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Sleep promotes offline enhancement of an explicitly learned discrete but not an explicitly learned continuous task. Nature and Science Sleep

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Abstract: Background Healthy young individuals benefit from sleep to promote offline enhancement of a variety of explicitly learned discrete motor tasks. It remains unknown if sleep will promote learning of other types of explicit tasks. The purpose of this study is to verify the role of sleep in learning an explicitly instructed discrete motor task and to determine if participants who practice an explicitly instructed continuous tracking task demonstrate sleep-dependent offline learning of this task. Methods In experiment 1, 28 healthy young adults (mean age 25.6 ± 3.8 years) practiced a serial reaction time (SRT) task at either 8 am (SRT no-sleep group) or 8 pm (SRT sleep group) and underwent retention testing 12 ± 1 hours later. In experiment 2, 20 healthy young individuals (mean age 25.6 ± 3.3 years) practiced a continuous tracking task and were similarly divided into a no-sleep (continuous tracking no-sleep group) or sleep group (continuous tracking sleep group). Individuals in both experiments were provided with explicit instruction on the presence of a sequence in their respective task prior to practice. Results Individuals in the SRT sleep group demonstrated a significant offline reduction in reaction time whereas the SRT no-sleep group did not. Results for experiment 1 provide concurrent evidence that explicitly learned discrete tasks undergo sleep-dependent offline enhancement. Individuals in the continuous tracking sleep group failed to demonstrate a significant offline reduction in tracking error. However, the continuous tracking no-sleep group did demonstrate a significant offline improvement in performance. Results for experiment 2 indicate that sleep is not critical for offline enhancement of an explicit learned continuous task. Conclusion The findings that individuals who practiced an explicitly instructed discrete task experienced sleep-dependent offline learning while those individuals who practiced an explicitly instructed continuous ta