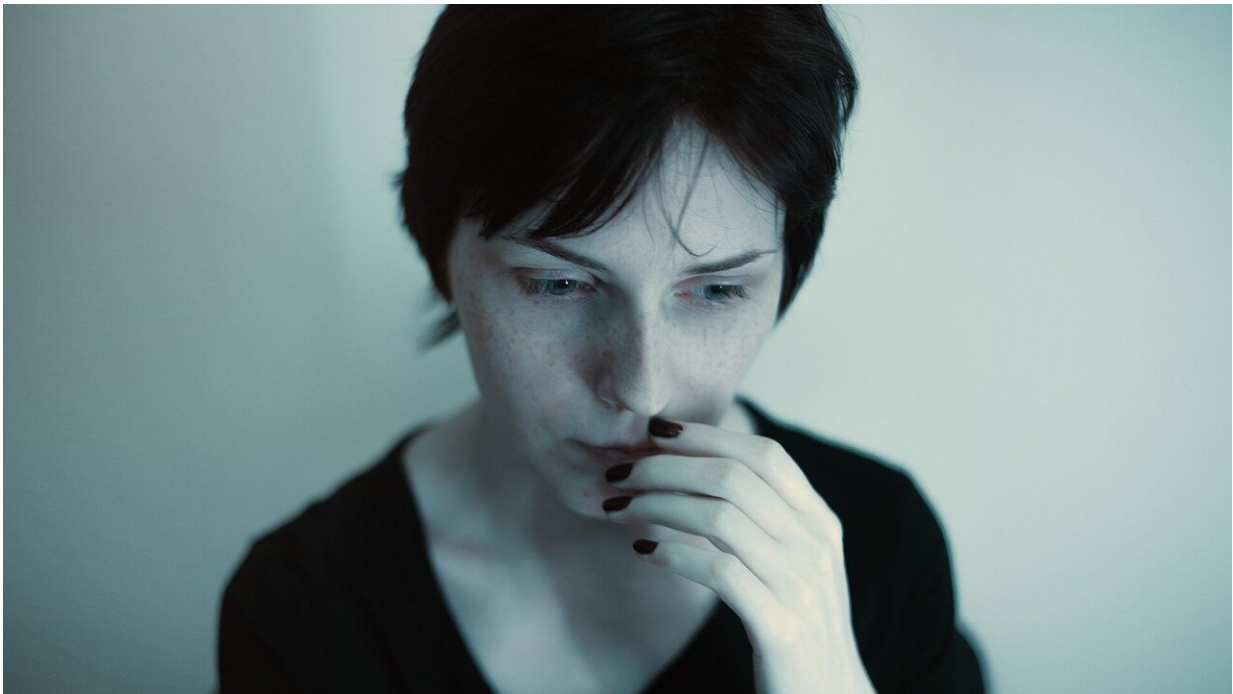


Researchers look at why memories attached to emotions are so strong

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Memories linked with strong emotions often become seared in the brain.

Most people can remember where they were on 9/11, or what the weather was like on the day their first child was born. Memories about world events on Sept 10, or lunch last Tuesday, have long been erased.

Why are memories attached to emotions so strong?

"It makes sense we don't remember everything," says René Hen, Ph.D., professor of psychiatry and neuroscience at Columbia University Vagelos College of Physicians and Surgeons. "We have limited [brain](#) power. We only need to remember what's important for our future wellbeing."

Fear, in this context, is not just a momentary feeling but a learning experience critical to our survival. When a new situation makes us fearful, the brain records the details in our neurons to help us avoid similar situations in the future, or use appropriate caution.

What's still a mystery is why these memories, recorded by the brain's hippocampus, become so strong.

To find out, Hen and Jessica Jimenez, an MD/Ph.D. student at Columbia, placed mice into new, frightening environments and recorded the activity of hippocampal neurons that reach out to the brain's [fear](#) center (the amygdala). The neurons' activity was also recorded a day later when the mice tried to retrieve memories of the experience.

Unsurprisingly, neurons that respond to the frightening environment send that information to the brain's fear center.

"What was surprising was that these neurons were synchronized when the mouse later recalled the memory," Hen says.

"We saw that it's the synchrony that is critical to establish the fear memory, and the greater the synchrony, the stronger the memory," Jimenez adds. "These are the types of mechanisms that explain why you remember salient events."

How and when synchronization occurs is still unknown, but the answer could reveal the inner workings of the brain that create lifelong memories and lead to new treatments for posttraumatic stress disorder.

"In people with PTSD, many similar events remind them of the original frightening situation," Hen says, "and it's possible that synchronization of their [neurons](#) has become too strong."

"We're really trying to dig into the mechanisms of how emotional memories form to find better treatments for people with PTSD and [memory](#) disorders in general."

More information: Jessica C. Jimenez et al, Contextual fear memory retrieval by correlated ensembles of ventral CA1 neurons, *Nature Communications* (2020). [DOI: 10.1038/s41467-020-17270-w](https://doi.org/10.1038/s41467-020-17270-w)

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