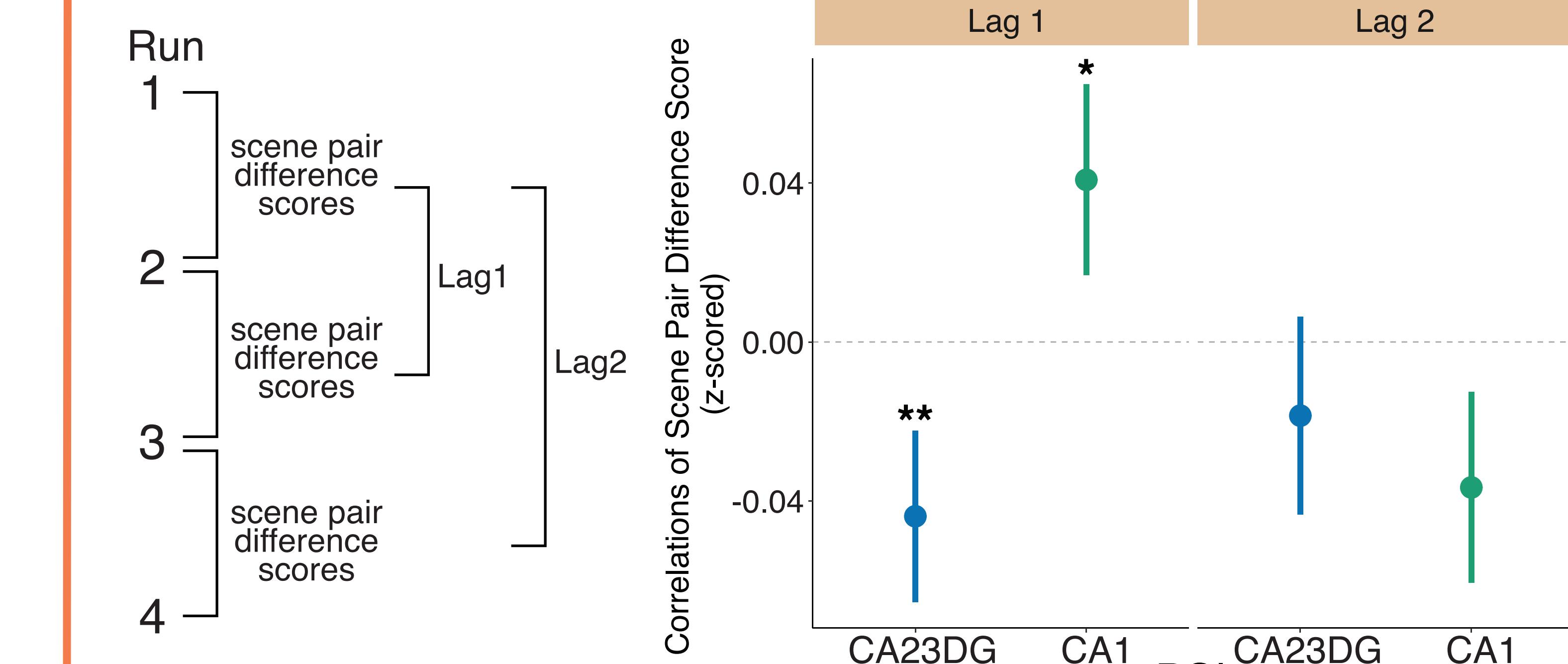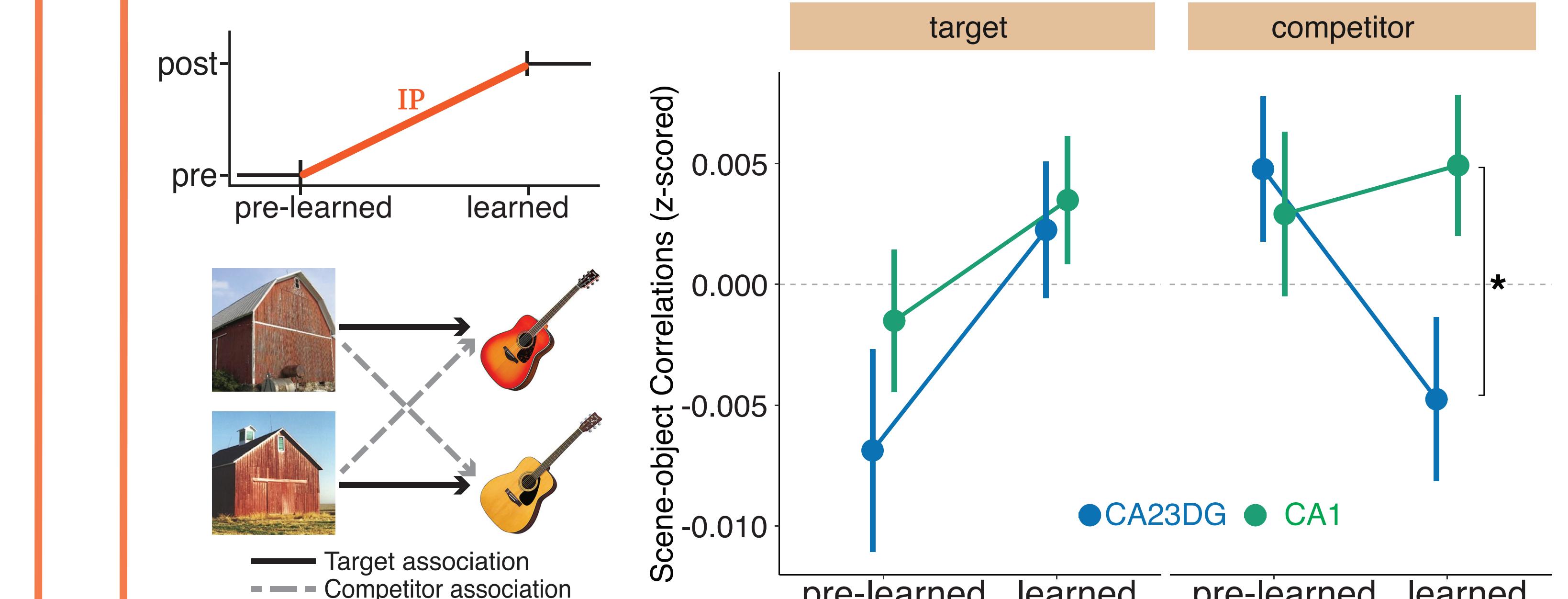

Identifying inflection point in learning

Repulsion in CA23DG occurred only at Inflection Point

CA23DG pattern overlap triggered repulsion

CA23DG discriminated target vs. competitor associations

CONCLUSIONS

- Hippocampus exaggerates differences between similar memories (repulsion effect).
- CA23DG repulsion was time-locked to specific point in learning when interference between memories was resolved.
- Overlap in CA23DG triggered repulsion[9], and CA1 showed opposite effect.
- CA23DG, but not CA1, discrimated target vs. competitor associations.
- Critically, our findings revealed multiple dissociations between CA23DG and CA1 in memory interference resolution.

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