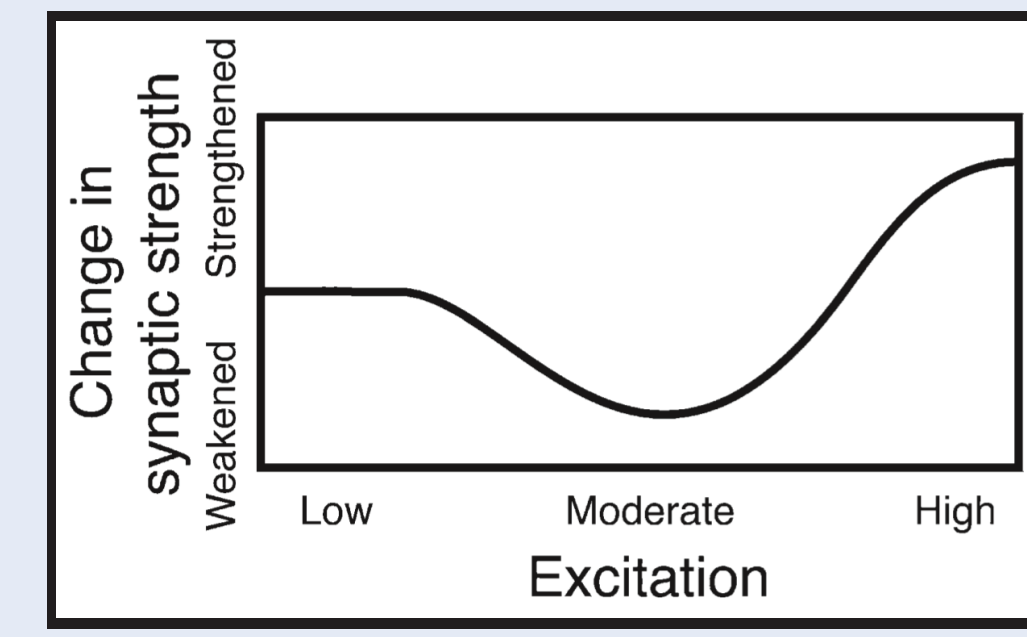


Suppression of word-scene paired associate memories using an RSVP task

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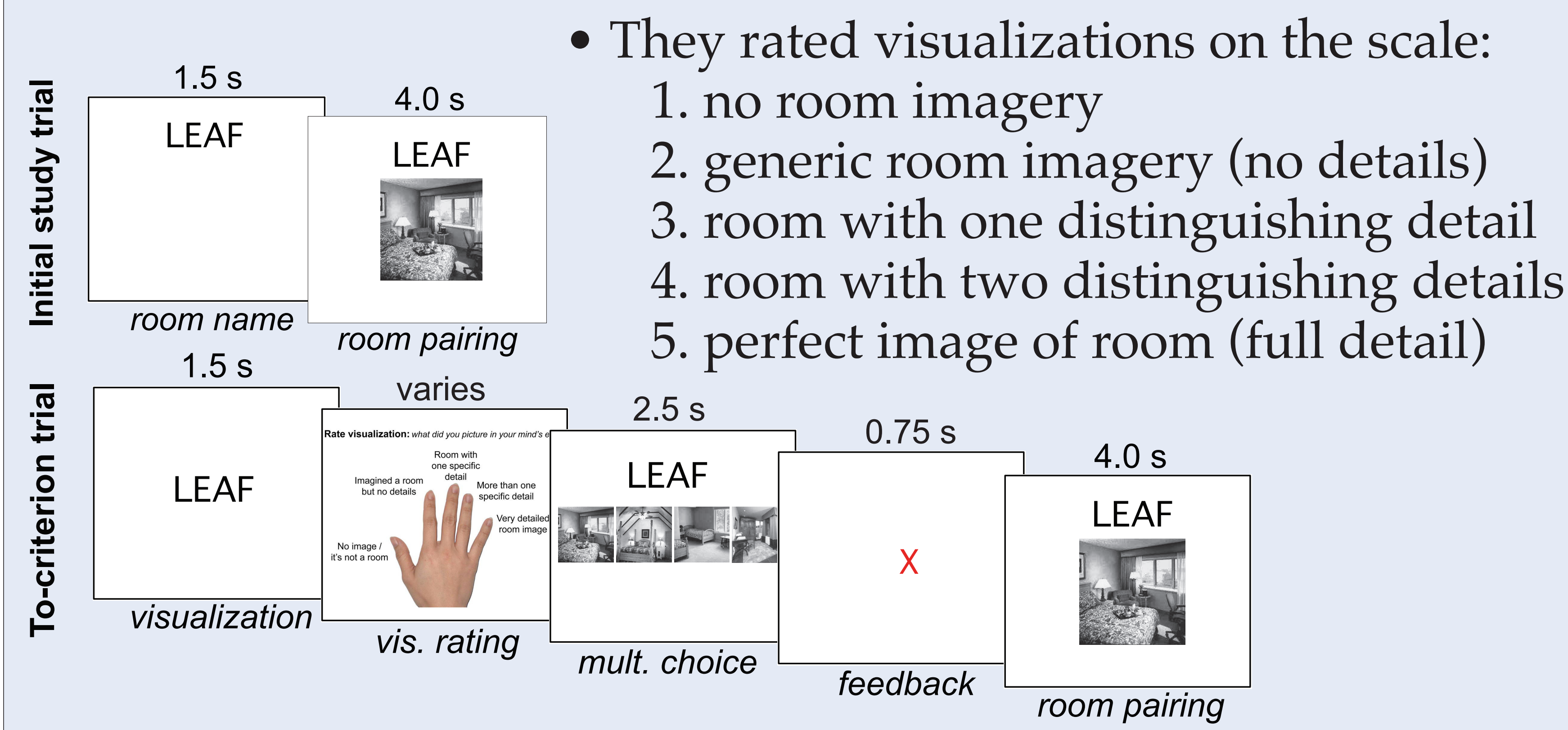
Introduction

- The nonmonotonic plasticity hypothesis posits that moderate levels of memory reactivation lead to weakening of the reactivated memory.
- One recent human EEG experiment illustrated a link between intermediate levels of stimulus activity in a trial and negative priming in that trial (Newman & Norman, 2010).
- We searched for weakening that could be detected long after interventions that elicited moderate memory reactivation.

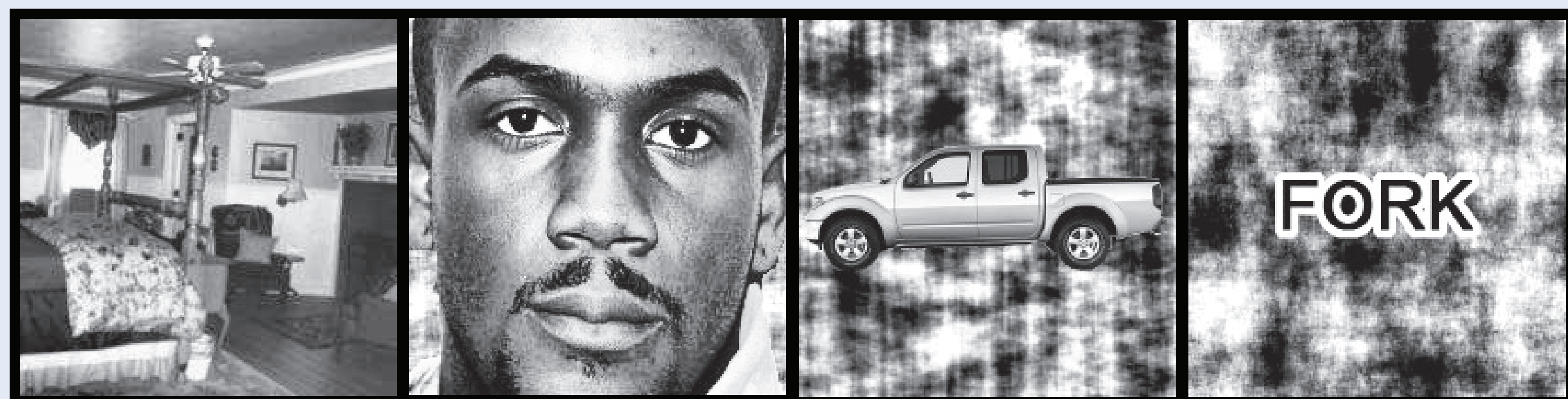


Phase 1. Word-room associate learning

- Exp 1: $n=7$ healthy English-native adults (5 F, mean age 22.1)
- Exp 2: $n=16$ healthy English-native adults (5 F, mean age 20.9)
- P_s studied the “names” of 30 hotel rooms and practiced visualizing the rooms when provided with the names.
- They completed a multiple choice room test, with feedback, which continued until they correctly identified all rooms.

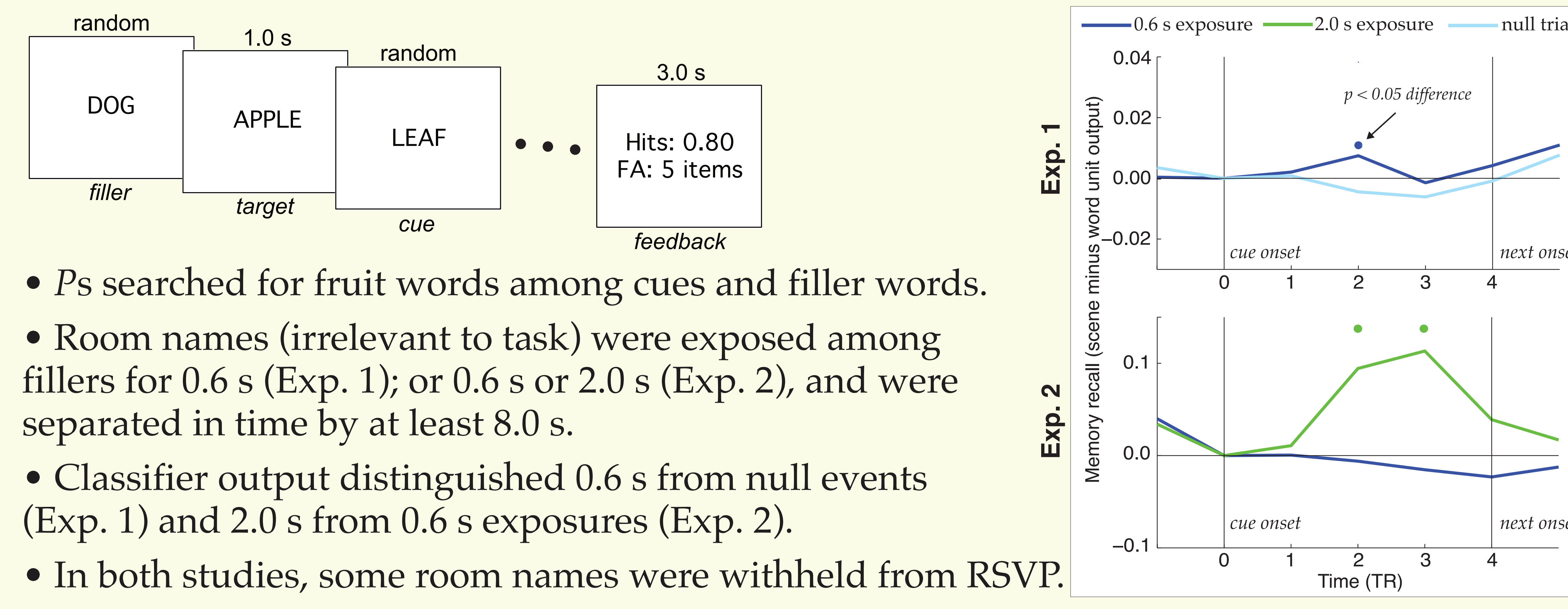


Phase 2. Classifier training (fMRI)

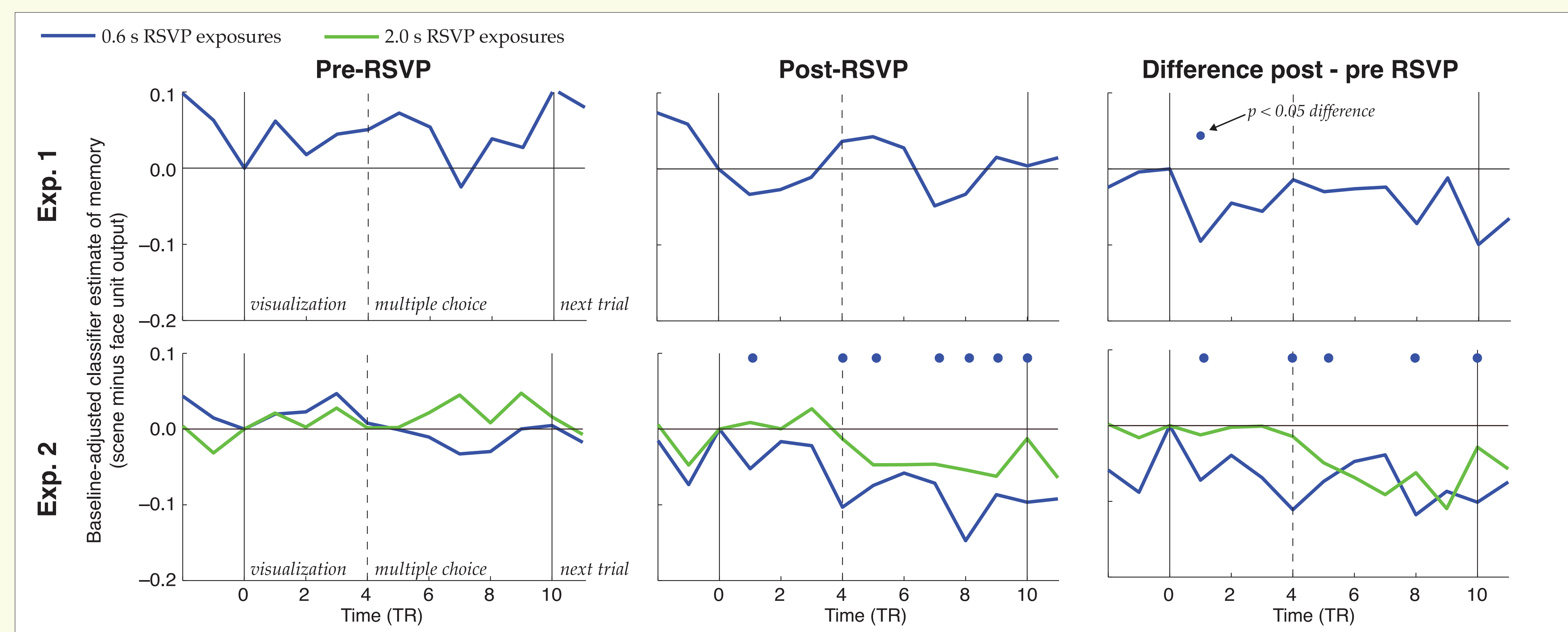
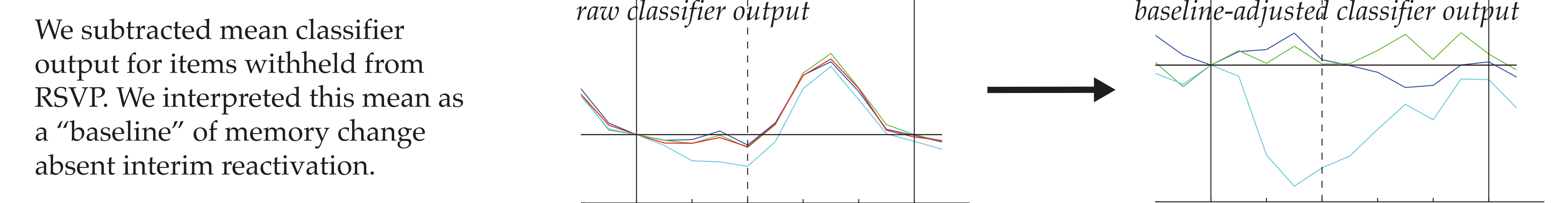
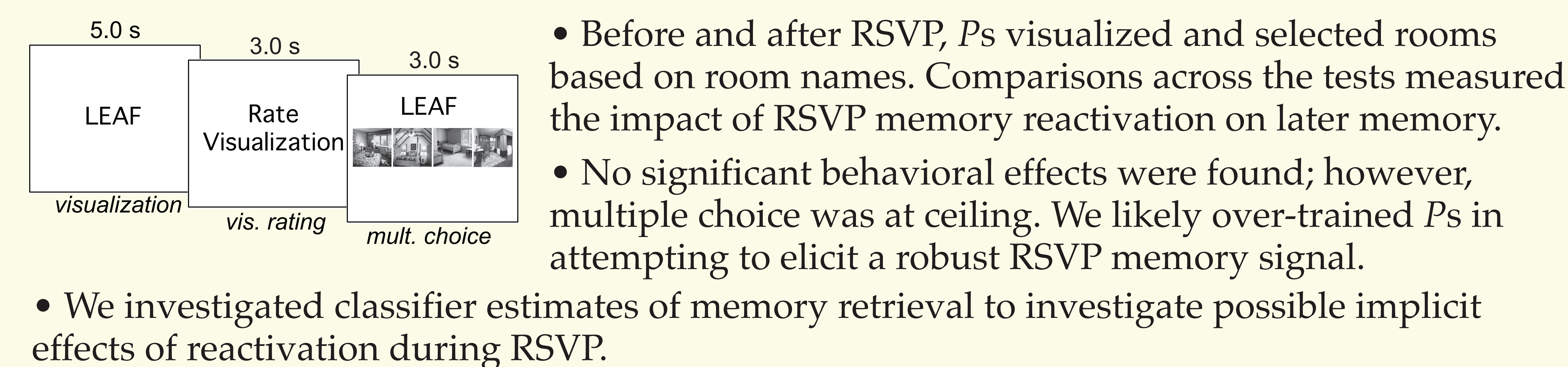


- P_s identified repeated images within blocks of room, face, car or word images.
- For analysis, we inclusively masked FFG and PHG voxels using segmentations based on participants’ own anatomies.
- Training parameters: ridge regression classifier, $\lambda=10$, six cross-validation folds (mean accuracy = 0.83).

Phase 4. RSVP memory reactivation (fMRI)



Phases 3 and 5. Memory test (fMRI)

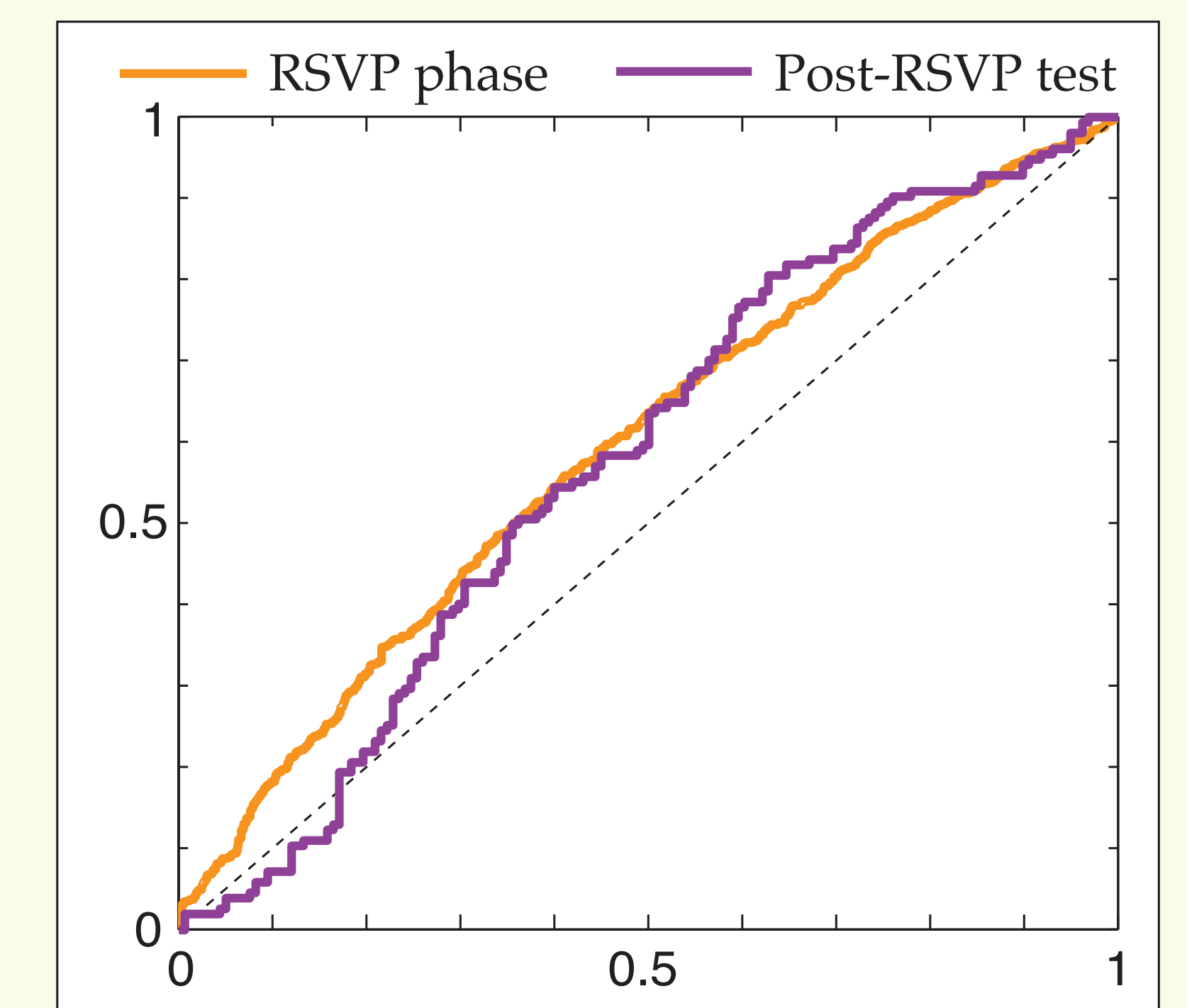


- In both experiments, 0.6 s exposures during RSVP later led to significant weakening of classifier memory signal, whereas 2.0 s exposures did not.

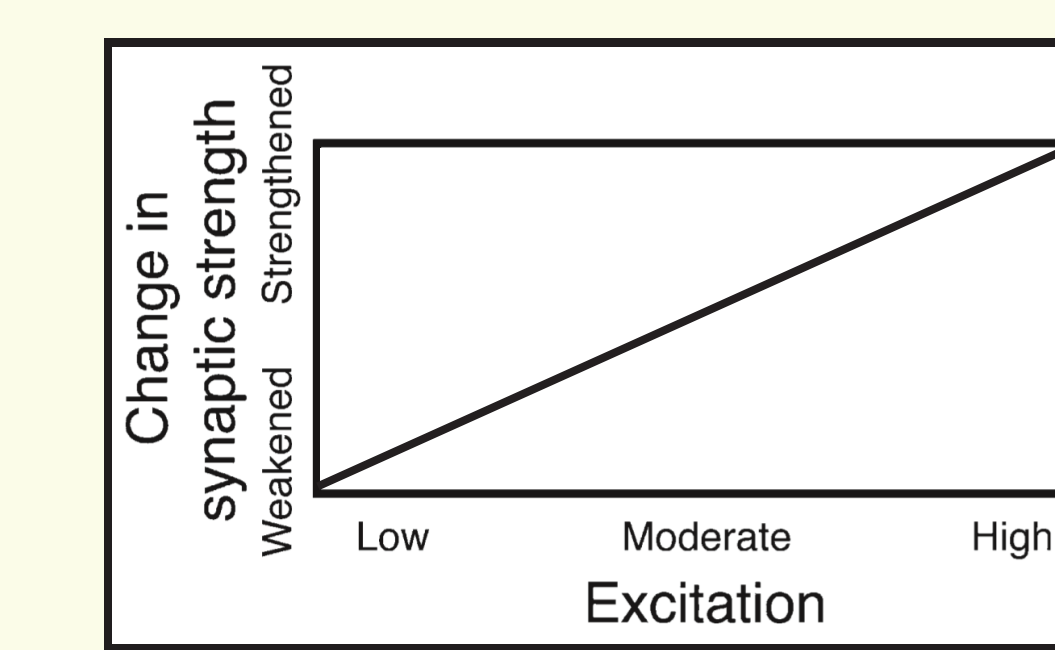
Next steps: fitting a plasticity curve

- Our classifier measured different amounts of memory reactivation associated with different exposure durations.
- Our classifier measured weaker memory reactivation following short RSVP cue exposures relative to longer RSVP cue exposures and cues withheld from RSVP.
- Given that we can measure degree of memory reactivation as well as its putative impact on later memory reactivation, can we now fit a continuous function that describes this impact?

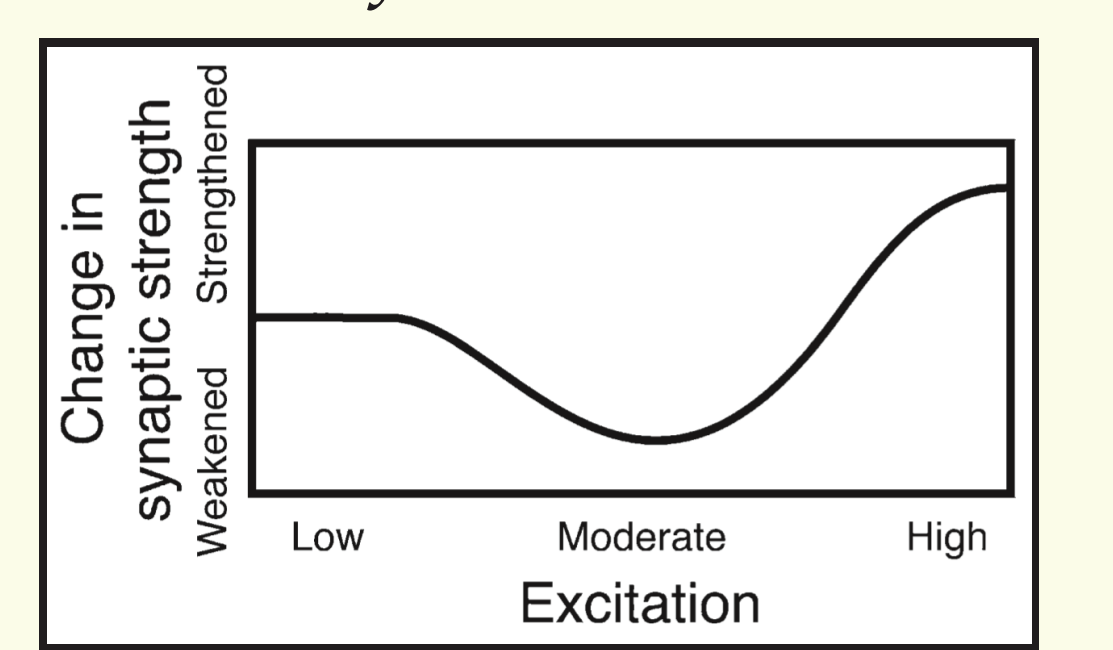
Short vs. long-duration room names: distinguishability in RSVP and at test (ROC curve)



Monotonic learning function



Non-monotonic learning function



Conclusions

- By exposing memory cues at short (0.6 s) and long (2.0 s) durations during an RSVP task, we elicited weak and strong memory reactivation, respectively, as measured using a classifier sensitive to the content of the associative memories in our experiment.
- Weaker memory reactivations during RSVP were linked to weaker memory reactivations in a later memory test, whereas strong reactivations during RSVP had no effect.
- These findings are consistent with the nonmonotonic plasticity hypothesis.

References & Acknowledgements

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- Newman, E. L., & Norman, K. A. (2010). Moderate excitation leads to weakening of perceptual representations. *Cereb Cortex*, 20, 2760-2770.