Memories exist even when forgotten, study suggests

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Jeff Johnson of the UCI Center for the Neurobiology of Learning & Memory and colleagues discovered that a person's brain activity while remembering an event is very similar to when it was first experienced, even if specifics can't be recalled. Photo by Daniel A. Anderson / University Communications

A woman looks familiar, but you can't remember her name or where you met her. New research by UC Irvine neuroscientists suggests the memory exists - you simply can't retrieve it.

Using advanced brain imaging techniques, the scientists discovered that a person's brain activity while remembering an event is very similar to when it was first experienced, even if specifics can't be recalled.

"If the details are still there, hopefully we can find a way to access them," said Jeff Johnson, postdoctoral researcher at UCI's Center for the Neurobiology of Learning & Memory and lead author of the study,

appearing Sept. 10 in the journal *Neuron*.

"By understanding how this works in young, healthy adults, we can potentially gain insight into situations where our memories fail more noticeably, such as when we get older," he said. "It also might shed light on the fate of vivid memories of traumatic events that we may want to forget."

In collaboration with scientists at Princeton University, Johnson and colleague Michael Rugg, CNLM director, used functional magnetic resonance imaging to study the brain activity of students.

Inside an fMRI scanner, the students were shown words and asked to perform various tasks: imagine how an artist would draw the object named by the word, think about how the object is used, or pronounce the word backward in their minds. The scanner captured images of their brain activity during these exercises.

About 20 minutes later, the students viewed the words a second time and were asked to remember any details linked to them. Again, brain activity was recorded.

Utilizing a mathematical method called pattern analysis, the scientists associated the different tasks with distinct patterns of brain activity. When a student had a strong recollection of a word from a particular task, the pattern was very similar to the one generated during the task. When recollection was weak or nonexistent, the pattern was not as prominent but still recognizable as belonging to that particular task.

"The pattern analyzer could accurately identify tasks based on the patterns generated, regardless of whether the subject remembered specific details," Johnson said. "This tells us the brain knew something about what had occurred, even though the subject was not aware of the

information."

Source: University of California - Irvine