Forgetting uses more brain power than remembering

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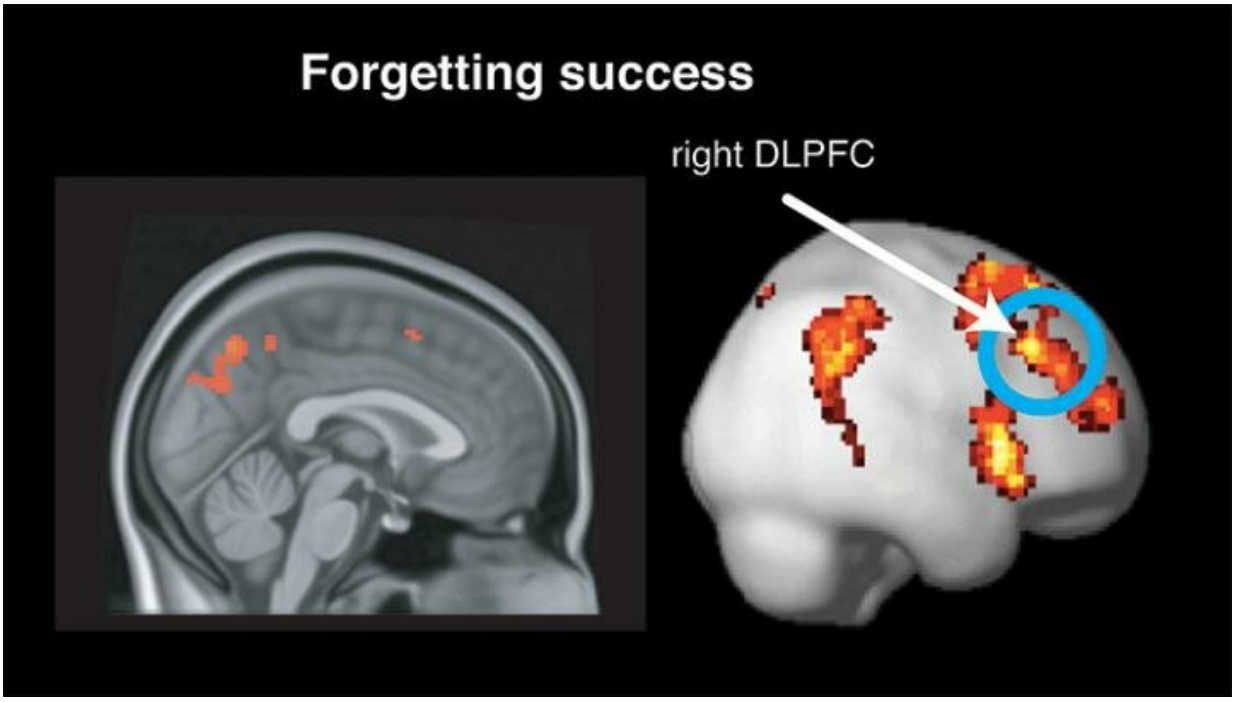

GLM results for forgetting success (greater activity for successful intentional forgetting relative to successful intentional remembering, P

Choosing to forget something might take more mental effort than trying to remember it, researchers at The University of Texas at Austin discovered through neuroimaging.

These findings, published in the *Journal of Neuroscience*, suggest that in order to forget an unwanted experience, more attention should be focused on it. This surprising result extends prior research on intentional forgetting, which focused

on reducing attention to the unwanted information through redirecting attention away from unwanted experiences or suppressing the memory's retrieval.

"We may want to discard memories that trigger maladaptive responses, such as traumatic memories, so that we can respond to new experiences in more adaptive ways," said Jarrod Lewis-Peacock, the study's senior author and an assistant professor of psychology at UT Austin. "Decades of research has shown that we have the ability to voluntarily forget something, but how our brains do that is still being questioned. Once we can figure out how memories are weakened and devise ways to control this, we can design treatment to help people rid themselves of unwanted memories."

Memories are not static. They are dynamic constructions of the brain that regularly get updated, modified and reorganized through experience. The brain is constantly remembering and forgetting information—and much of this happens automatically during sleep.

When it comes to intentional forgetting, prior studies focused on locating "hotspots" of activity in the brain's control structures, such as the prefrontal cortex, and long-term memory structures, such as the hippocampus. The latest study focuses, instead, on the sensory and perceptual areas of the brain, specifically the ventral temporal cortex, and the patterns of activity there that correspond to memory representations of complex visual stimuli.

"We're looking not at the source of attention in the brain, but the sight of it," said Lewis-Peacock, who is also affiliated with the UT Austin Department of Neuroscience and the Dell Medical School.

Using neuroimaging to track patterns of brain activity, the researchers showed a group of healthy adults images of scenes and faces, instructing them to either remember or forget each image.

Their findings not only confirmed that humans have the ability to control what they forget, but that successful intentional forgetting required "moderate levels" of brain activity in these sensory and perceptual areas—more activity than what was required to remember.

"A moderate level of brain activity is critical to this forgetting mechanism. Too strong, and it will strengthen the memory; too weak, and you won't modify it," said Tracy Wang, lead author of the study and a psychology postdoctoral fellow at UT Austin. "Importantly, it's the intention to forget that increases the activation of the memory, and when this activation hits the 'moderate level' sweet spot, that's when it leads to later forgetting of that experience."

The researchers also found that participants were more likely to forget scenes than faces, which can carry much more emotional information, the researchers said.

"We're learning how these mechanisms in our brain respond to different types of information, and it will take a lot of further research and replication of this work before we understand how to harness our ability to forget," said Lewis-Peacock, who has begun a new study using neurofeedback to track how much attention is given to certain types of memories.

"This will make way for future studies on how we process, and hopefully get rid of, those really strong, sticky emotional memories, which can have a powerful impact on our health and well-being," Lewis-Peacock said.

More information: More is Less: Increased Processing of Unwanted Memories Facilitates Forgetting, *JNeurosci* (2019). DOI: 10.1523/JNEUROSCI.2033-18.2019

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