

Learning how memory works could be key to treating PTSD

August 26 2019, by Kelly Oakes, Horizon Magazine



Memories from a traumatic event seem to encode in a different way to usual ones. Credit: Tomás Ryan

Think back to what you did last weekend. You might be able to picture it clearly, but there should be no doubt in your mind that whatever you are remembering happened in the past. For people with post-traumatic stress



disorder (PTSD), however, memories of traumatic events often return in the form of vivid flashbacks that make it feel like it's happening all over again—putting them right back at the scene of a car crash, or the moment they lost a loved one.

Currently, treatments for <u>intrusive memories</u> include psychological therapy and medication. But to better help people deal with <u>traumatic</u> <u>memories</u>, some researchers believe we need to go back to basics and figure out how, exactly, our <u>memory</u> works in the first place.

"It's always been a major challenge to find ways of understanding how memories are stored in the brain," said Professor Tomás Ryan, a neuroscientist at Trinity College Dublin, Ireland. He is working on a project called <u>MEME</u>, investigating how clusters of connected <u>brain</u> <u>cells</u> physically store memories in the brain.

Our current understanding is this: every time your brain encodes a new memory, it enlists a group of neurons and changes them in some way. New connections between those neurons are formed, others are strengthened, and the cell cluster, which now holds the memory, is called an engram.

The project builds on technology Prof. Ryan helped develop at MIT in Boston, US, that lets researchers tag and manipulate engram cells in rodents.

"It's only been in the last seven, eight years that we started to develop the technology that allows us to label the specific memory and engram cells in mice, rats, and flies," he said. "We're now able to identify the cells and study their biology, but also turn them on and off, and see how they are important for memory and behaviour."

Engrams



There are lots of outstanding questions about engrams that Prof. Ryan hopes to address, including why certain memories are allocated to particular cells. Another important question—and one that could prove relevant for those with memories they'd rather forget—is why engrams persist for so long.

Though research into engrams is ongoing, results so far suggest that we may never be able to make distressing memories disappear entirely, but altering them to be less intrusive might be possible.

"The more we look at engram biology, it does seem that these memories are lasting forever, and that when we modify them, we may just be modifying our access to them," said Prof. Ryan. "I think the best way forward in treating PTSD is to find ways of not getting rid of traumatic memories, but changing them by reconsolidation, or updating them to less traumatic forms of those memories."

During a traumatic event, distressing memories seem to behave in a different way to usual memories. One explanation of this, called dual representation theory, says that we form two different representations of <u>traumatic events</u> in our memory.

"If something very emotional happens, what we tend to encode first is everything we see, feel, hear and smell, all sensation-based impressions and all the emotions attached to that," said Dr. Thomas Meyer, a psychologist at University College London, UK. The second representation of the event we store is more abstract and includes context like why we were there and what led up to the event—the bigger picture.

It's the emotions and sensations from that first representation which later form the basis of flashbacks of the traumatic event. "All these emotions come back and we see what happened again, and it frightens us again,"



he said.

Spatial recollection

If dual representation theory is correct, says Dr. Meyer, traumatic experience should affect our spatial recollection of events. We should remember where everything was located in the scene more accurately when asked to reconstruct it from the same perspective from which we experienced the event in the first place, rather than from a new angle, because we would only have encoded the scene from our original point of view.

A project called <u>TRAUMA_CONTEXT</u>, run by Dr. Meyer, tests this idea by using virtual reality to simulate a traumatic event. Participants—who were screened beforehand to make sure they had no history of trauma—viewed a scene depicting the aftermath of a plane crash through a VR headset. Later, they looked at the same scene again, both from the original angle and from a new one, and were asked to point out where certain details—including emotionally disturbing features such as bodies—they'd seen in the original scene had been located.

Results from this first experiment show that people do seem to remember distressing events better from the angle at which they first viewed it. They also show that the more emotional a feature of the scene was, the better people were at placing it in the right location.

Dr. Meyer has now begun testing whether it's possible to train people to become better at reconstructing a traumatic scene from new angles—essentially, helping them put the event in context. By having participants keep diaries for three days after the experiment, he'll measure how the scene they witnessed affected them, and whether the training can help dampen any intrusive memories they have.



Though the point of this project is not to directly help anyone with traumatic memories, this spatial training technique could help those with PTSD in the future, says Dr. Meyer.

Training

One current treatment for PTSD is imaginal exposure therapy, in which people have to recount their traumatic experience and confront their troubling memories. If spatial training is effective, it might offer an alternative.

"Maybe we don't have to focus on the most distressing parts of the event only," said Dr. Meyer. "We could help people improve their spatial memory of the event, literally imagine the traumatic event from a different angle."

Either way, Prof. Ryan believes that getting to the bottom of exactly how memory works is a prerequisite for truly understanding health conditions that involve memory, including PTSD.

"If we want to have new ways of treating memory disorders, we need to have new ways of making discoveries about how memories work," he said. "We know quite a bit about what goes wrong in disease, such as Alzheimer's, but we know very little about how memories actually function in health."

Provided by Horizon: The EU Research & Innovation Magazine

Citation: Learning how memory works could be key to treating PTSD (2019, August 26) retrieved 27 April 2024 from <u>https://medicalxpress.com/news/2019-08-memory-key-ptsd.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private



study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.