# Hippocampal Repulsion as a Function of Memory Similarity and Experience

Dominik Graetz, Wanjia Guo, Soroush Mirjalili, Eric Wang, Ulrich Mayr, Brice A. Kuhl
Department of Psychology, University of Oregon

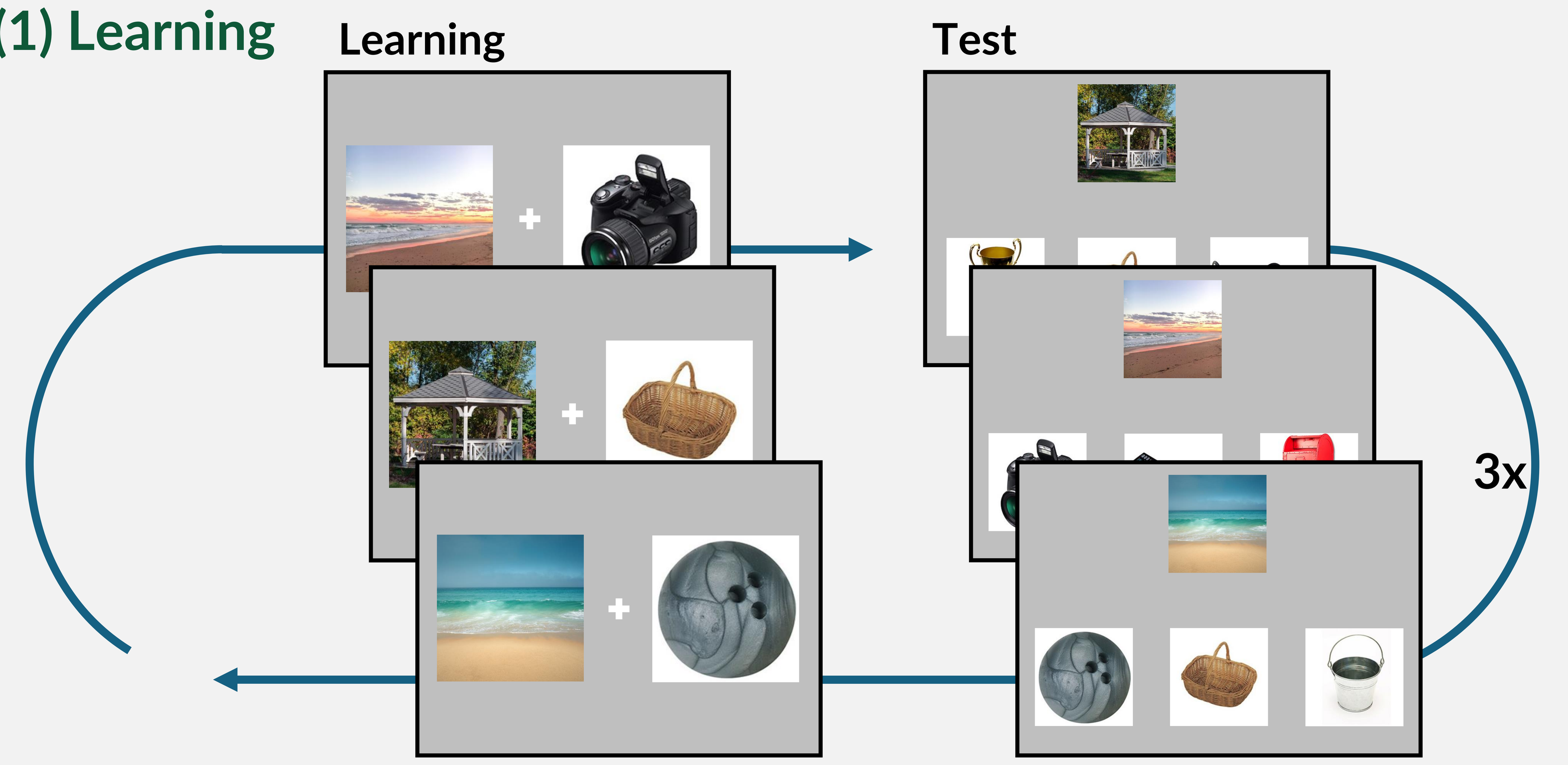
## Introduction

- **Event similarity** can trigger the '**repulsion**' of hippocampal activity patterns[1–5].
- Repulsion is thought to **protect** similar memories **from interference**[1, 6, 7].

**Current study goal:**
**Measure hippocampal repulsion as a function of memory similarity and resistance to interference**

## Study Design (*N* = 20)

### (1) Learning




**High training** – more learning + test feedback
**Low training** – less learning, no feedback

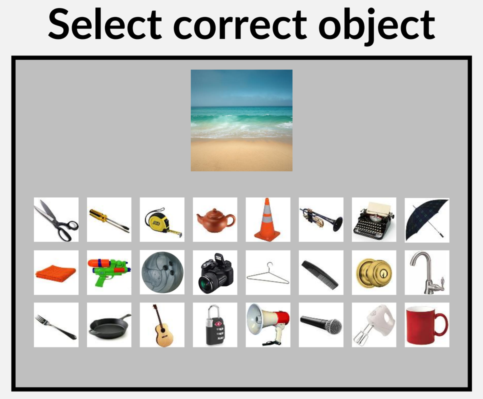
### (2) fMRI Task

Respond to new scenes

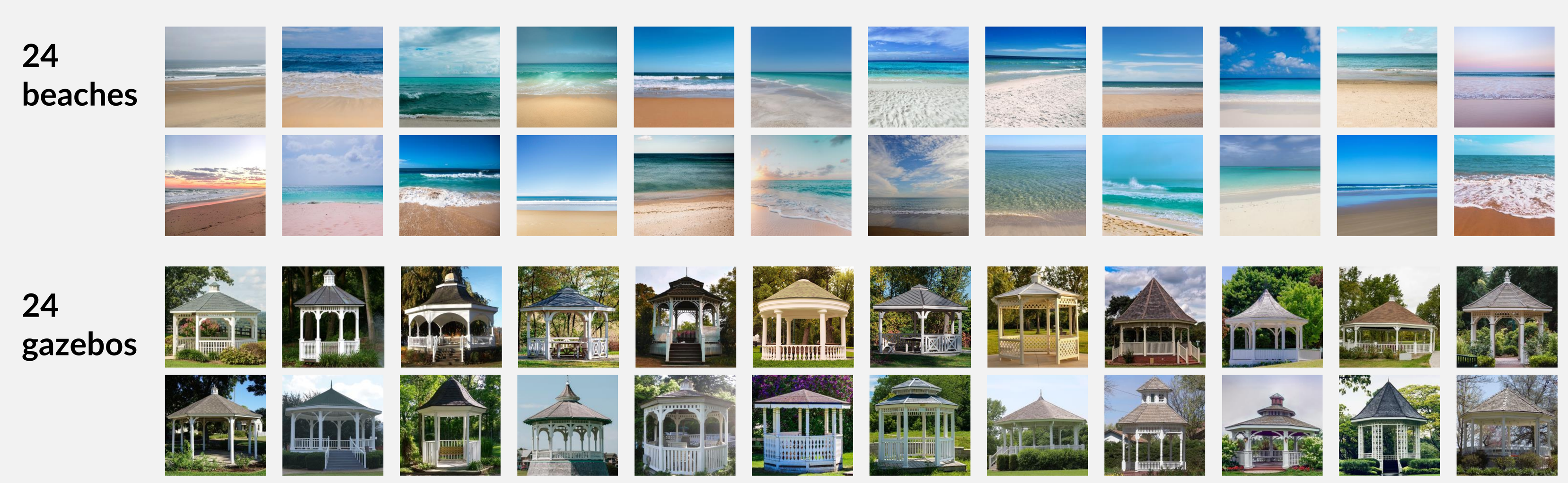
24 stimuli x 2 categories x 8 runs

### (3) Post-Test

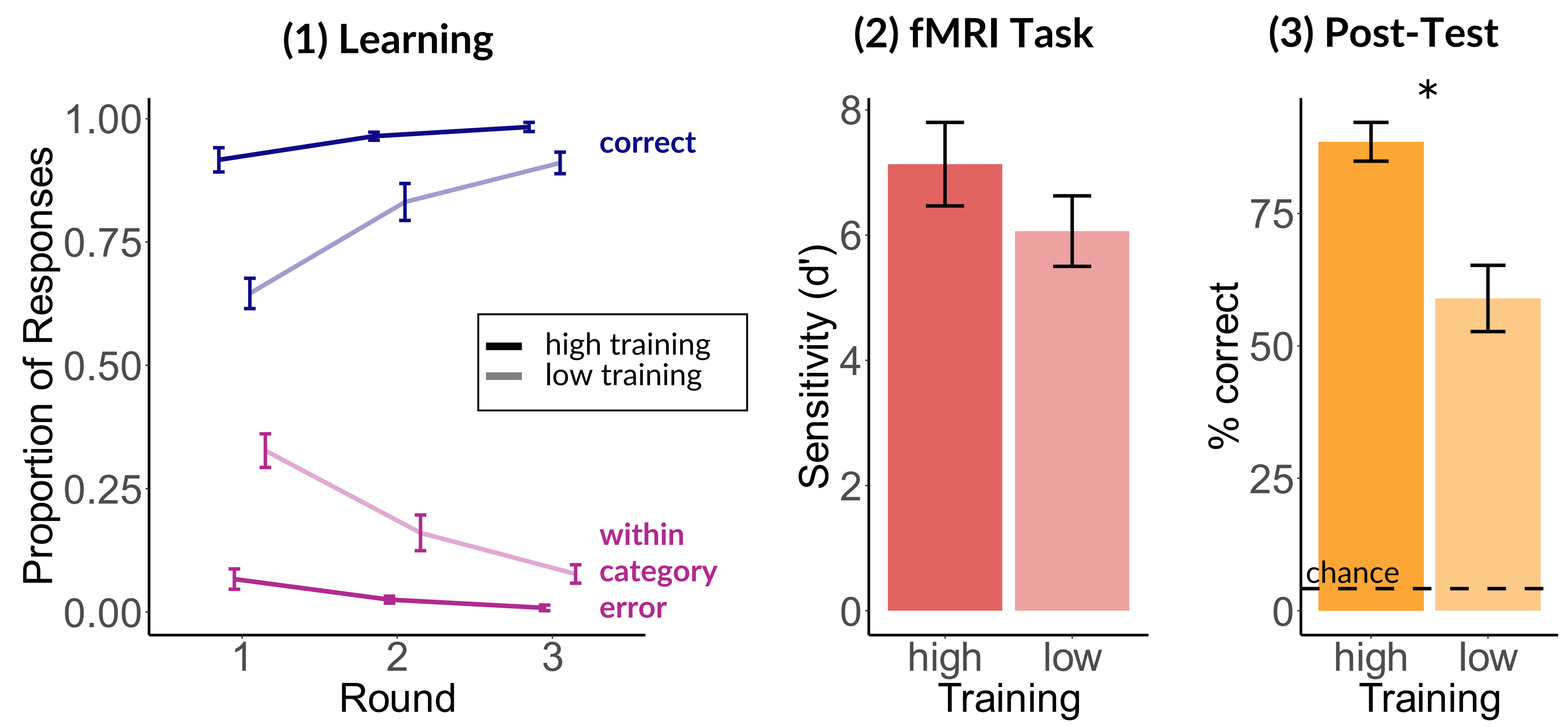
Select correct object



### Scenes

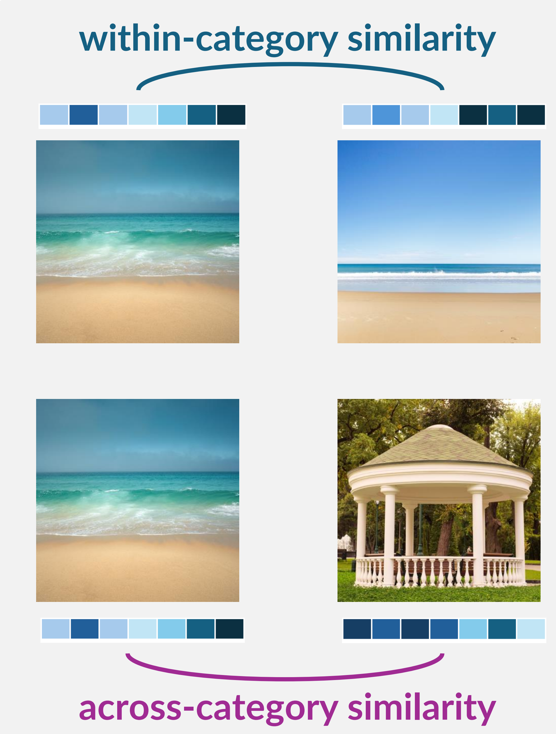



## Behavioral Memory Performance




- Participants were generally very good at learning the scene-object associations
- Scene-object memory was better after high vs. low training
- Errors during training were overwhelmingly 'within-category errors' (interference errors)

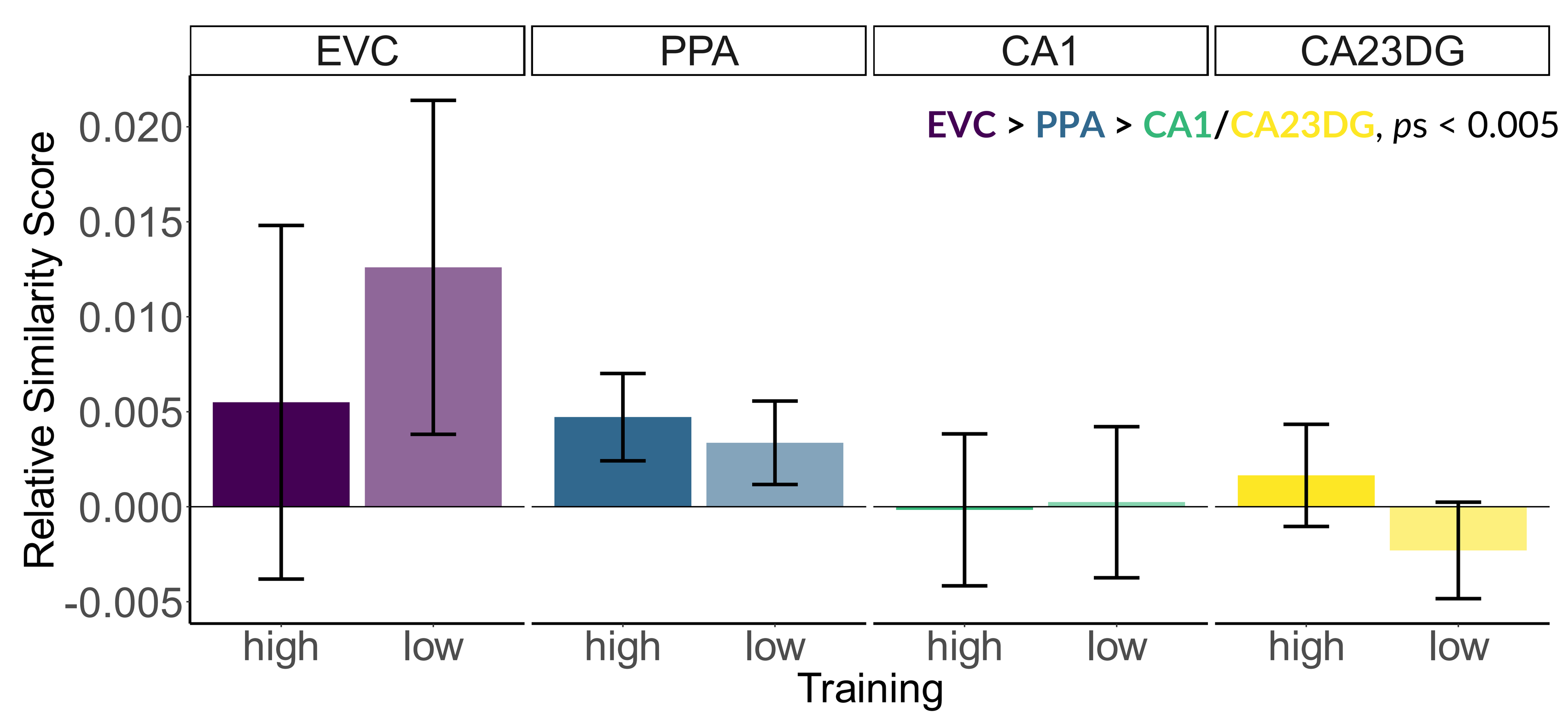
## fMRI Pattern Similarity



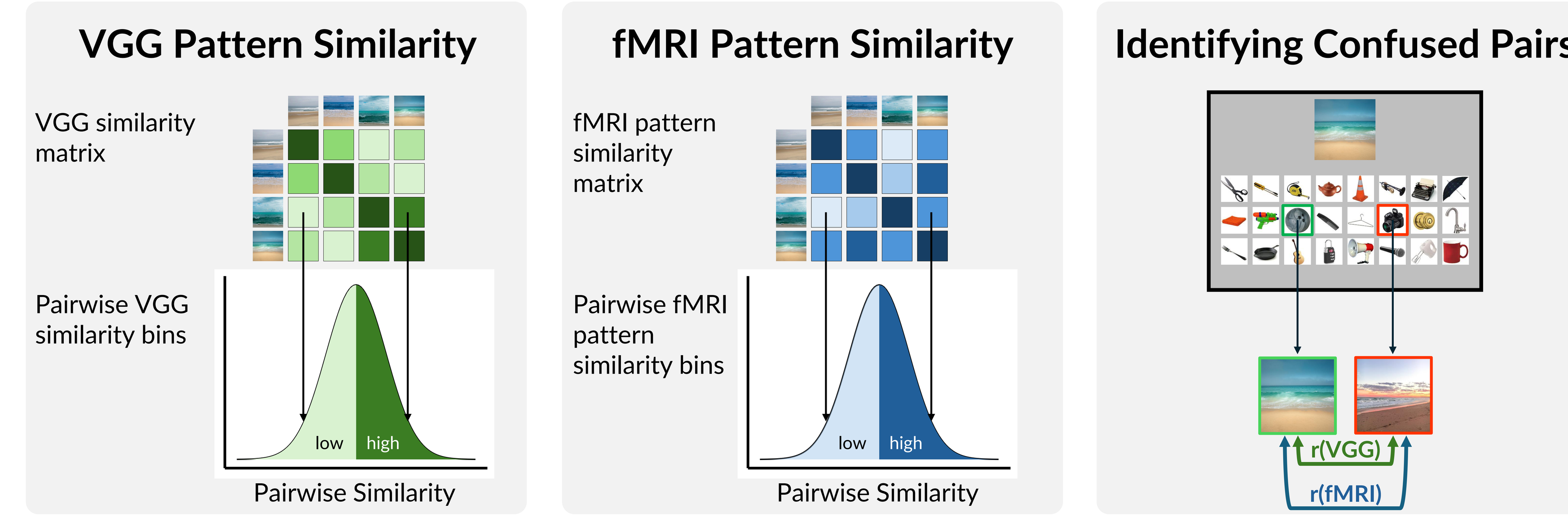

**Relative Similarity Score** = **within-category similarity** - **across-category similarity**

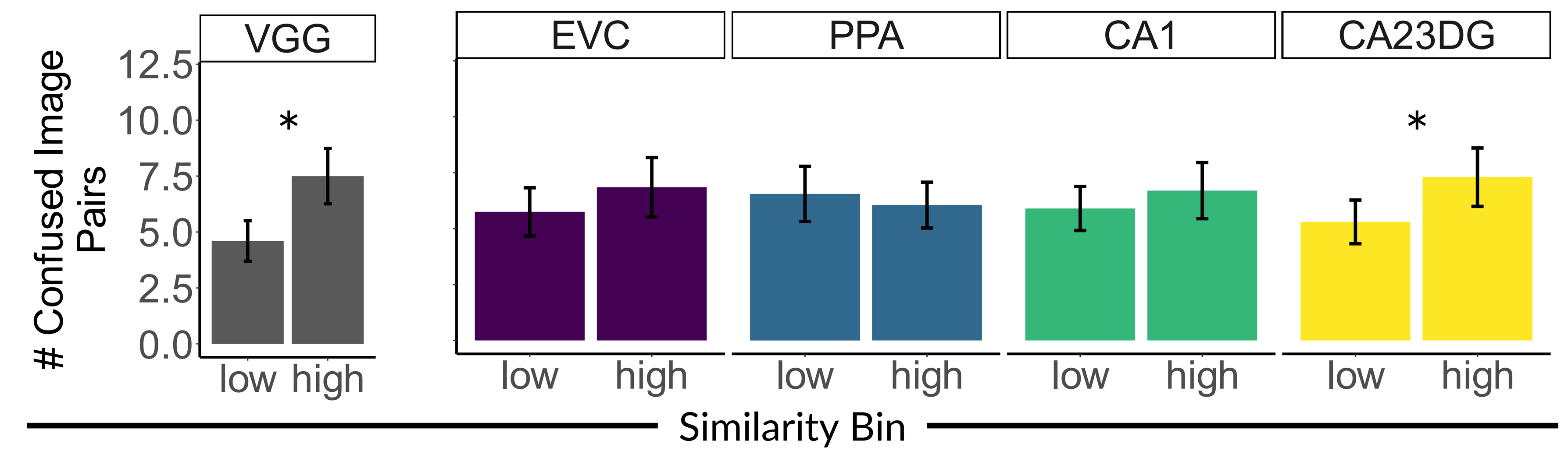
**Positive**: within-category similarity > across-category similarity
**Negative**: within-category similarity < across-category similarity (**repulsion**)

Relative similarity scores:
- Higher in EVC/PPA than in hippocampus (CA1, CA23DG)
- Did not differ from 0 in CA1/CA23DG (no repulsion effect)
- Did not differ as a function of training for any ROIs

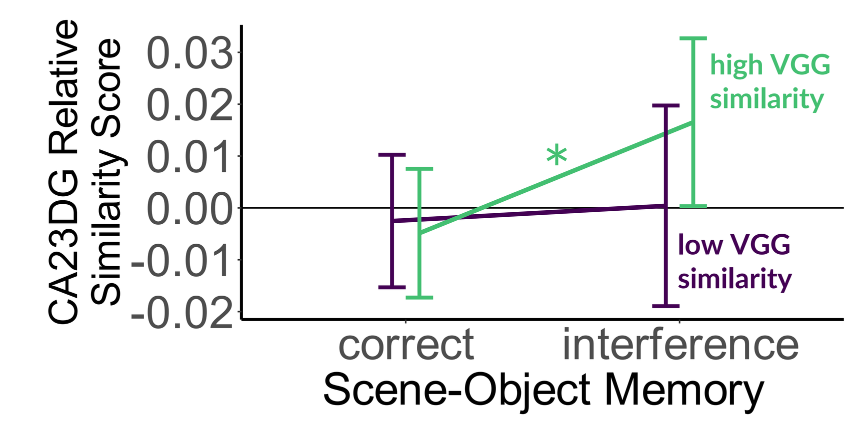



## Pattern Overlap Predicts Confusability




- Greater scene similarity (indexed by VGG) predicted more interference errors ('swapping' corresponding objects)
- When CA23DG similarity was lower, interference errors were reduced
- Benefit of low CA23DG similarity was most evident when scenes were most similar (high VGG similarity)




## Conclusions

Our preliminary results indicate that
- EVC and PPA reflected similarity within scene categories
- In the hippocampus, scenes within a category were no more similar than scenes across categories[8]
- CA23DG predicted which pairs of images were confused: lower similarity → less confusion
- VGG similarity also predicted interference errors
- CA23DG similarity was most predictive of interference errors when VGG similarity was high

## References

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