Have a vexing problem? Sleep on it.

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New Northwestern University research shows people actually might solve a problem better if they "sleep on it." In fact, the researchers were able to improve problem solving upon waking by manipulating a critical process during sleep.

The study provides important information about information processing during sleep, as well as incubation for problem solving—why we sometimes solve a problem better after a break.

"We know that people rehearse or 'consolidate' memories during sleep, strengthening and reorganizing them," said Kristin Sanders, first author of the study and a doctoral student in psychology in the Weinberg College of Arts and Sciences at Northwestern. "It's also known that this natural process can be boosted by playing sounds associated with the information being rehearsed."

Because many tricky problems are solved by thinking of them in a new way, Sanders and colleagues hypothesized that rehearsing unsolved problems during sleep would help people refine their memories of the problems, and improve their chance to solve them the next day.

In the study, people attempted several puzzles in the evening while listening to specific sound cues. While they slept, a program presented sounds associated with half the puzzles they had failed in the evening. The following morning participants solved the puzzles that had the associated sound cues played overnight better, compared to the puzzles that got no cues.

"This study provides yet more evidence that brain processing during sleep is helpful to daytime cognition," said Mark Beeman, professor of psychology and a senior author of the study."In this case, if you want to solve problems or make the best decisions, better to sleep on it than to be on Twitter at 3 a.m."

The research is the first demonstration of actually improving problem solving by targeting memories for unsolved problems for extra processing during sleep. It strengthens the literature suggesting sleep reorganizes memory, and suggests that problem solving may benefit from sleep due to rehearsal and consolidation of problem memory.

"Problem solving is part of everyone's daily life. While we use tricky puzzles in our study, the underlying cognitive processes could relate to solving any problem on which someone is stuck or blocked by an incorrect approach," Sanders said.

However, the research may only apply to situations where people have the background information they need to solve the problem and just haven't found the right configuration yet.

"For example, no matter how much sleep I get, I'm not going to suddenly figure out black holes or find a cure for a rare disease, because I don't have the necessary background knowledge," Beeman said. "However, if you've studied a problem thoroughly and are still stuck, thinking about it during a good night's sleep may be just the trick."

"Targeted Memory Reactivation During Sleep Improves Next-Day Problem Solving" published

online Oct. 11 in *Psychological Science.*

More information: Kristin E. G. Sanders et al.
Targeted Memory Reactivation During Sleep
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