

Dissociable neural reinstatement of emotional memories in the human PFC

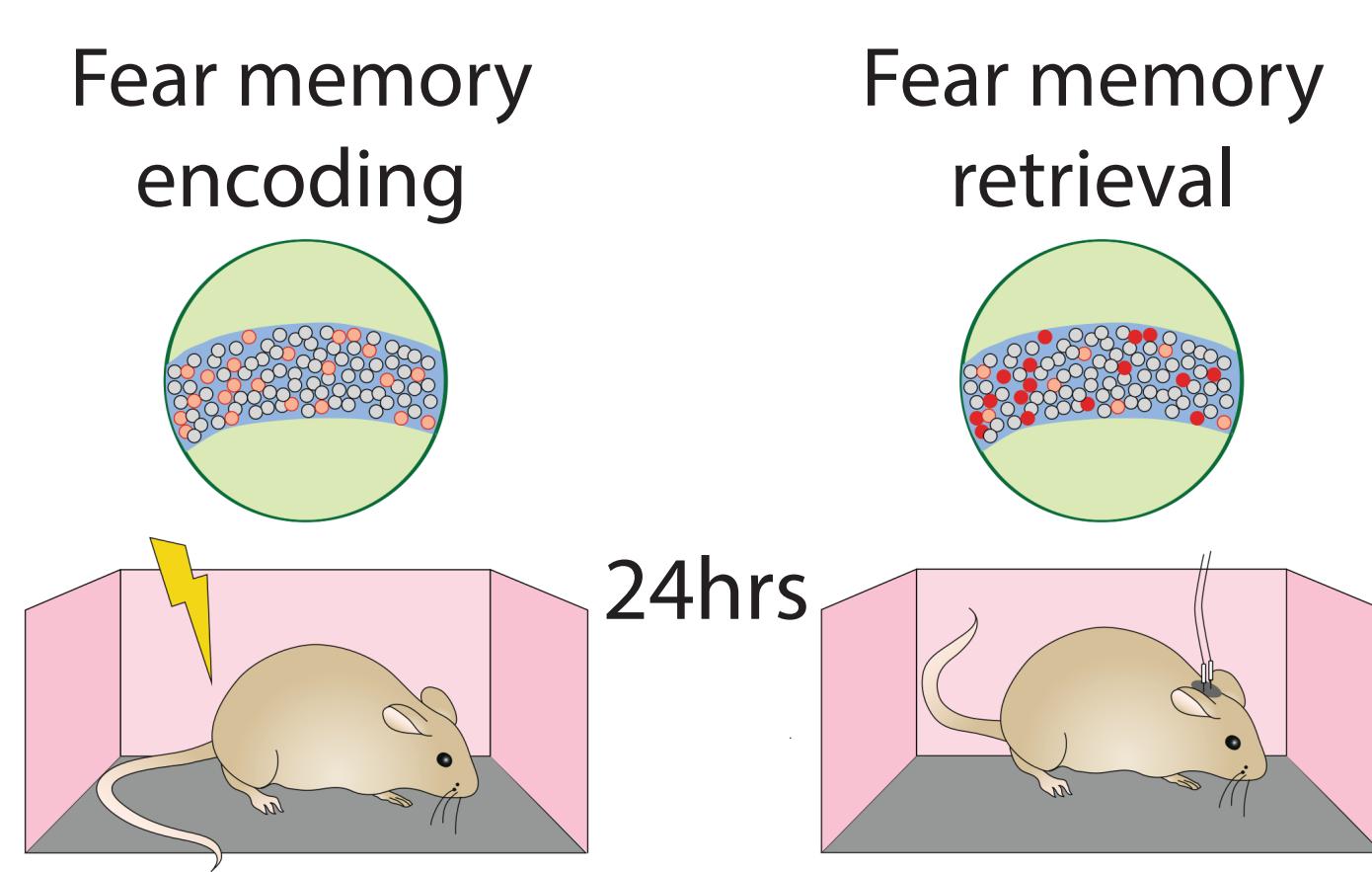
Augustin C. Hennings*, Mason McClay, Jarrod A. Lewis-Peacock, & Joseph E. Dunsmoor

Institute for Neuroscience, The University of Texas at Austin

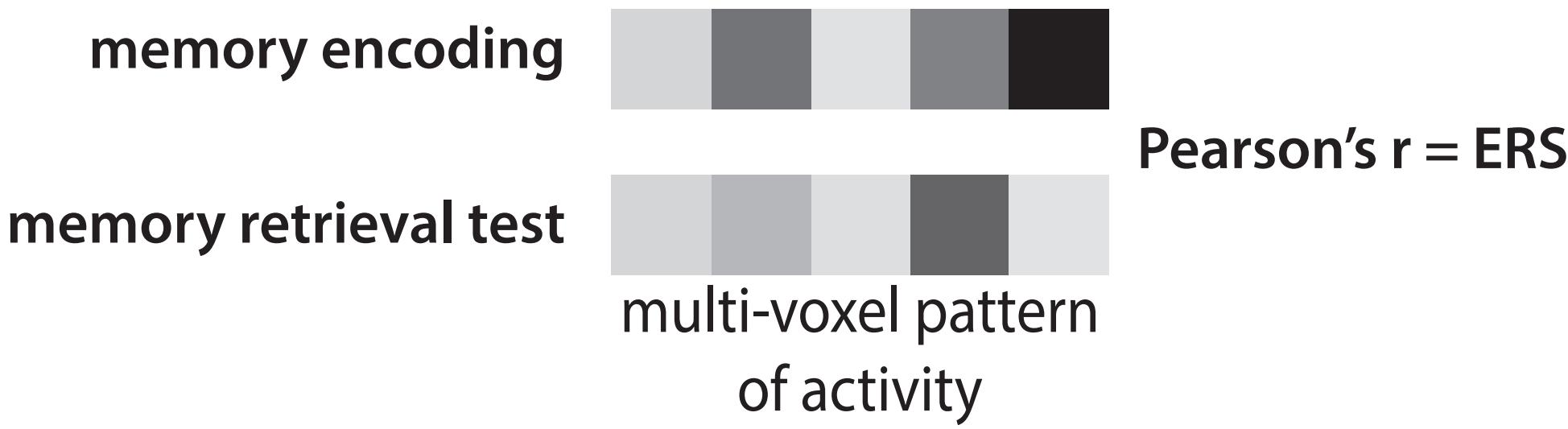
1. INTRODUCTION

Background

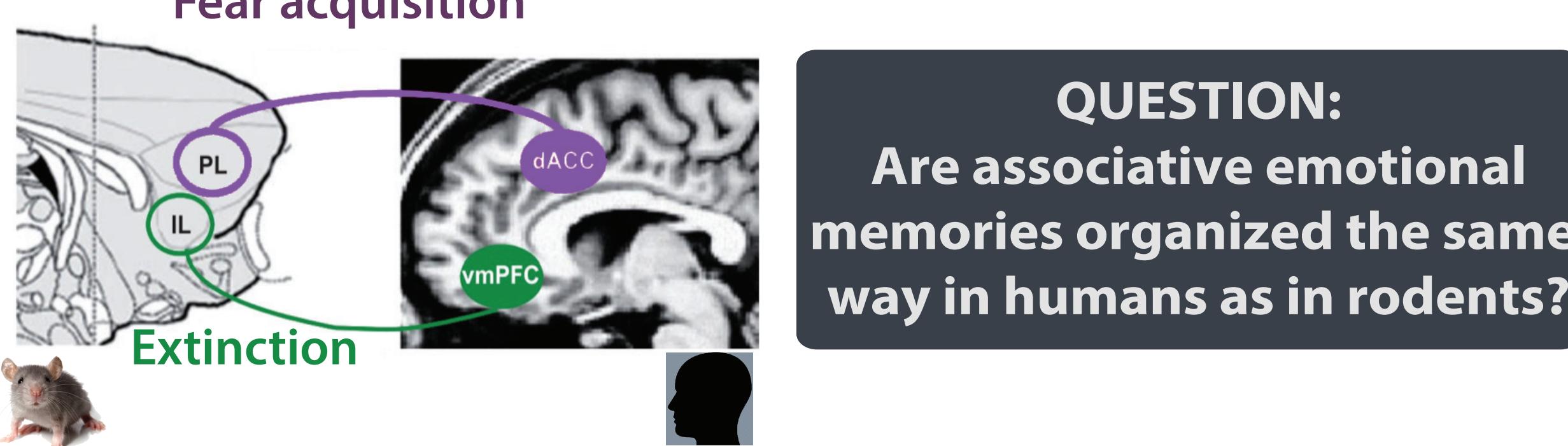
Specificity of neural coding



Reinstatement in the human brain



Dual role of PFC in emotional memory



Hypotheses

There will be a double dissociation of emotional memory reinstatement in the PFC

Individuals with PTSD will display dysregulated reinstatement of emotional memories across these regions

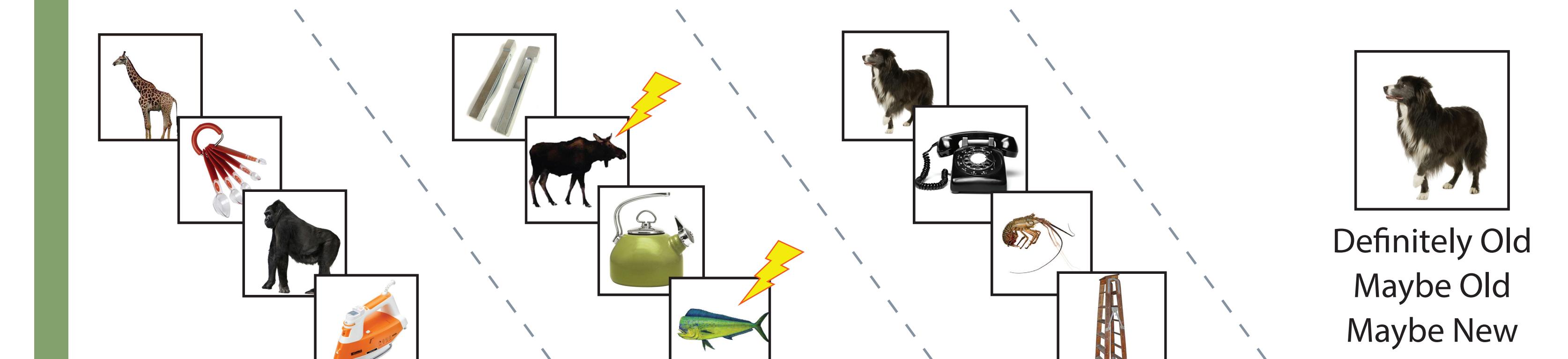
2. METHODS

N=24 Healthy adults, N=24 Individuals with PTSD

2-day fMRI study, TR = 2s, 3mm³ resolution. Imaging data preprocessed with fMRIPrep, cortical ROIs defined from meta-analyses, 10mm spheres restricted to grey matter. Freesurfer parcellations used for subcortical ROIs

Episodic-associative hybrid task

Baseline → Fear acquisition → Extinction → Surprise Recognition Memory Test 24hrs



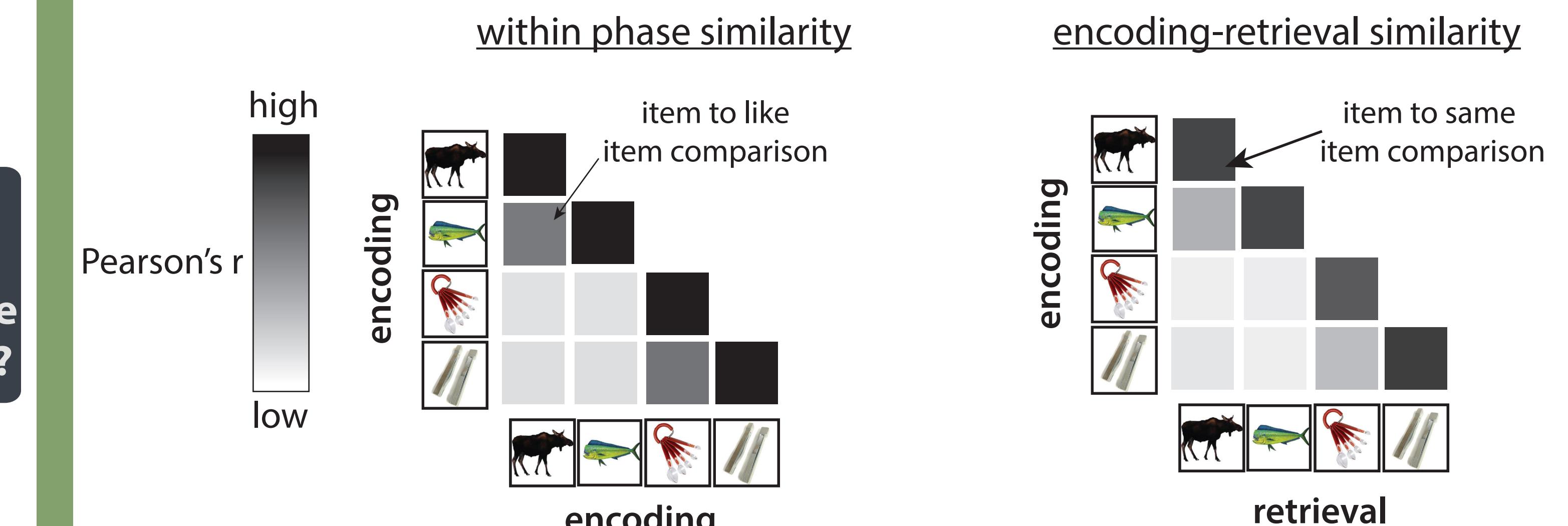
CS+ CS- = Animals, Tools ⚡ 50% CS+US reinforcement

Unique exemplars are encoded in distinct emotional contexts - "engram tag"

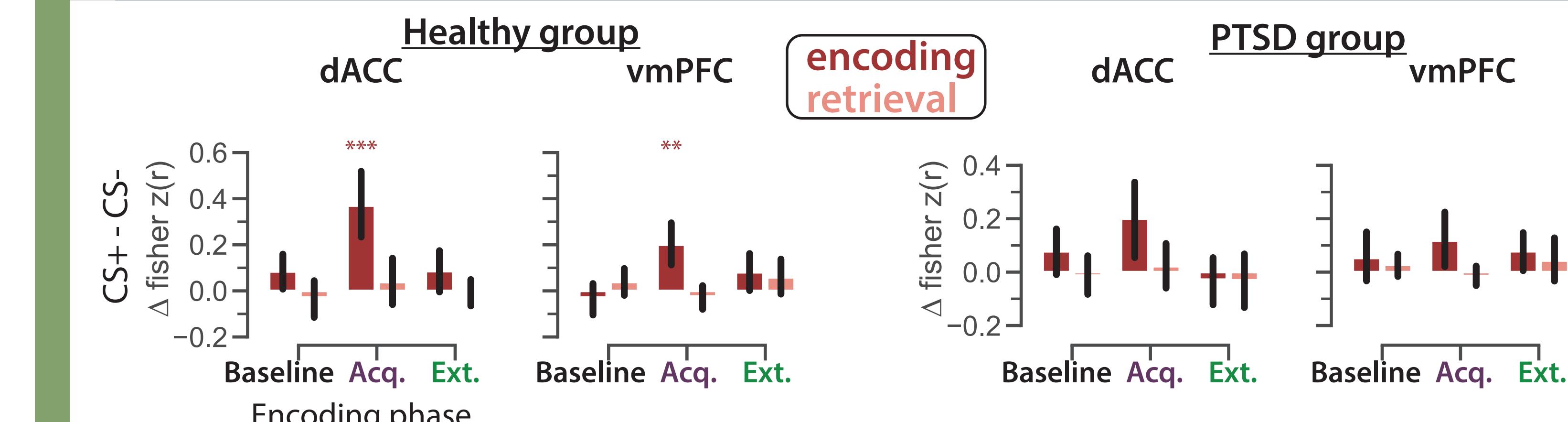
Each episodic memory has 1 emotional association (none, fear, or safety)

Memory is probed 24hrs later, with no threat of shock

Quantifying representational similarity



PFC is sensitive to emotional memories during encoding



CONCLUSIONS

Healthy adults exhibit a double dissociation of associative emotional memory reinstatement in the PFC

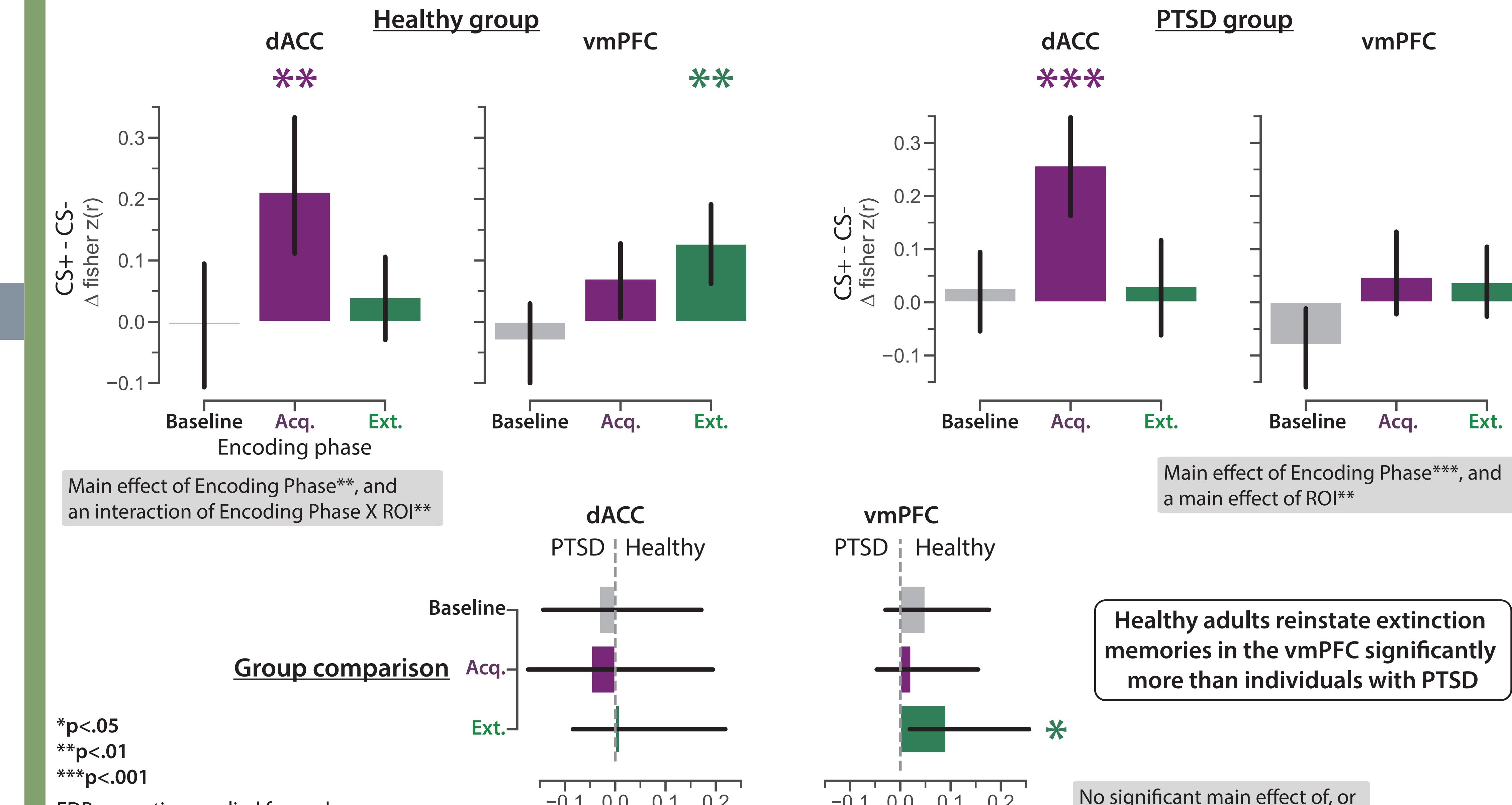
Individuals with PTSD display dysregulation of emotional memory reinstatement in the PFC

Distinct organization of opposing emotional memories in the PFC may be adaptive in healthy adults, may prevent memories from being overwritten

References
Frankland, et al., (2019). Nature Neuroscience.
Quirk & Mueller (2008). Neuropsychopharmacology.
Ritchey, et al., (2013). Cerebral Cortex.
Dunsmoor & Kroes, (2019). Current Opinion in Behavioral Science
Funding: NIH/NIMH R01 MH106719

3. RESULTS

Double dissociation of emotional memory reinstatement in PFC



No emotional reinstatement observed in subcortical ROIs

