

Out of mind, out of sight: Suppressing unwanted memories reduces their unconscious influence on behaviour

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Credit: QThomas Bower

(Medical Xpress)—New research shows that, contrary to what was previously assumed, suppressing unwanted memories reduces their influence on behaviour, and sheds light on how this process happens in the brain.

The study, published online in *PNAS*, challenges the idea that suppressed memories remain fully preserved in the brain's unconscious, allowing them to be inadvertently expressed in someone's behaviour. The results of the study suggest instead that the act of suppressing intrusive memories helps to disrupt traces of the memories in the parts of the brain responsible for sensory processing.

The team at the MRC Cognition and Brain Sciences Unit and the University of Cambridge's Behavioural and Clinical Neuroscience Institute (BCNI) have examined how suppression affects a memory's unconscious influences in an experiment that focused on suppression of [visual memories](#), as intrusive unwanted memories are often visual in nature.

After a trauma, most people report intrusive memories or images, and people will often try to

push these intrusions from their mind, as a way to cope. Importantly, the frequency of intrusive memories decreases over time for most people. It is critical to understand how the healthy brain reduces these intrusions and prevents unwanted images from entering consciousness, so that researchers can better understand how these mechanisms may go awry in conditions such as [post-traumatic stress disorder](#).

Participants were asked to learn a set of word-picture pairs so that, when presented with the word as a reminder, an image of the object would spring to mind. After learning these pairs, brain activity was recorded using functional magnetic resonance imaging (fMRI) while participants either thought of the object image when given its reminder word, or instead tried to stop the memory of the picture from entering their mind.

The researchers studied whether suppressing visual memories had altered people's ability to see the content of those memories when they re-encountered it again in their visual worlds. Without asking participants to consciously remember, they simply asked people to identify very briefly displayed objects that were made difficult to see by visual distortion. In general, under these conditions, people are better at identifying objects they have seen recently, even if they do not remember seeing the object before—an unconscious influence of memory. Strikingly, they found that suppressing visual memories made it harder for people to later see the suppressed object compared to other recently seen objects.

Brain imaging showed that people's difficulty seeing the suppressed object arose because suppressing the memory from conscious awareness in the earlier memory suppression phase had inhibited activity in visual areas of the brain, disrupting visual

memories that usually help people to see better. In essence, suppressing something from the mind's eye had made it harder to see in the world, because visual memories and seeing rely on the same brain areas: out of mind, out of sight.

Over the last decade, research has shown that suppressing unwanted memories reduces people's ability to consciously remember the experiences. The researchers' studies on memory suppression have been inspired, in part, by trying to understand how people adapt memory after psychological trauma. Although this may work as a coping mechanism to help people adapt to the trauma, there is the possibility that if the memory traces were able to exert an influence on unconscious behaviour, they could potentially exacerbate mental health problems. The idea that suppression leaves unconscious memories that undermine mental health has been influential for over a century, beginning with Sigmund Freud.

These findings challenge the assumption that, even when suppressed, a memory remains fully intact, which can then be expressed unconsciously. Moreover, this discovery pinpoints the neurobiological mechanisms underlying how this suppression process happens, and could inform further research on uncontrolled 'intrusive memories', a classic characteristic of post-traumatic stress disorder.

Dr Michael Anderson, at the MRC Cognition and Brain Sciences Unit said: "While there has been a lot of research looking at how suppression affects conscious memory, few studies have examined the influence this process might have on unconscious expressions of memory in behaviour and thought. Surprisingly, the effects of suppression are not limited to conscious memory. Indeed, it is now clear, that the influence of suppression extends beyond areas of the brain associated with conscious [memory](#), affecting perceptual traces that can influence us unconsciously. This may contribute to making unwanted visual memories less intrusive over time, and perhaps less vivid and detailed."

Dr Pierre Gagnepain, lead author at INSERM in France said: "Our memories can be slippery and

hard to pin down. Out of hand and uncontrolled, their remembrance can haunt us and cause psychological troubles, as we see in PTSD. We were interested whether the brain can genuinely suppress memories in healthy participants, even at the most unconscious level, and how it might achieve this. The answer is that it can, though not all people were equally good at this. The better understanding of the neural mechanisms underlying this process arising from this study may help to better explain differences in how well people adapt to [intrusive memories](#) after a trauma."

More information: Suppressing unwanted memories reduces their unconscious influence via targeted cortical inhibition, www.pnas.org/cgi/doi/10.1073/pnas.1311468111

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