

Competitive learning modulates memory consolidation during sleep



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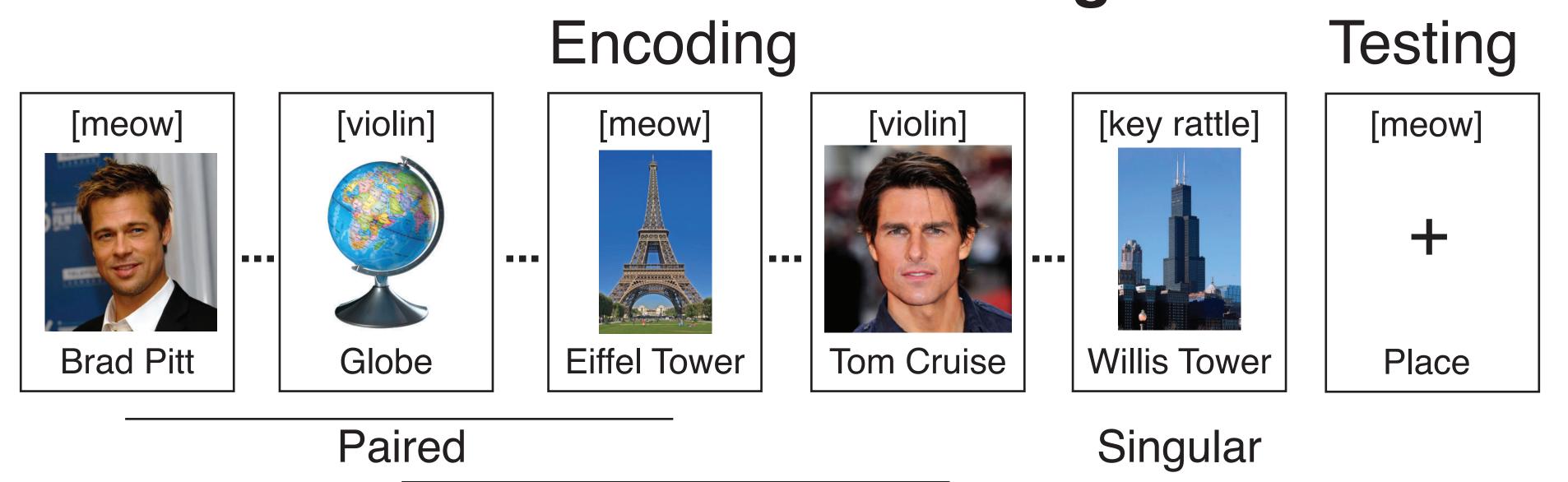
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Sleep matters: New memory traces are reactivated during post-learning sleep (Wilson & McNaughton, 1994).

Competition matters: Competition between memories during wake can cause memory weakening (Norman, Newman, & Detre, 2007; Lewis-Peacock & Norman, 2014).

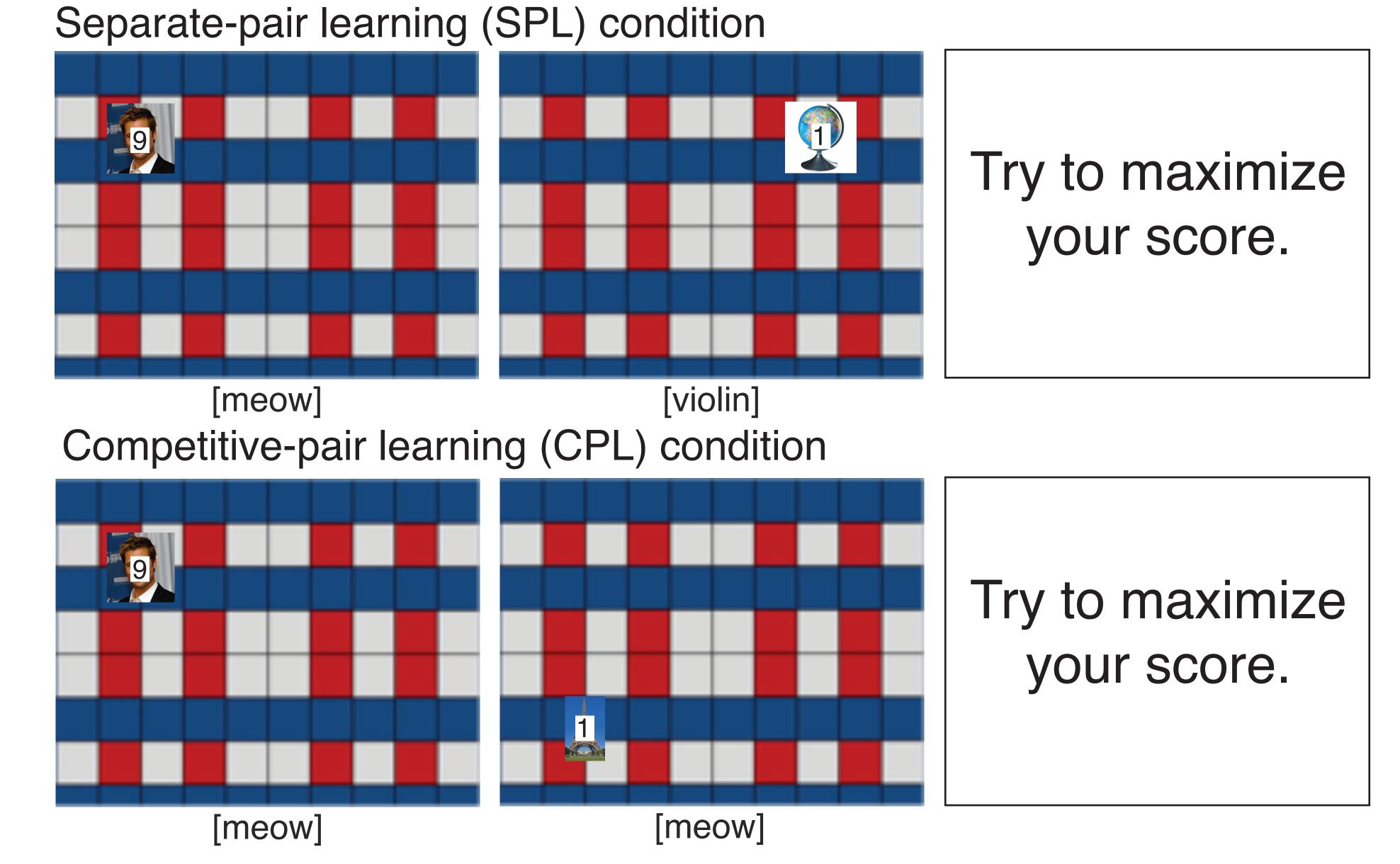
Prediction: When memories compete during wake, cueing them during sleep via targeted memory reactivation (TMR) will rekindle this competition and cause memory weakening.

Phase 1: Sound - item over-learning



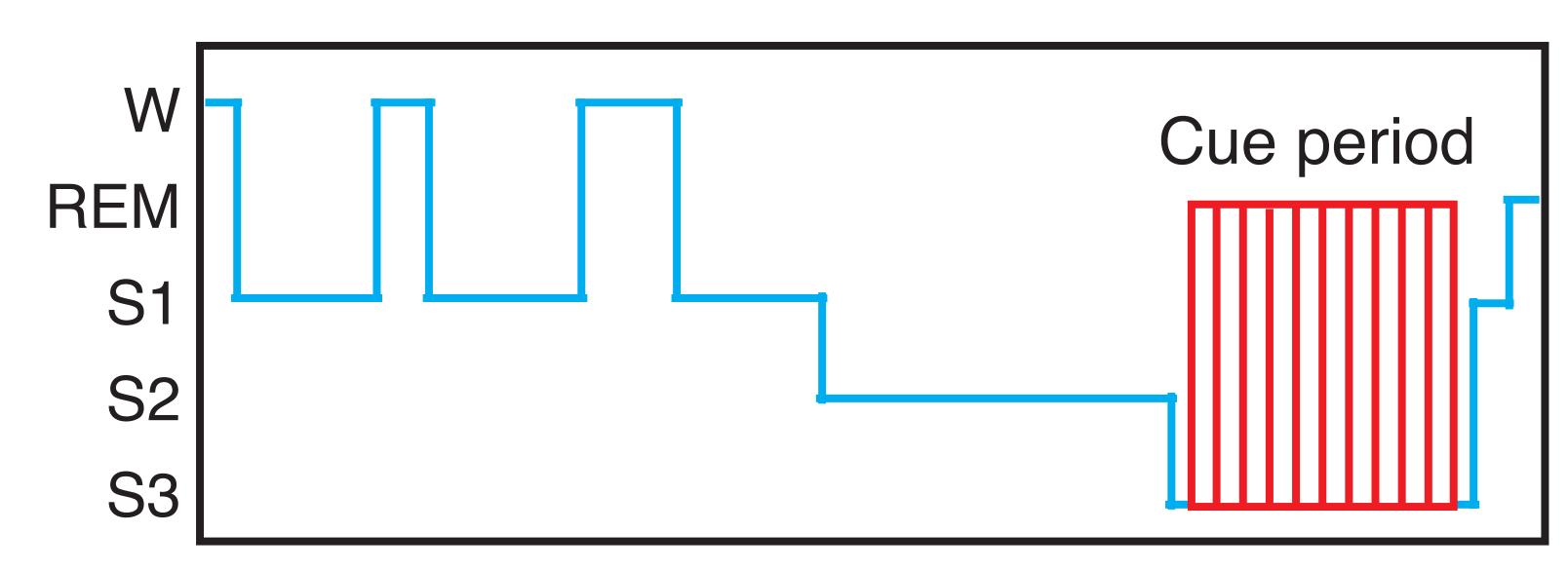
Phase 2: Item - spatial location learning

Paired

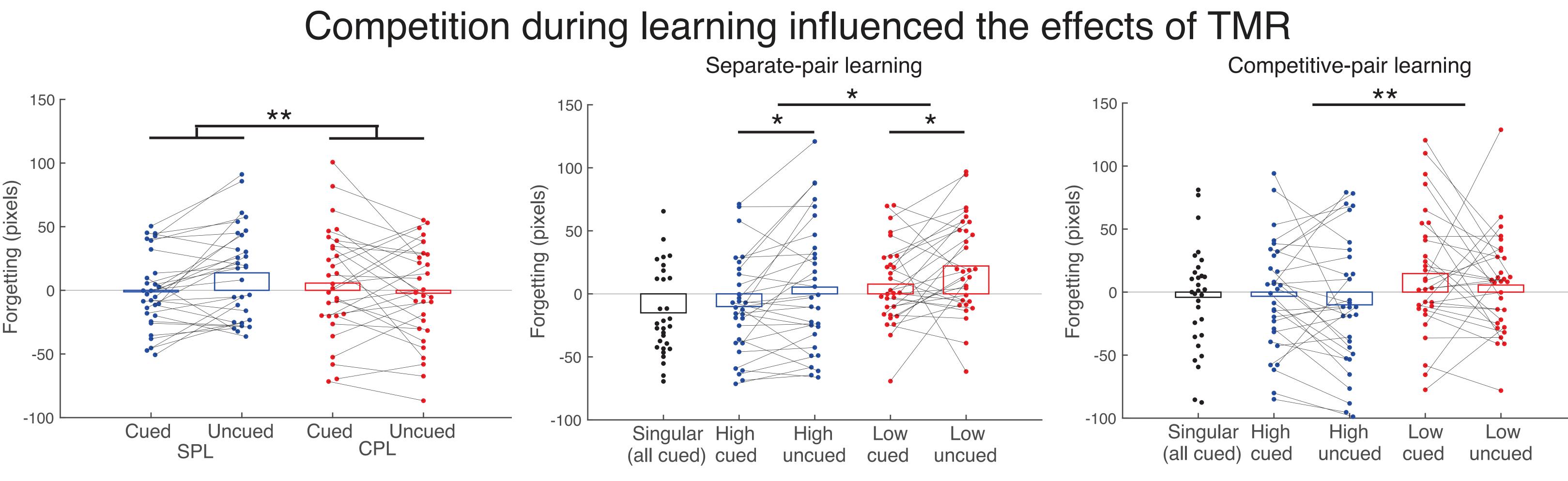


Phase 3: Pre-nap spatial memory test

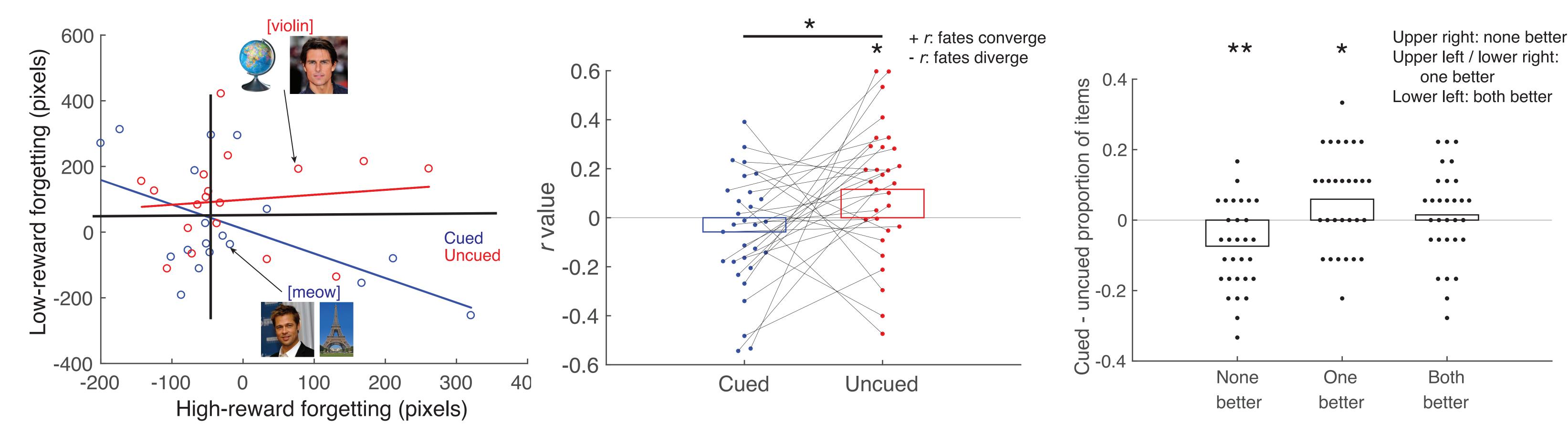
Phase 4: 90-min nap



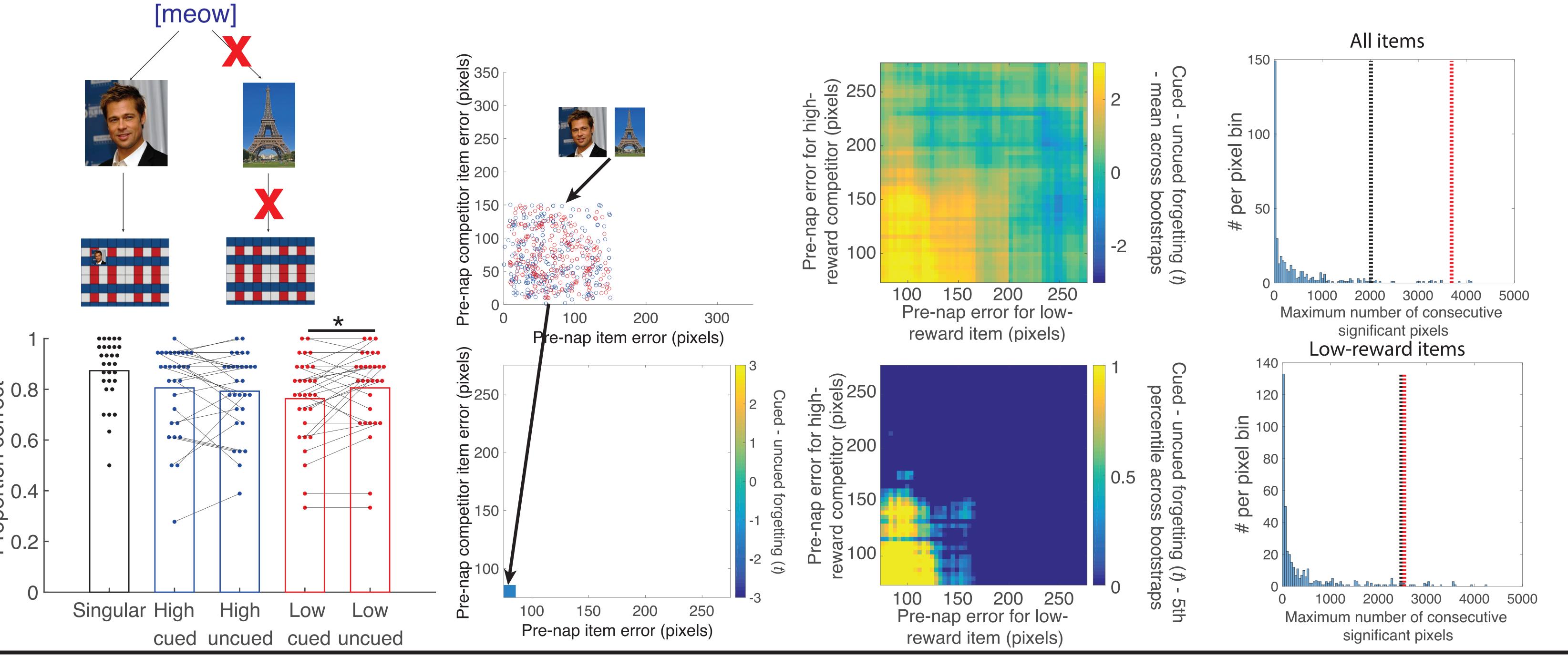
Phase 5: Post-nap spatial + sound-item test



Under separate pair learning, cueing tended to help one item, but not both



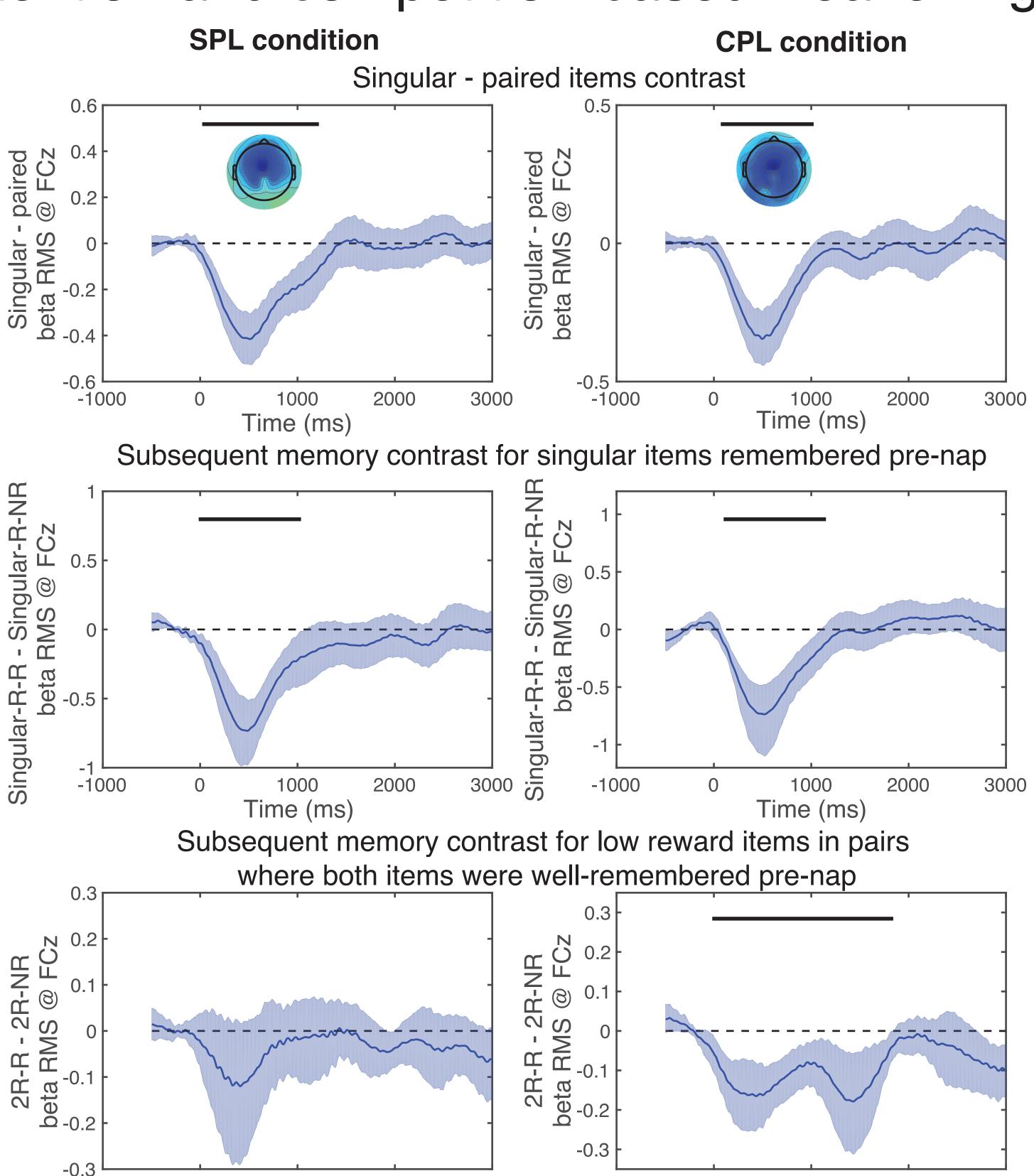
Under competitive learning, cueing impaired memory for well-learned items & sound-item pairs



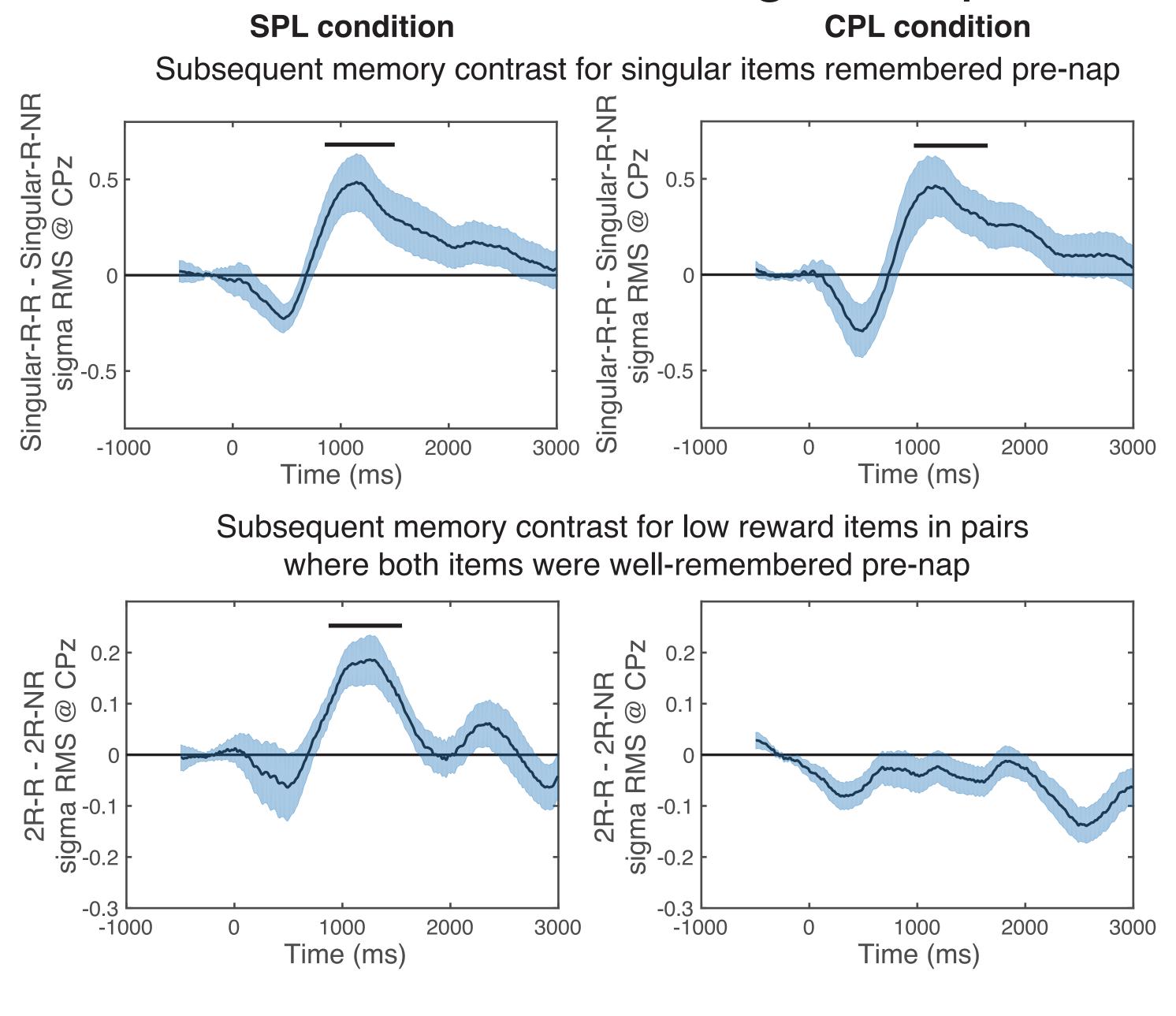
Take-home messages

- Competition strongly modulates the effects of TMR
- Cues impair memory in competitive-pair learning
- Under separate learning, cues benefitted only one memory, showing possible reactivation bandwidth limit
- Beta power indexed competition and memory weakening

Post-cue beta power negatively predicted retention and competition-based weakening.



Post-cue sigma power predicted retention and was reduced under high competition.



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