

Study challenges theory on unconscious memory system in the brain

February 27 2015, by Kim Horner

A new study by a UT Dallas researcher challenges a long-accepted scientific theory about the role the hippocampus plays in our unconscious memory.

For decades, scientists have theorized that this part of the brain is not involved in processing unconscious memory, the type that allows us to do things like button a shirt without having to think about it.

But research by Dr. Richard Addante, a senior lecturer in the School of Behavioral and Brain Sciences, raises doubts about that theory.

"These intriguing new findings raise important questions regarding the organization of [memory systems](#) and will doubtlessly receive a great deal of attention from other investigators," said Dr. Bert Moore, dean of the School of Behavioral and Brain Sciences and Aage and Margareta Møller Distinguished Professor. "Dr. Addante's careful, thoughtful work provides exciting insights into the [brain](#) bases of memory."

Addante used electroencephalography (EEG) to test [brain wave patterns](#) while giving memory tests to amnesia patients with damaged hippocampi. He then compared those results with control subjects as part of the study, which was published recently in the journal *NeuroImage*.

Much of the knowledge about the hippocampus and how our brains organize memory comes from research at the Massachusetts Institute of

Technology on an amnesia patient known in textbooks as "Patient H.M." The patient was later revealed to be Henry Molaison, who died in 2008.

Molaison's hippocampus and other tissue were removed in 1957 to treat intractable epilepsy. The surgery was effective in reducing the seizures, but researchers were surprised to find that Molaison could no longer form new long-term memories, though he could recall his past before the surgery and could also exhibit preserved unconscious memory abilities.

Given the research on Molaison, Addante expected the amnesia patients to perform well on the unconscious memory tests when he began his study. If the hippocampus is not needed for unconscious memory, they should perform just as well as the [control subjects](#), he believed.

But the patients' EEGs showed much different results than the others, forcing Addante to change his hypothesis.

Challenging an established [scientific theory](#)—widely published in major neuroscience textbooks—was a long shot, he said. Addante wrestled with whether the huge undertaking was worth the investment.

"I didn't know if the research would ever see the light of day," said Addante, who was a graduate researcher at the University of California, Davis when he tested the patients. "But I was committed to solving a puzzle and have never quit anything thus far in life."

Now that the work is published, Addante hopes the research will lead to more studies in this area. He said there's a need for more research using EEG to study unconscious memory.

"If nothing else, prove it wrong," Addante said. "If that happens, that's awesome, too, because that's science and progress."

More information: www.sciencedirect.com/science/journal/10538119

Provided by University of Texas at Dallas

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