

Fear memories made too quickly may be at heart of memory disorders

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Credit: Flickr/Noemi Galera

Research by neuroscientists at UTS, the University of Sydney and the Garvan Institute has revealed a new insight into fear memories that might help to explain how disorders such as post-traumatic stress disorder (PTSD) arise and why they are so difficult to treat.

The researchers found animals can create a fear [memory](#) quickly during a short fearful event, but the hippocampus, a different brain region

responsible for gradually forming memories of events and places over time, does not have time to be fully engaged.

UTS Professor of Neuroscience Bryce Vissel, senior investigator of the study, said the results suggest animals may be able to form strong fear memories rapidly but their hippocampus cannot form a complete picture of when, where or what happened during the event.

"This could be significant because animals rely on their memory of where, when and how the traumatic event occurred to determine when they should be fearful in future," Professor Vissel said.

"If they form an ambiguous memory that lacks the detail necessary to tell different environments or situations apart, they may trigger the traumatic memory in a variety of inappropriate circumstances.

"We suggest that this in turn may lead to abnormal fear-related behaviours in irrelevant settings, as is commonly seen in [memory disorders](#) such as [post-traumatic stress disorder](#) (PTSD)."

Jessica Leake and Dr Raphael Zinn undertook the experiments in Professor Vissel's laboratory. They suggest the findings, while preliminary, might help to explain why disorders of memory such as PTSD are so difficult to treat.

"Traditionally, memory disorders have been investigated and treated by focusing on the idea that memory recall is faulty. However, if part of the problem lies in how the memory was formed in the first place, research and treatments may need to focus not only on how the memory is recalled but also on how it was originally formed," Dr Zinn said.

The team aims to explore these possibilities further by investigating what memory dysfunction, if any, is produced by rapid [fear-memory](#)

formation, and what brain mechanisms might exist that could be harnessed to repair it. They hope to contribute to a better understanding of fear memory and to help pave new ways to treat memory disorders.

The research was undertaken at UTS and the Garvan Institute of Medical Research in Sydney. The paper is published in the journal *Learning and Memory*.

More information: Jessica Leake et al. Dissociation between complete hippocampal context memory formation and context fear acquisition, *Learning & Memory* (2017). [DOI: 10.1101/lm.044578.116](https://doi.org/10.1101/lm.044578.116)

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