

New images of the brain show the forgetful side effect of frequent recall

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A new study from the University of Birmingham and the MRC Cognition and Brain Sciences unit in Cambridge has shown how intentional recall is beyond a simple reawakening of a memory; and actually leads us to forget other competing experiences that interfere

with retrieval. Quite simply, the very act of remembering may be one of the major reasons why we forget.

The research, published today in *Nature Neuroscience*, is the first to isolate the adaptive forgetting mechanism in the [human brain](#). The [brain](#) imaging study shows that the mechanism itself is implemented by the suppression of the unique cortical patterns that underlie competing memories. Via this mechanism, remembering dynamically alters which aspects of our past remain accessible.

Dr Maria Wimber, from the University of Birmingham, explained, "Though there has been an emerging belief within the academic field that the brain has this inhibitory mechanism, I think a lot of people are surprised to hear that recalling memories has this darker side of making us forget others by actually suppressing them."

Patterns of [brain activity](#) in the participants were monitored by MRI scans while they were asked to recall individual memories based on images they had been shown earlier.

The team, co-led by Dr Michael Anderson from the MRC Cognition and Brain Sciences Unit Cambridge, were able to track the brain activity induced by individual memories and show how this suppressed others by dividing the brain into tiny 3-dimensional voxels.

Based on the fine-grained activation patterns of these voxels, the researchers were able to witness the neural fate of individual memories as they were reactivated initially, and subsequently suppressed.

Over the course of four selective retrievals the participants in the study were cued to retrieve a target [memory](#), which became more vivid with each trial. Competing memories were less well reactivated as each trial was carried out, and indeed were pushed below baseline expectations for

memory, supporting the idea that an active suppression of memory was taking place.

Dr. Anderson said "People are used to thinking of forgetting as something passive. Our research reveals that people are more engaged than they realise in shaping what they remember of their lives. The idea that the very act of remembering can cause forgetting is surprising, and could tell us more about selective memory and even self deception."

Dr Wimber continued, "Forgetting is often viewed as a negative thing, but of course, it can be incredibly useful when trying to overcome a negative memory from our past. So there are opportunities for this to be applied in areas to really help people."

The team note that being able to decode how the brain goes about suppressing competing information needs to be acknowledged in a number of situations; not least in the judicial process.

Dr Wimber said, "It has significance for anything that relies on memory, but a really good example is that of eyewitness testimonies. When a witness is asked to recall specific information about an event, and they are quizzed time and time again, it could well be to the detriment of associated memories - giving the impression that their memory is sketchy. In fact, the repeated recall is causing them to forget these details."

The findings of this research are not restricted to specific memory types. Semantic memory, episodic memory and even recently acquired short-term memories are impacted by the forgetful side effect of frequent recall.

Though people differ genetically, it is believed that all brains are capable of inducing varying degrees of this forgetting mechanism.

Studying the neural basis of forgetting has proven challenging in the past because the 'engram', that is, the unique neural fingerprint that an experience leaves in our memory, has been difficult to pinpoint in brain activity. By capitalising on the relationship between perception and memory, the study detected neural activity caused by the activation of individual memories, giving a unique window into the invisible neurocognitive processes triggered when a reminder recapitulates several competing memories.

More information: *Nature Neuroscience*, [DOI: 10.1038/nn.3973](https://doi.org/10.1038/nn.3973)

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