

## Why do we forget?

**Author: Adrian Ephraim**

Contrary to the popular belief that memories simply fade with time and forgetting is an early sign of dementia or Alzheimer's disease, a new theory suggests that forgetting is actually a form of learning.

The cynics among us would agree that if you ever forgot your anniversary, you would instantly learn never to forget it again, based on your spouse's level of disgust. Forgetting has traditionally been associated with a lack of care and attention, tardiness, or worse. The reality is that despite the brain's 100 billion neurons, which help us invent the future, create new vaccines, and send billionaires to space, it still needs help trying to remember simple information like a birthday, Mother's Day, or where you left your car keys.

Now there is scientific evidence to suggest that forgetting certain events and moments in life can be beneficial. Experts say forgetting can lead to more flexible behaviour and better decision-making.

Dr Tomás Ryan, Associate Professor at the Institute of Neuroscience at Trinity College Dublin, and Dr Paul Frankland, Professor in the Department of Psychology at the University of Toronto, are the scientists who have put forward their study, published in the leading international journal, *Nature Reviews Neuroscience*.

Ryan and Frankland's study explains that "forgetting may be a functional feature of the brain, allowing it to interact dynamically with the environment". In other words, if you create memories under circumstances that are not relevant to your current environment, forgetting those memories can be a positive change that allows you to deal with your current situation and realities.

"Memories are stored in ensembles of neurons called 'engram cells' and successful recall of these memories involves the reactivation of these ensembles. The logical extension of this is that forgetting occurs when engram cells cannot be reactivated," Ryan explains. "The memories themselves are still there, but if the specific ensembles cannot be activated they can't be recalled. It's as if the memories are stored in a safe but you can't remember the code to unlock it."

We've all been in situations where we've felt our memories are locked in and we're unable to release them when we need to, and yet somehow when we least expect it – probably late at night or in the shower – the memory comes flooding back. In other words, according to the scientists, we learn to forget some memories while retaining others that are important. Recent research indicates that forgetting is due to altered memory access rather than memory loss.

Recent studies [<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0120644>] have shown that 56% of information is forgotten within an hour, 66% after a day, and 75% after six days.

"There are multiple ways in which our brains forget, but all of them act to make the engram – the physical embodiment of a memory – harder to access," Franklin adds.

"Our new theory proposes that forgetting is due to circuit remodelling that switches engram cells from an accessible to an inaccessible state," Ryan says. "Because the rate of forgetting is impacted by environmental conditions, we propose that forgetting is actually a form of learning that alters memory accessibility in line with the environment and how predictable it is."

The Decay Theory is one reason that experts propose for humans forgetting so much information, and that if a memory is not retrieved and rehearsed regularly, it will fade and disappear almost completely. The brain prunes memories that are not in use in a process called "active forgetting".

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Interference is another reason humans forget. It happens when memories compete and replace other memories. In most cases, forgetting is a failure of memory retrieval. For some forgetting is temporary, while in extreme cases it may be permanent.

Another reason for forgetting is that some people have trouble committing certain information to memory in the first place. Memories also tend to be simplified. You may remember an event or the gist of it, but it's rare that you would remember the details. Doing this allows you to store more important information that you can recall at a later stage when you need it the most.

An important reason we forget is because we want to and we need to. It's called motivated forgetting. People who have been through trauma would instinctively want to forget the experience and block it out because those painful memories could bring about stress and anxiety. Forgetting in this case becomes a survival technique for the mind.

Meanwhile, in Canada, researchers have put forward a paper that supports the idea that a memory can take the form of two different representations in the brain: familiarity or recollection, meaning "the primary cause of forgetting... depends on the nature of the initial memory".

Familiarity is defined as being able to "know" something happened without remembering the exact details or the context. An example would be that person who looks familiar, who you know you've met before, but you can't quite put your finger on when or where.

A Recollection on the other hand is being able to remember an event or meeting someone, with the defining details. You remember the person and the defining details of the meeting.

Ryan and Frankland believe that "natural forgetting" is a reversal, and that in extreme cases such as Alzheimer's those natural forgetting mechanisms are "hijacked", resulting in reduced engram cell accessibility, and "pathological memory loss".

Let's not forget that forgetting has also spawned entire industries built on our perceived absent-mindedness, and so we must have reminders, calendars, scheduling, and note-taking.