Learning in the New Economy
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Really? Your Mom Was Right! A Good Night's Sleep Can Help You Learn Better.

by LiNE Zine Staff

Here's welcome news to all fans of long, restful nights of slumber. Scientists have discovered a new link between memory and sleep. According to a recent study, your mother was right–you do learn and perform better when you've had at least six, and preferably eight, hours of sleep.

So, if you work for a start-up and are surviving on three hours of sleep per night; or if you lie awake, losing sleep worrying about why you're not working for a start-up, read no further. You won't remember this anyway.

Dr. Robert Stickgold, assistant professor of psychiatry at Harvard Medical School, and his colleagues in the Laboratory of Neurophysiology at the Massachusetts Mental Health Center, conducted research that leads to a new hypothesis for memory formation. Described in the March 2000 issue of **The Journal of Cognitive Neuroscience**, the hypothesis points to physical and chemical changes the brain undergoes during two stages of sleep—one at the beginning of the night, and the other early in the morning. The interaction between those two stages may be what strengthens memory traces.

Stickgold believes the research proves that the right kind of sleep and the right amount of sleep is critical to our ability to learn. If you don't get enough sleep or good enough sleep after learning something new, you won't effectively integrate what you've learned into your memory.

The Study

Researchers trained a group of Harvard undergrads to spot visual targets on a computer screen and to press a button as soon as they were certain they had seen a target. Students were retested 3 to 12 hours later the same day, without improvement in speed beyond their best time at the end of training. Students who slept six hours or less after training showed no improvement when they performed the task the following day.

But students who slept more than six hours showed marked improvements in speed and accuracy when tested the next day.

The students who improved the most were those who slept for eight hours. With eight hours of sleep, you become the lucky beneficiary of two stages of sleep–the first two hours of the night spent in deep, slow-wave sleep, and the last two hours in the vivid dream-filled rapid eye movement state (REM). [There were no reports about the benefits of sleeping more than eight hours–perhaps the students from this group couldn't be bothered to wake up and attend training?]

The benefits of longer and better sleep continued to grow for test participants. Further testing showed that the well-rested students improved even more in speed and accuracy from two days to a week after the initial training.

The Hypothesis

Dr. Stickgold believes that during the first two hours of slow-wave sleep, certain brain chemical levels plunge, and information flows out of the hippocampus memory region and into the cortex.

The brain then goes through a type of internal dialogue that sends this new information into appropriate networks and categories over the next four hours. A slow protein synthesis process strengthens connections between nerve cells that have acquired the new information.

During the REM phase in the last two hours of sleep, brain chemistry changes drastically. The brain shuts off the hippocampus, and, Stickgold hypothesizes, literally re-enacts the training, solidifying the newly made connections in its memory banks.

REM sleep seems particularly important to integrating information into the brain over the long term. People who cut their sleep short for the last couple of hours each night generally won't do as well as those who get a full night's sleep.

The Implications

Since humans are, well, human, we will more than likely continue to push the bad habit of skimping on sleep in exchange for grabbing more time. But institutions have an opportunity to instill and apply better habits for better learning conditions. Universities, medical schools, and the military should take note of what we've suspected all along: sleep deprived conditions are not optimal conditions for learning. This study could prove that boosting an individual's amount of sleep might improve their performance.

It also provides scientific evidence for something that students and teachers have long known–all night cram sessions do not result in long-term learning. Because of the lack of sleep, especially the critical REM stage, the information never becomes fully integrated into the memory.

Best of all, the study equips us to challenge expectations about what makes a smart learner. The Harvard undergrads' performance on the retests did not depend on their IQ, SAT scores, preparation, or how hard they tried. Rather, it depended on how well they had slept the night before the test.

As Dr. Stickgold said, "In any kind of learning, it's a great idea to sleep on it."

We'll leave the "I told you so" to dear old mom.

–LiNE Zine
