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Good night's sleep may rescue memories

Scientists say findings could help learning, mental treatments

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(AP) -- In a finding that backs up motherly advice to get a good night's sleep, scientists have found that peaceful slumber apparently restores memories that were lost during a hectic day.

It's not just a matter of physical recharge. Researchers say sleep can rescue memories in a biological process of storing and consolidating them deep in the brain's complex circuitry.

The finding is one of several conclusions made in a pair of studies that appear in Thursday's issue of the journal *Nature* that look at how sleep affects the memory-recording processes, and perhaps safeguards them.

Researchers who conducted the experiments said the results may influence how students learn, and someday could be incorporated into treatments for mental illnesses involving memories, such as post-traumatic stress disorder.

However, other scientists who were not involved in the experiments said additional research is needed into the sleep-memory connection.

In separate studies, scientists at the University of Chicago and the Harvard Medical School trained college-age people to perform specific tasks, then tested them to see how much they recalled after either a night's sleep or several hours awake.

The University of Chicago study found that test subjects who listened to a voice synthesizer's murky speech understood



New studies report that memories are lost during the day, but reconstituted by the brain during sleep.

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more words after a night of sleep than counterparts who were tested just hours after the training, with no sleep.

"We all have the experience of going to sleep with a question and waking up with the solution," said Daniel Margoliash, a professor of neurobiology at the University of Chicago.

Margoliash, who worked with colleagues Howard Nusbaum and Kimberly Fenn, said it could be that a person acquires so many memories each day that some details are lost in that jumble -- but that the brain sorts and reorganizes the memories during sleep.

Or, memories could actually be lost during the day, he said, but reconstituted by the brain during sleep by some process that taps into the general rules the test subjects learned in their voice-recognition training.

The brain's hard drive

James L. McGaugh, director of the Center for the Neurobiology of Learning and Memory, at the University of California at Irvine, said the voice recognition training is similar to learning a new language and is therefore more complex than being taught to repeat a simple task. In the tests, the subjects never heard the same synthesized word twice.

"These are highly interesting findings that add additional information concerning the affects of sleep on memory," he said. "This takes it to a new level."

Still, McGaugh said further experiments are needed to assess a number of factors that could have influenced the outcomes.

For example, he said the people trained late at night may have performed better because they went to sleep not long after their training, while their morning trained counterparts were exposed to an entire day of memories before being tested.

In that study, one group was trained at 9 a.m., then tested 12 hours later, while a second group was trained at 9 p.m. and then tested the next morning after a night's sleep.

The researchers found that while the people tested at night experienced a 10 percentage point improvement over their pre-training test, those who had a night's sleep had a 19 percentage point improvement over their pre-training test.

In the second study, Harvard Medical School scientists trained 100 subjects ages 18-27 to perform finger-tapping sequences similar to learning piano scales. Their ability to repeat those sequences was then tested at various intervals, including after one and two nights of sleep.

The researchers found evidence that memories are consolidated in three stages in a process similar to storing data on a computer's hard drive. The second stage requires sleep, which the Harvard team also found sharpened the subject's performance the next day.

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However, when subjects briefly rehearsed a finger-tapping sequence they had learned the previous day just before learning a second exercise, their accuracy on the first sequence suffered when they tried to repeat it on the third day.

But they performed the second exercise reliably -- suggesting that "not all memories are equal," and the order in which they are learned may be important, said McGill University psychologist Karin Nader, who reviewed both Nature studies.

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