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Introduction

Multiplication Learning

- Academic success depends on learning skills and facts.
- Sleep has been found to benefit various types of skill learning.
- Multiplication learning is a type of skill learning that depends on practice¹ — here we sought evidence on whether it also depends on memory reactivation during sleep.

Targeted Memory Reactivation (TMR)

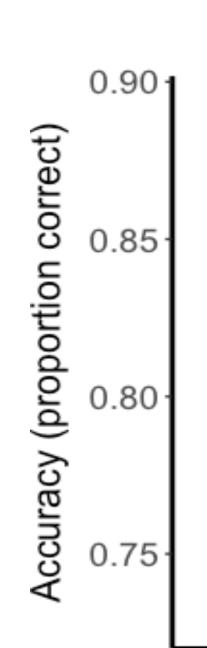
- Targeted memory reactivation is a technique that involves pairing cues with newly learned information that can later be presented during sleep to promote memory reactivation and later memory retrieval^{2,3}.
- TMR with auditory cues during slowwave sleep can produce memory benefits for procedural memory and creative problem-solving tasks^{4,5}.
- The role of sleep and TMR have not yet been tested in students solving multiplication problems.

Reference

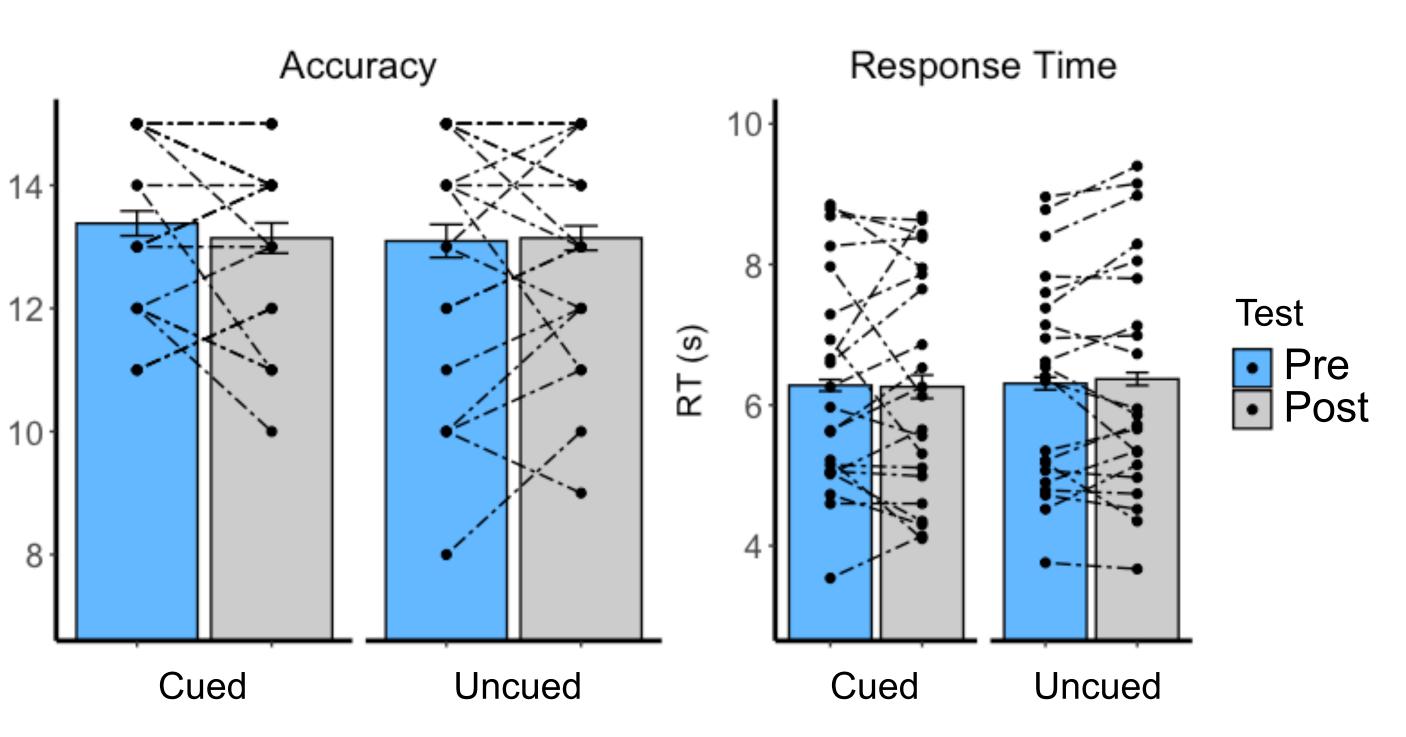
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Research Question

Results



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Targeted Memory Reactivation for Multiplication Problems During an Afternoon Nap

Northwestern University

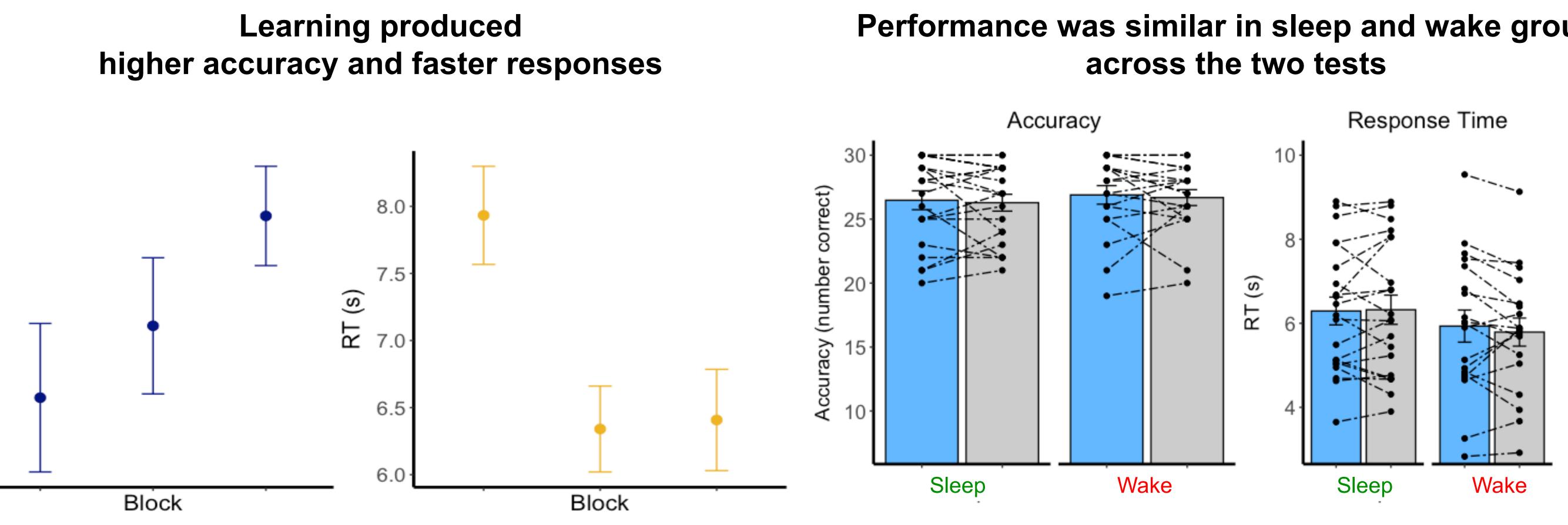
This experiment was designed to test whether performance in a multiplication task would be influenced by memory reactivation during sleep or by sleep physiology signals.

Experimental Design

Sleep Subjects: ✤ 21 undergraduates, 20.62 ± 2.29 years, who were requested to wake up 2 hours earlier than normal and to avoid caffeine

Wake Subjects: ✤ 19 undergraduates, 21.00 ± 3.38 years

Experiment began between 11am – 3pm



Performance was similar for problems that were cued versus uncued

