

Researchers unravel how the brain remembers

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FIU doctoral student Maanasa Jayachandran is working to unravel the mystery of how the brain recalls memories in the correct order.

If she's successful, it might lead to a better understanding of how diseases like Alzheimer's affect memory and how to treat them.

Recalling a memory in the correct order is a crucial skill when it comes to completing tasks or even reminiscing with family. Yet, it's still among the many enduring mysteries of how the [brain](#) works.

Jayachandran has been studying the role of different parts of the brain and how they retrieve memory in a sequence. For her study, Jayachandran trained rats to remember sequences of odors. She would then put the odors out of sequence and ask the rats to tell her if they were in the correct order or not. Rats were rewarded with water when they were right.

"These rats are very good at this task and are able to tell if an [odor](#) is in the correct sequence or not" Jayachandran said.

To simulate the effects of a brain disorder, Jayachandran and psychology assistant professor Timothy A. Allen blocked rats' ability to transmit messages between different parts of their brain.

With the connection interrupted, Jayachandran discovered rats could not determine if memories were out of sequence. Then they repeated the experiment by interrupting another connection to a different part of the brain. Again, they failed the task.

"We were expecting there to be a difference between the two," Allen said. "What's nice about this [task](#) is we could ask how the animals were retrieving the information. It turned out they had almost opposite patterns of wrong answers."

Depending on what the researchers turned off in the [rats'](#) brain, one structure was able to remember the sequence better and the other

structure remembered worse the more out of sequence the odors were out of order, Jayachandran said.

Learning how this process works helps researchers to better understand what might be happening in the brains of people who are affected by [memory](#) disorders. It suggests that in the future we can manipulate these circuits in people to improve their ability to retrieve memories in the correct order, Allen said.

The study was published in the journal *Cell Reports*.

More information: Maanasa Jayachandran et al. Prefrontal Pathways Provide Top-Down Control of Memory for Sequences of Events, *Cell Reports* (2019). [DOI: 10.1016/j.celrep.2019.06.053](https://doi.org/10.1016/j.celrep.2019.06.053)

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