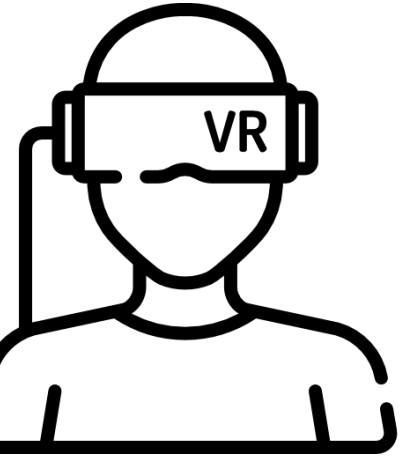


Context Matters: Dissecting Contextual Representations in Human Threat Learning and Memory under Free Behavior



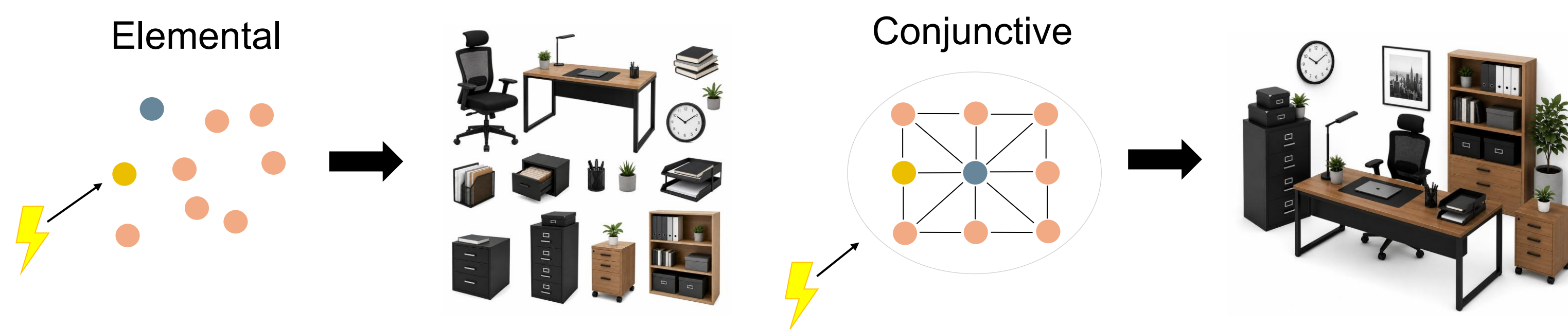
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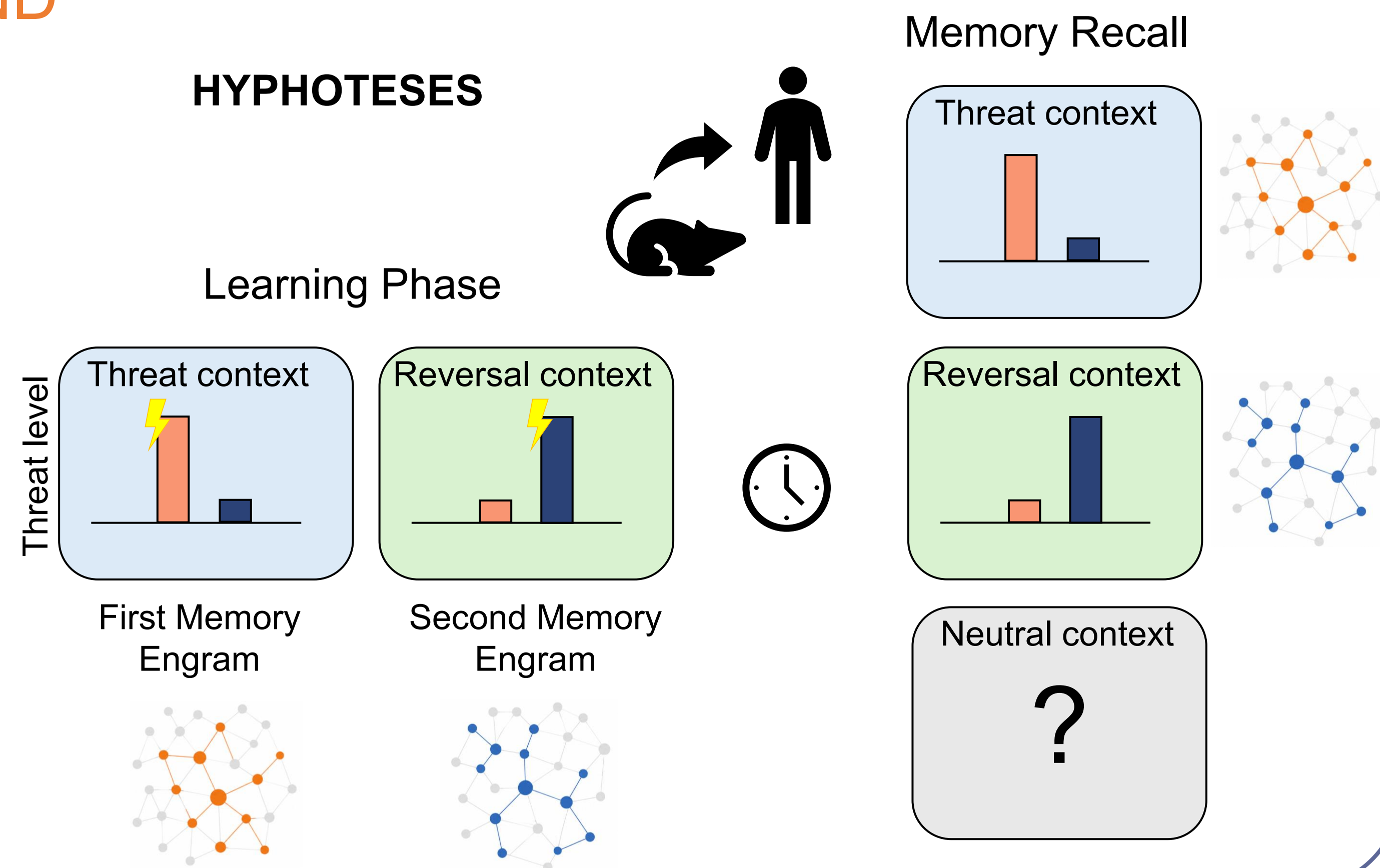
BACKGROUND

- Contextual information is critical for **adaptive defensive responses** and coherent memory retrieval^{1,2}. Contexts may function as retrieval cues that gate the expression of distinct **memory engrams** that dynamically **compete** during retrieval^{3,4}.
- Dual process theory**: animal studies have shown that contexts can be represented as a set of independent features (**elemental** representation), or these features can be bound into a coherent, hierarchical representation that functions as a unit (**conjunctive** representation)⁵.



Using immersive VR and active exploration, the current study investigates how contextual representations shape human defensive states and threat memory.

HYPHOTESSES



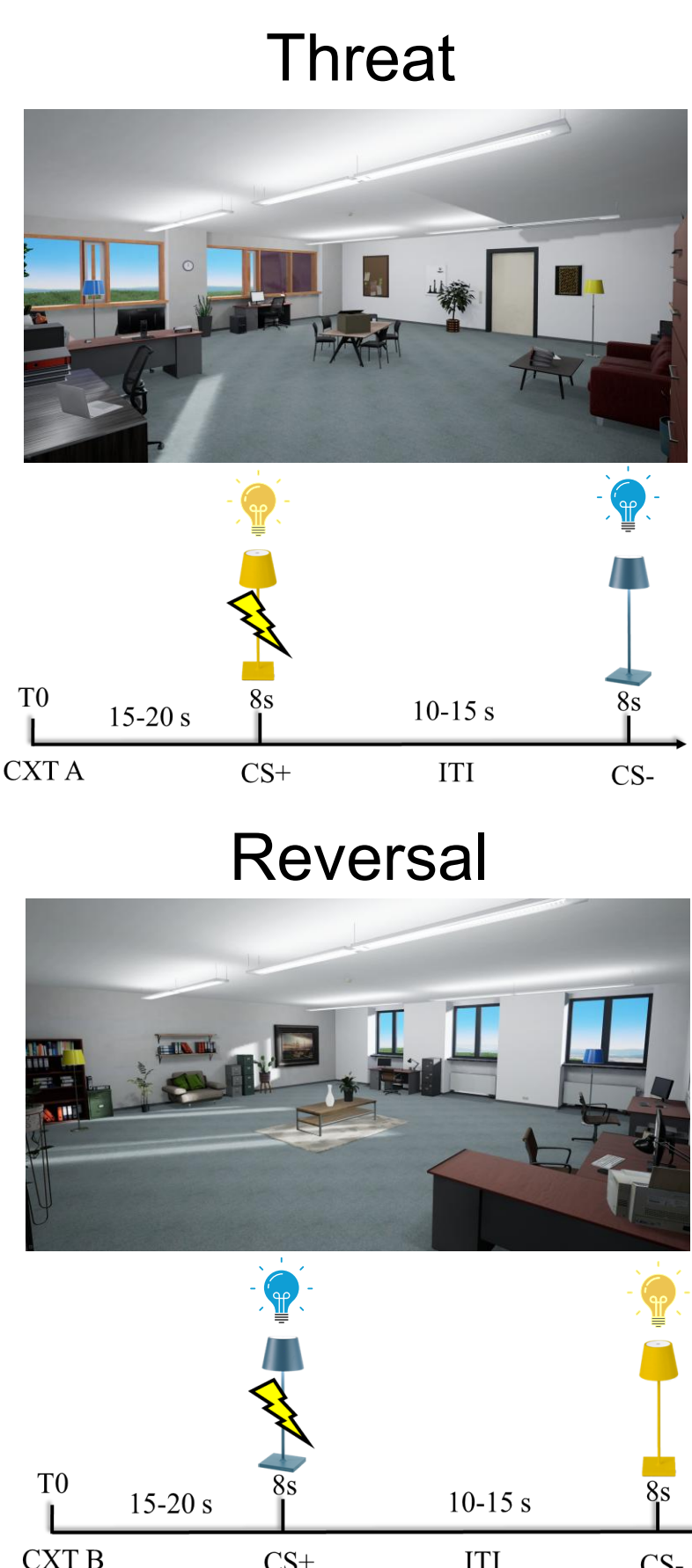
METHODS

DAY 1

Context Encoding



Context-Dependent Acquisition



Sample: N = 72 (38 males; M-age = 25.6 years)

DAY 2

Free - Behavior Retrieval



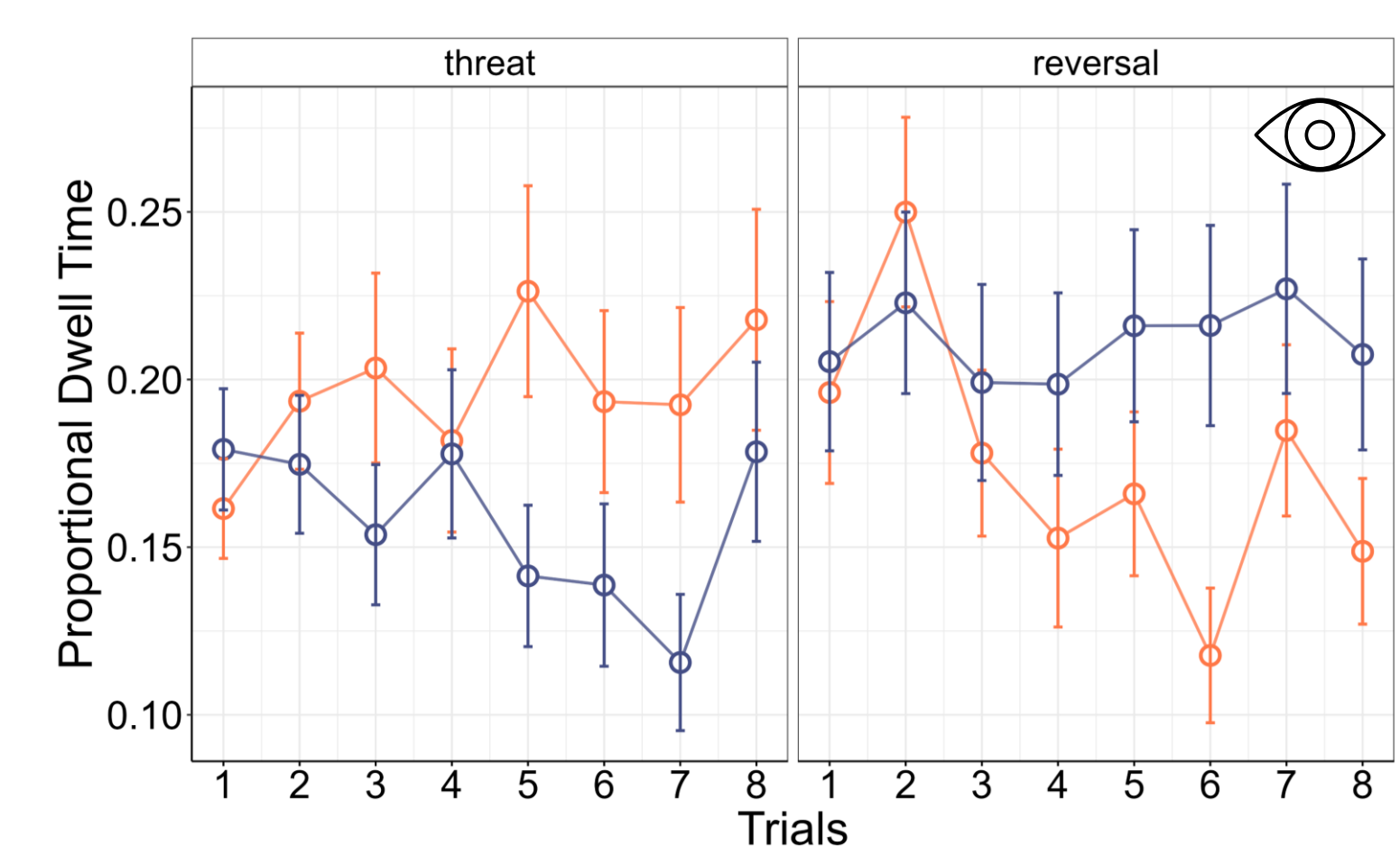
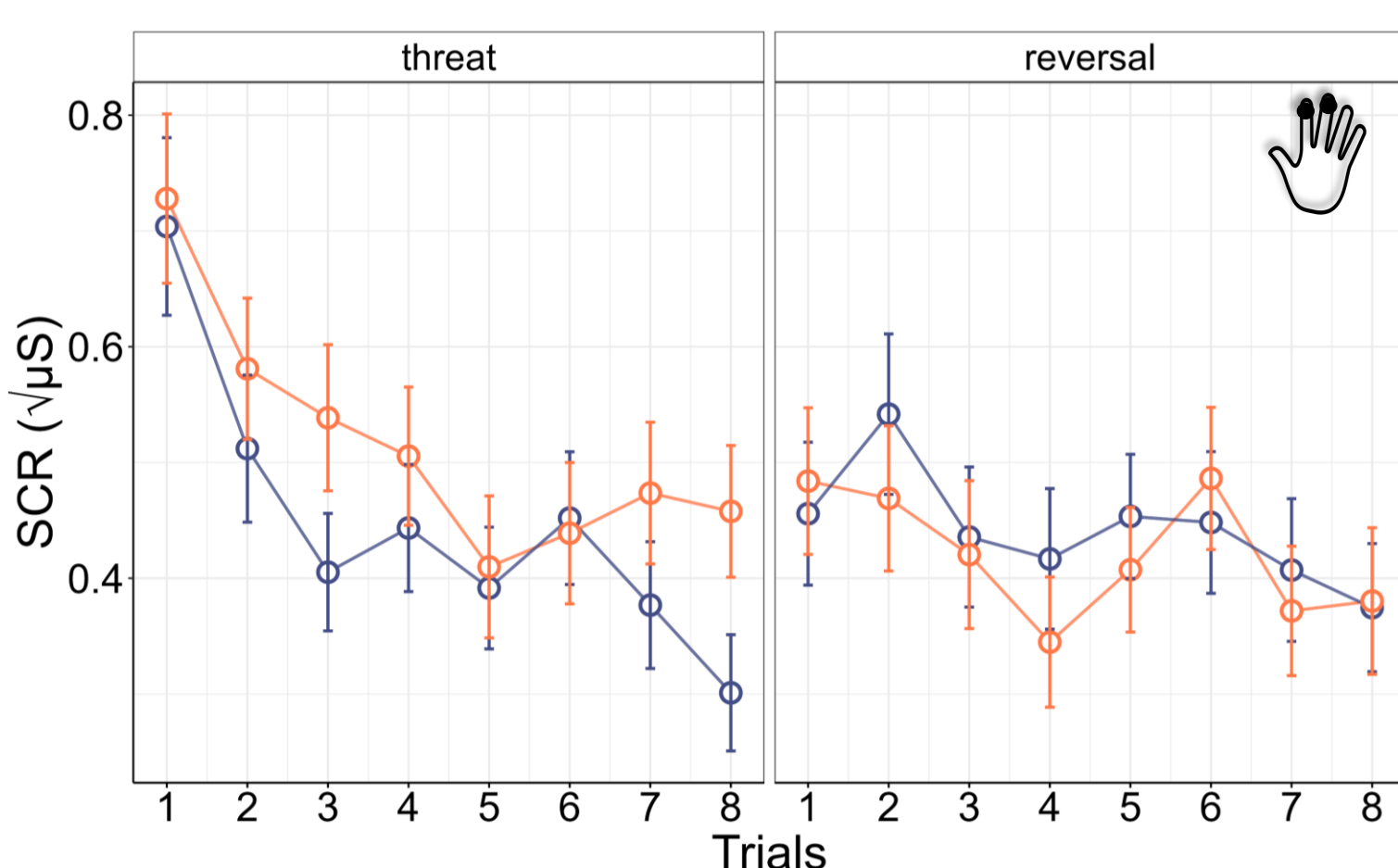
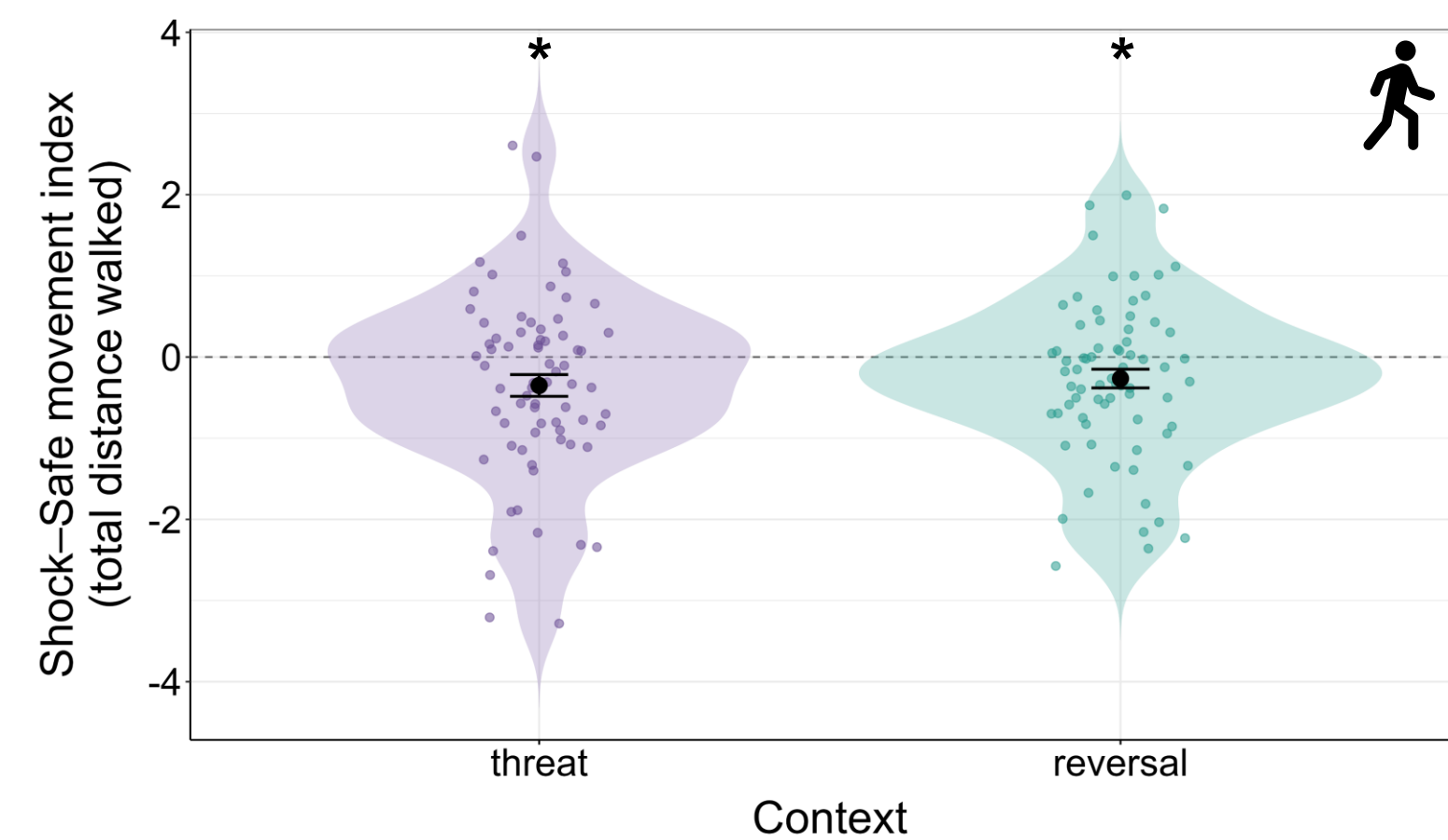
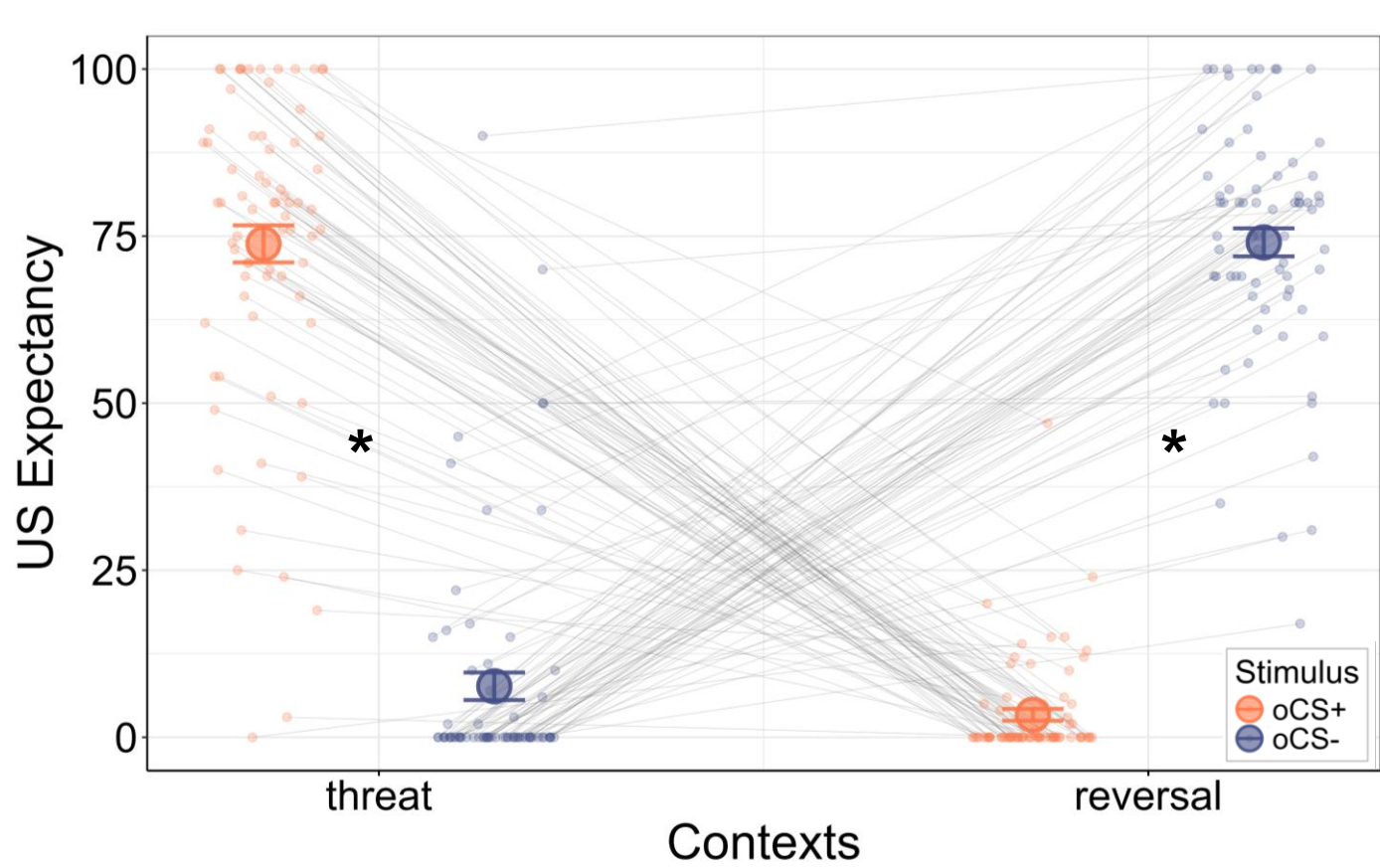
KEY TAKEAWAYS

- Using immersive VR and free behavior, we demonstrated that humans acquire complex contextual threat learning, with physiological, attentional, and spontaneous freezing-like behavioral responses dynamically shaped by contextual representations.
- Memory retrieval emerged as an active and context-dependent process that depends on both previously encoded experiences and the information available at the moment of recall.
- In the neutral context, conjunctive representations appeared to suppress the perceived threat value of individual cues at the subjective, but not the behavioral, level.

RESULTS

* $p < .05$

DAY 1



Context x stimulus $F(1, 71) = 4.37, p = .040, \eta_p^2 = .06$

Context x stimulus $F(1, 71) = 11.74, p = .001, \eta_p^2 = .14$

DAY 2

