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Key to False Memories Uncovered

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Duke University Medical Center neuroscientists say the places a memory is processed in the brain may determine how someone can be absolutely certain of a past event that never occurred.

These findings could help physicians better appreciate the memory changes that accompany normal aging or even lead to tools for the early diagnosis of Alzheimer's disease, according to Duke neuroscientist Roberto Cabeza, Ph.D.

Information retrieved from memory is simultaneously processed in two specific regions of the brain, each of which focuses on a different aspect of an past event. The medial temporal lobe (MTL), located at the base of the brain, focuses on specific facts about the event. The frontal parietal network (FPN), located at the top of the brain, is more likely to process the global gist of the event.

The specific brain area accessed when one tries to remember something can ultimately determine whether or not we think the memory is true or false, the researchers found.

"Human memory is not like computer memory -- it isn't completely right all the time," said Cabeza, senior author of a paper appearing in the Journal of Neuroscience. "There are many occasions when people feel strongly about past events, even though they might not have occurred."

Cabeza wanted to understand why someone could have such strong feelings of confidence about false memories. In his experiments, he

scanned the brains of healthy volunteers with functional MRI as they took well-established tests of memory and false memory. Functional MRI is an imaging technique that shows what areas of the brain are used during specific mental tasks.

During the brain scans, Cabeza found that volunteers who were highly confident in memories that were indeed true showed increased activity in the fact-oriented MTL region.

"This would make sense, because the MTL, with its wealth of specific details, would make the memory seem more vivid," Cabeza said. "For example, thinking about your breakfast this morning, you remember what you had, the taste of the food, the people you were with. The added richness of these details makes one more confident about the memory's truth."

On the other hand, volunteers who showed high confidence in memories that turned out to be false exhibited increased activity in the impressionistic FPN. The people drawing from this area of the brain recalled the gist or general idea of the event, and while they felt confident about their memories, they were often mistaken, since they could not recall the details of the memory.

These findings, coupled with the findings of other studies, can help explain what happens to the human brain as it ages, Cabeza said.

"Specific memories don't last forever, but what ends up lasting are not specific details, but more general or global impressions," Cabeza said. "Past studies have shown that as normal brains age, they tend to lose the ability to recollect specifics faster than they lose the ability recall impressions. However, patients with Alzheimer's disease tend to lose both types of memories equally, which may prove to be a tool for early diagnosis."

Cabeza's colleague for this research was Hongkeun Kim at Daegu University in South Korea. The research was supported by the National Institutes of Health and Daegu University.

Source: Duke University