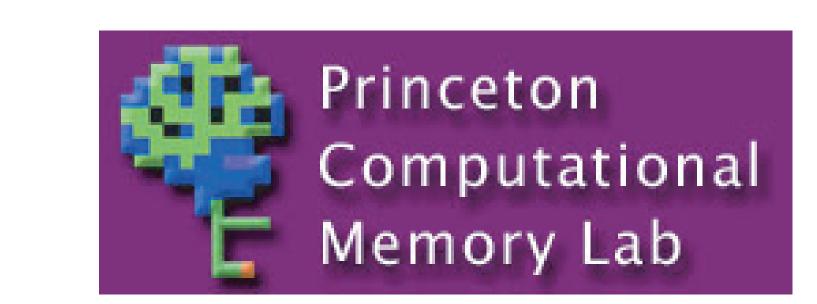


Suppression of word-scene paired associate memories using an RSVP task



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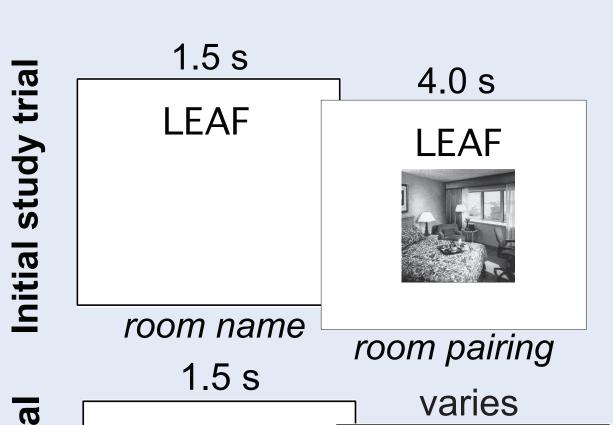
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Introduction

- 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.

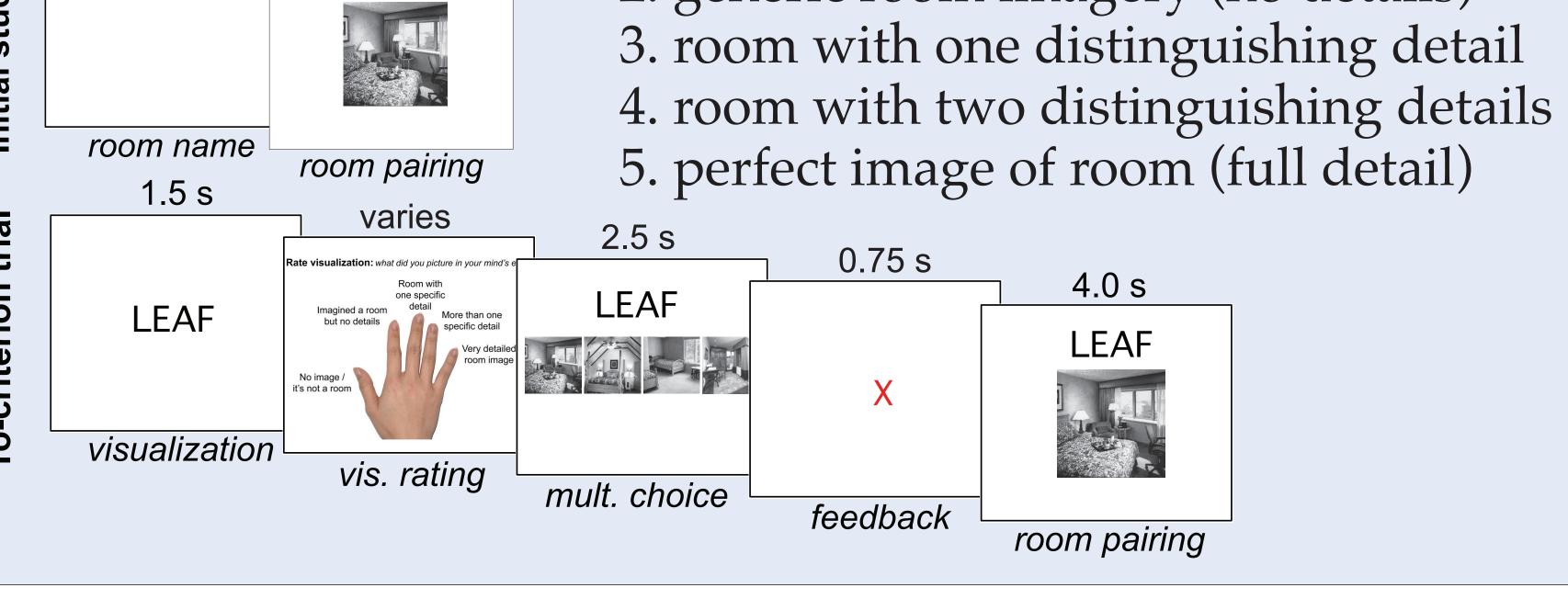
Phase 1. Word-room associate learning

- 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)
- Ps 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.

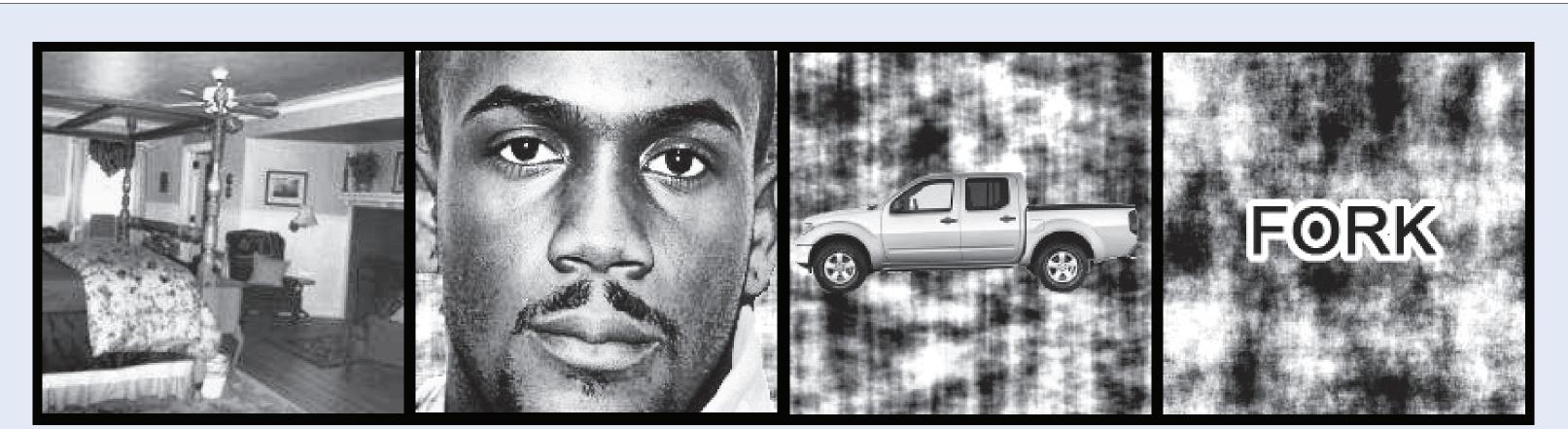


- They rated visualizations on the scale: . no room imagery
 - 2. generic room imagery (no details)
 - 3. room with one distinguishing detail

 - 5. perfect image of room (full detail)

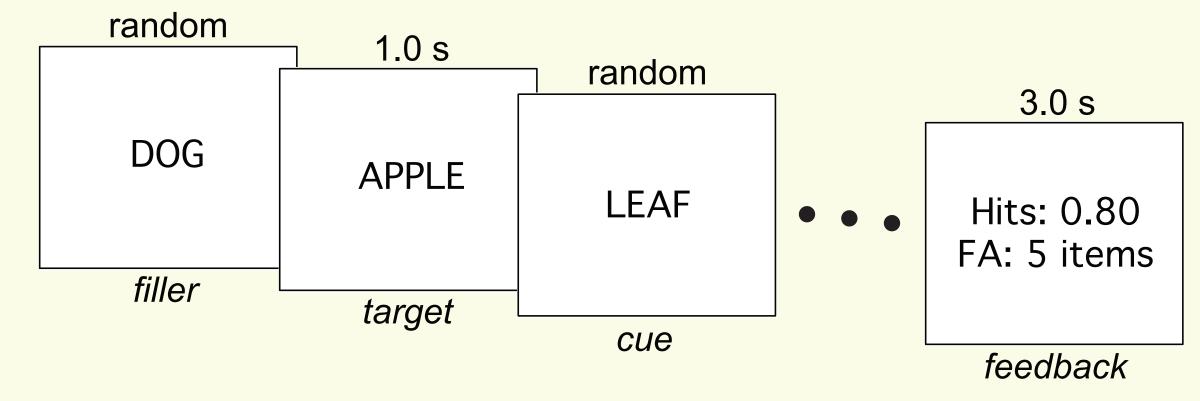


Phase 2. Classifier training (fMRI)

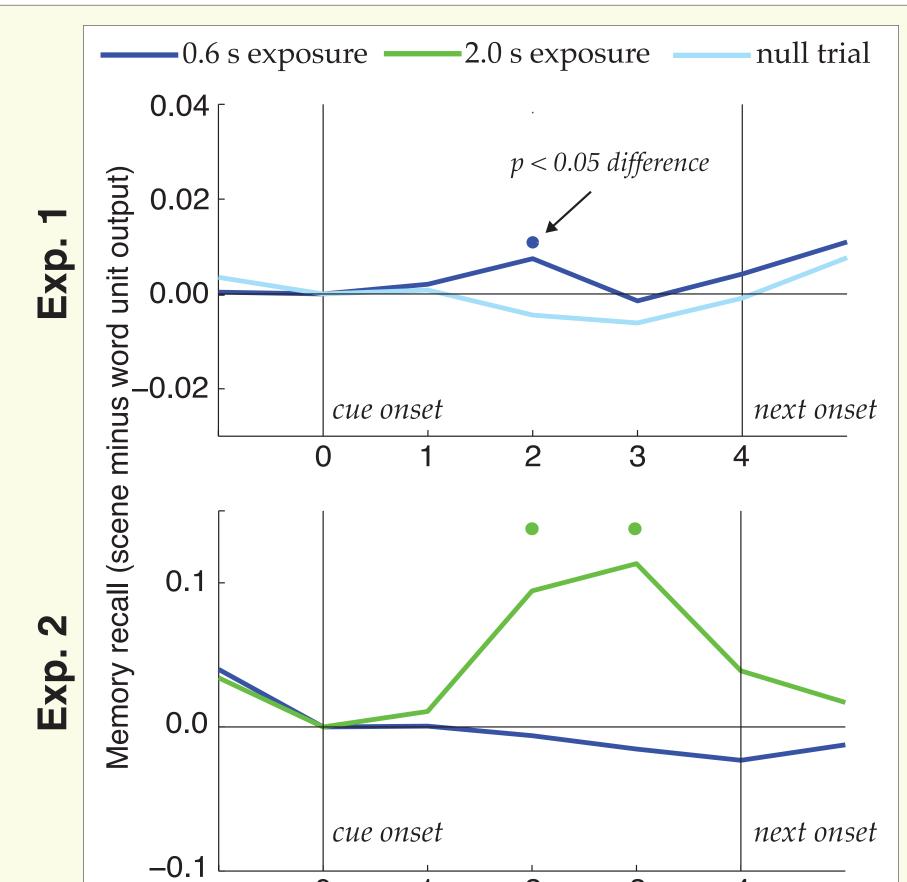


- Ps identified repeated images within blocks of room, face, car or word images.
- For analysis, we inclusively masked FFG and PHG voxels using segmentations based on participants' own anatomies.
- Training parameters: ridge regression classifier, lambda=10, six cross-validation folds (mean accuracy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

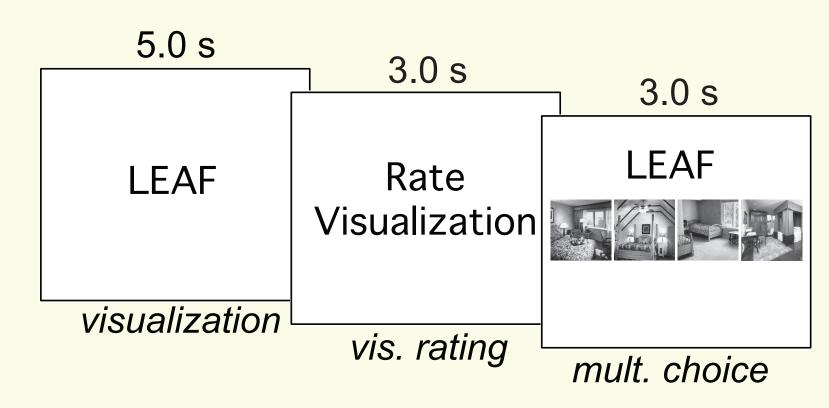
Phase 4. RSVP memory reactivation (fMRI)



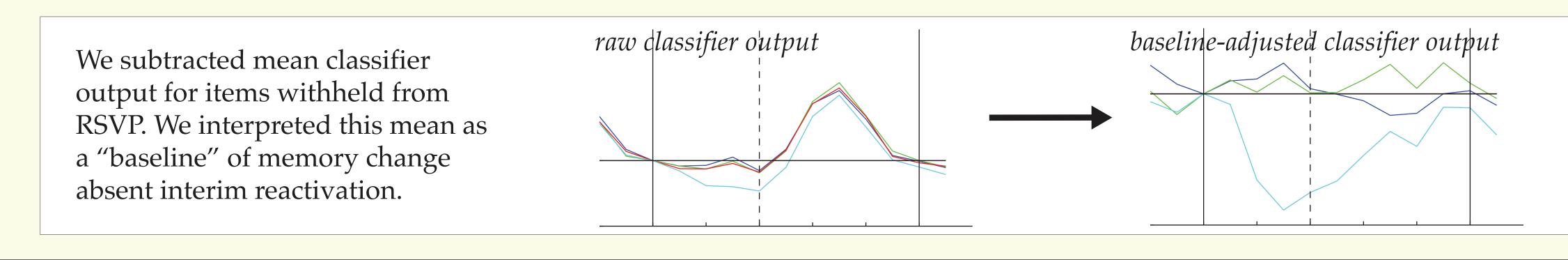
- Ps searched for fruit words among cues and filler words.
- Room names (irrelevant to task) were exposed among fillers for 0.6 s (Exp. 1); or 0.6 s or 2.0 s (Exp. 2), and were separated in time by at least 8.0 s.
- Classifier output distinguished 0.6 s from null events (Exp. 1) and 2.0 s from 0.6 s exposures (Exp. 2).
- In both studies, some room names were withheld from RSVP.

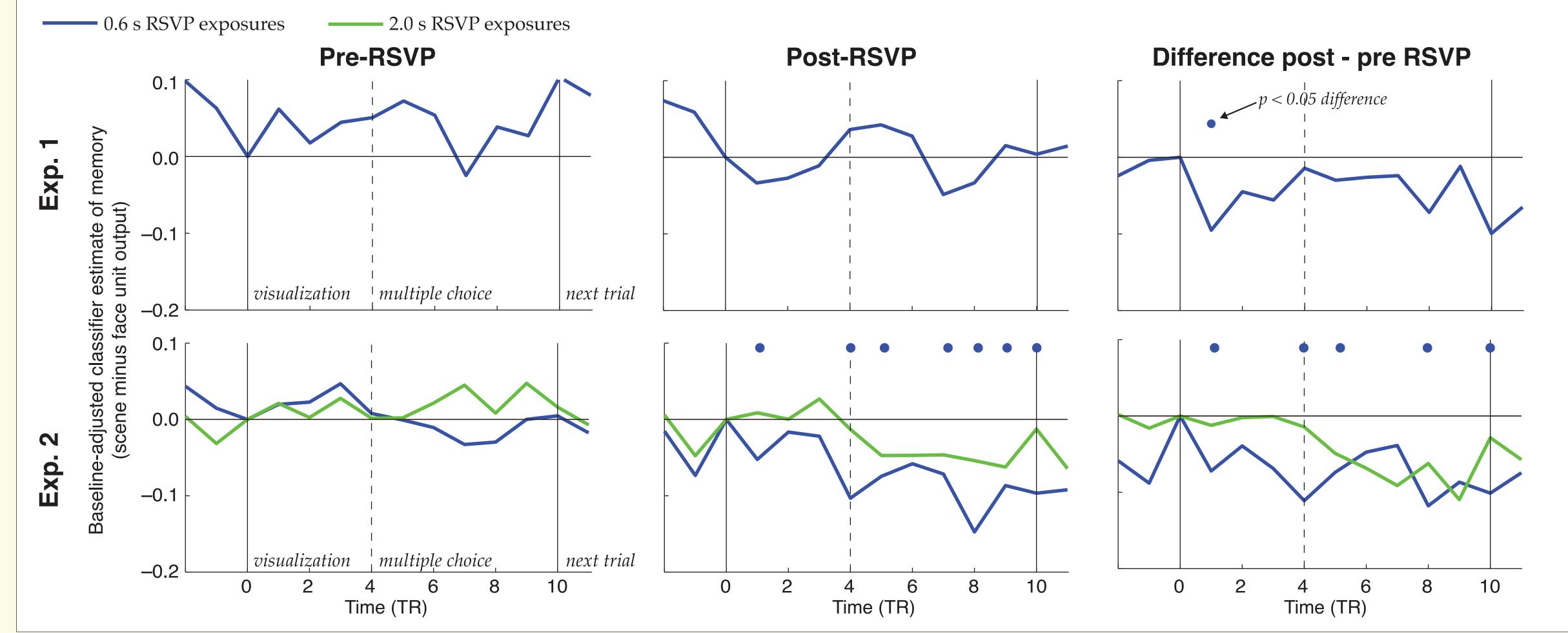


Phases 3 and 5. Memory test (fMRI)



- Before and after RSVP, Ps visualized and selected rooms based on room names. Comparisons across the tests measured the impact of RSVP memory reactivation on later memory.
- No significant behavioral effects were found; however, multiple choice was at ceiling. We likely over-trained Ps in attempting to elicit a robust RSVP memory signal.
- We investigated classifier estimates of memory retrieval to investigate possible implicit effects of reactivation during RSVP.

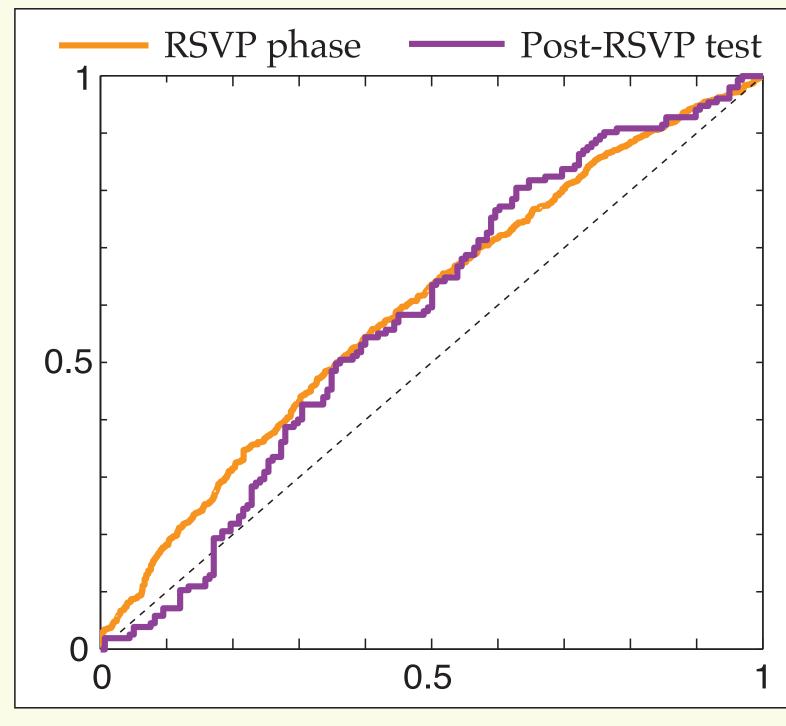




• In both experiments, 0.6 s exposures during RSVP later led to significant weakening of classifier memory signal, whereas 2.0 s exposures did not.

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

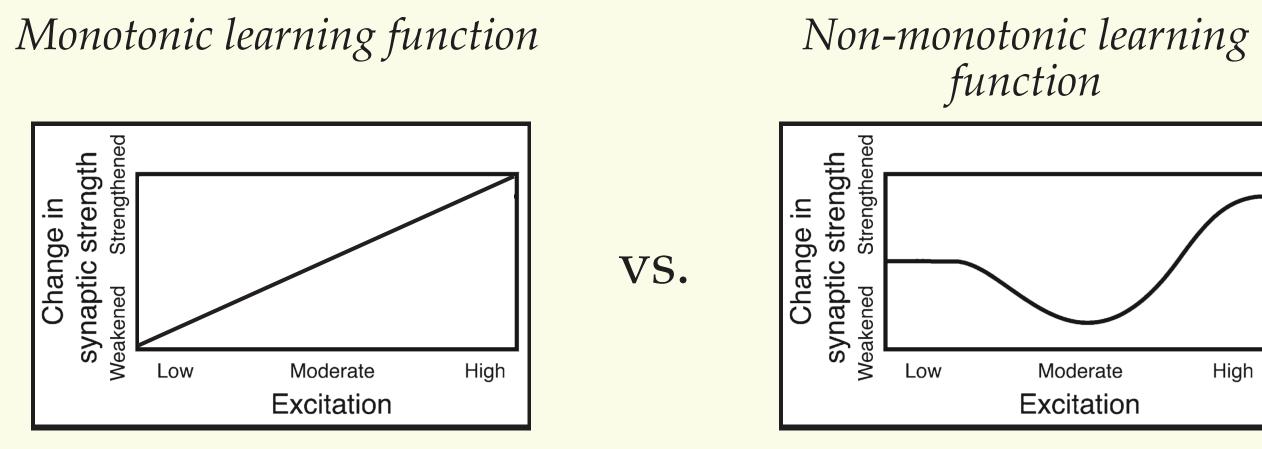


Short vs. long-duration room names:

distinguishability in RSVP and at test

(RÖC curve)

as well as its putative impact on later memory reactivation, can we now fit a continuous function that describes this impact?



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.