

The Brain Holds the Keys to Unlock 'Lost' Memories

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People may permanently store memories in their brains, even if they cannot consciously recall them, according to a study by Duke University Medical Center researchers.

"This finding provides insight into a fundamental neurological process and also may help us develop a tool for identifying so-called lost memories," said Roberto Cabeza, Ph.D., a member of the research team and associate professor of psychology and neuroscience in the Duke Center for Cognitive Neuroscience.

One possible future practical application of such a "memory tool" may be as a lie detector, the researchers suggest.

The team's findings were published in the May 24, 2006 edition of the *Journal of Neuroscience*.

The National Institutes of Health funded the study, which builds on the Duke team's earlier research on episodic memory processes.

In the current study, Cabeza and his colleagues used a sophisticated imaging technique to detect brain activity in the medial temporal lobes (MTL) of test subjects exposed to "new" and "old" experiences. Located deep inside the brain, the MTL is known to play a role in a person's ability to determine whether something happened in the past.

The researchers first showed 16 study subjects a list of words. The

subjects were then placed in a device called a magnetic resonance imaging scanner and shown another list of words, some of them "old" words previously viewed and others "new" words not previously viewed. The researchers observed brain activity, by measuring changes in blood flow picked up by the scanner, while participants looked at the words one at a time.

When subjects viewed an old word, they exhibited heightened activity in the rear portion of the MTL, whether or not they correctly stated that the word was old, Cabeza said. "This indicates that the brain has the correct answer even if we don't consciously think we've seen the word before," he said.

So why would a person make a mistake when asked about an event's oldness, if his or her brain holds the correct answer?

The researchers found that when a subject correctly reported seeing a "new" word, the scanner indicated that there was heightened activity mainly in a front portion of the MTL, rather than in the rear portion, as happens with old words. But when a subject mistakenly classified as new a word that was actually old, activity increased in both parts of the MTL, Cabeza said. This may lead the MTL to give mixed messages, resulting in an incorrect conscious response, he said.

Other participants in this research included Steven E. Prince and Mathias S. Fleck of Duke, and Sander M. Daselaar of the University of Amsterdam.

Source: Duke University

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