

Mechanisms of targeted memory reactivation during sleep:

The role of pre- and post-cue spindles

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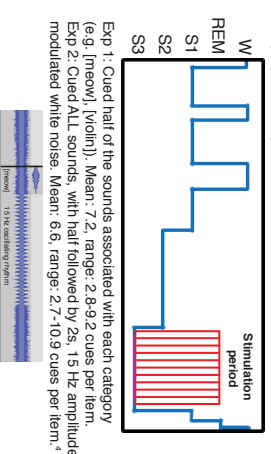
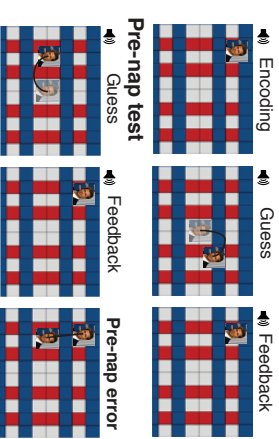
New memory traces become reactivated during post-learning sleep, leading to their stabilization¹.

Short bursts of activity called sleep spindles (11-16 Hz, 0.5-2 s) may contribute to this process². However, we lack temporally-precise evidence linking spindles and memory reactivation. Here we used targeted memory reactivation³ to investigate this link.

Wake classifier training



Picture - spatial location learning



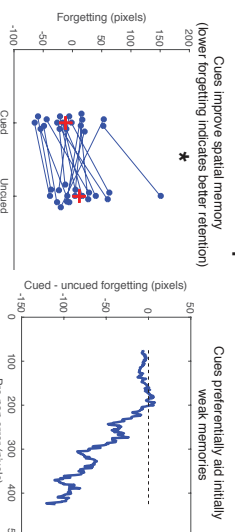
Post-nap spatial and sound-picture tests

Acknowledgements

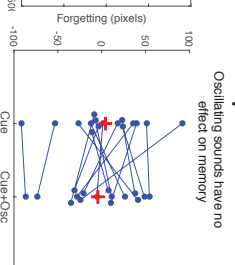
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Sound cues during sleep improve spatial memory

Experiment 1

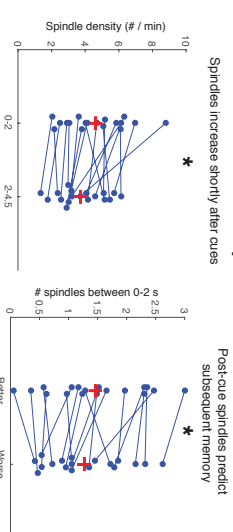


Experiment 2

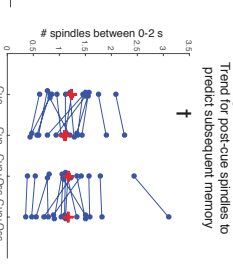


Post-cue spindles predict subsequent memory

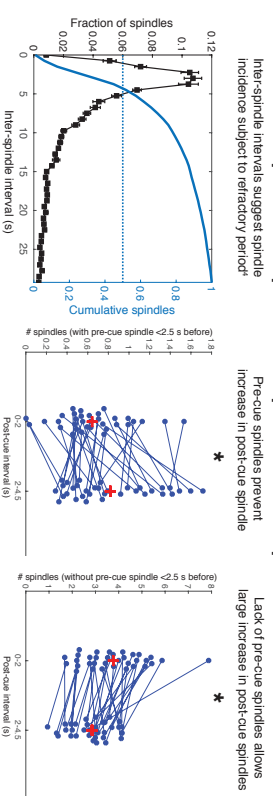
Experiment 1



Experiment 2



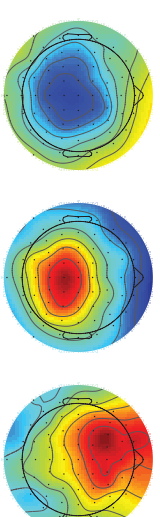
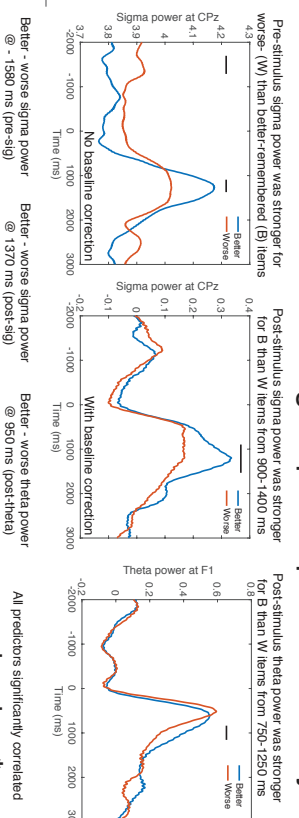
Pre-cue spindles prevent post-cue spindle increases



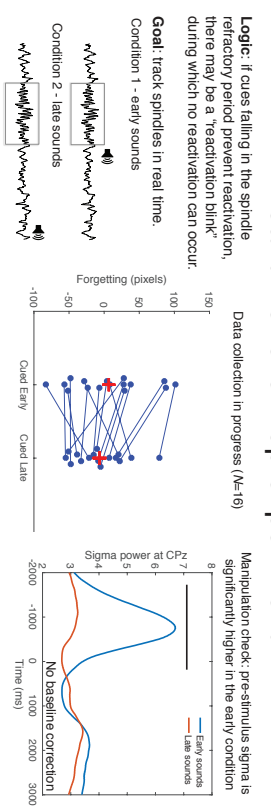
References

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Cue-locked theta and sigma power predict memory



Real-time follow-up experiment



Take-home messages

- 1) Sleep cues benefit memory³.
- 2) Post-cue spindles predict subsequent memory².
- 3) Three EEG measures signal successful memory reactivation - pre-stimulus sigma power, post-stimulus sigma power, and post-stimulus theta power.
- 4) Due to spindle refractoriness, pre-cue spindles may negatively predict subsequent memory — an idea we are examining in a real-time experiment.