

## Total recall sounds great, but some things should be forgotten

December 4 2015, by Jyutika Mehta

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External enhancements of memory may soon go high-tech. Credit: Nom & Malc, CC BY-NC-ND

Imagine never again forgetting where you parked your car, or that last item you had on your grocery list, or why you walked into this room anyway. If you trust [media stories](#) about research [currently under way at Defense Advanced Research Projects Agency \(DARPA\)](#) to build an implantable device to restore memory, you might not have to worry about these memory lapses in the future.

Many neuroscientists share the dream of neuroprosthetic technology that could help damaged brains function. [Many such devices](#) are in [various stages of experimentation](#). Beyond helping those with impaired memories, the next step could conceivably be implantable "brain chips" that would improve the memories of the rest of us, ensuring that in the future we never forget anything.

But what would it really mean if we were able to remember every single thing?

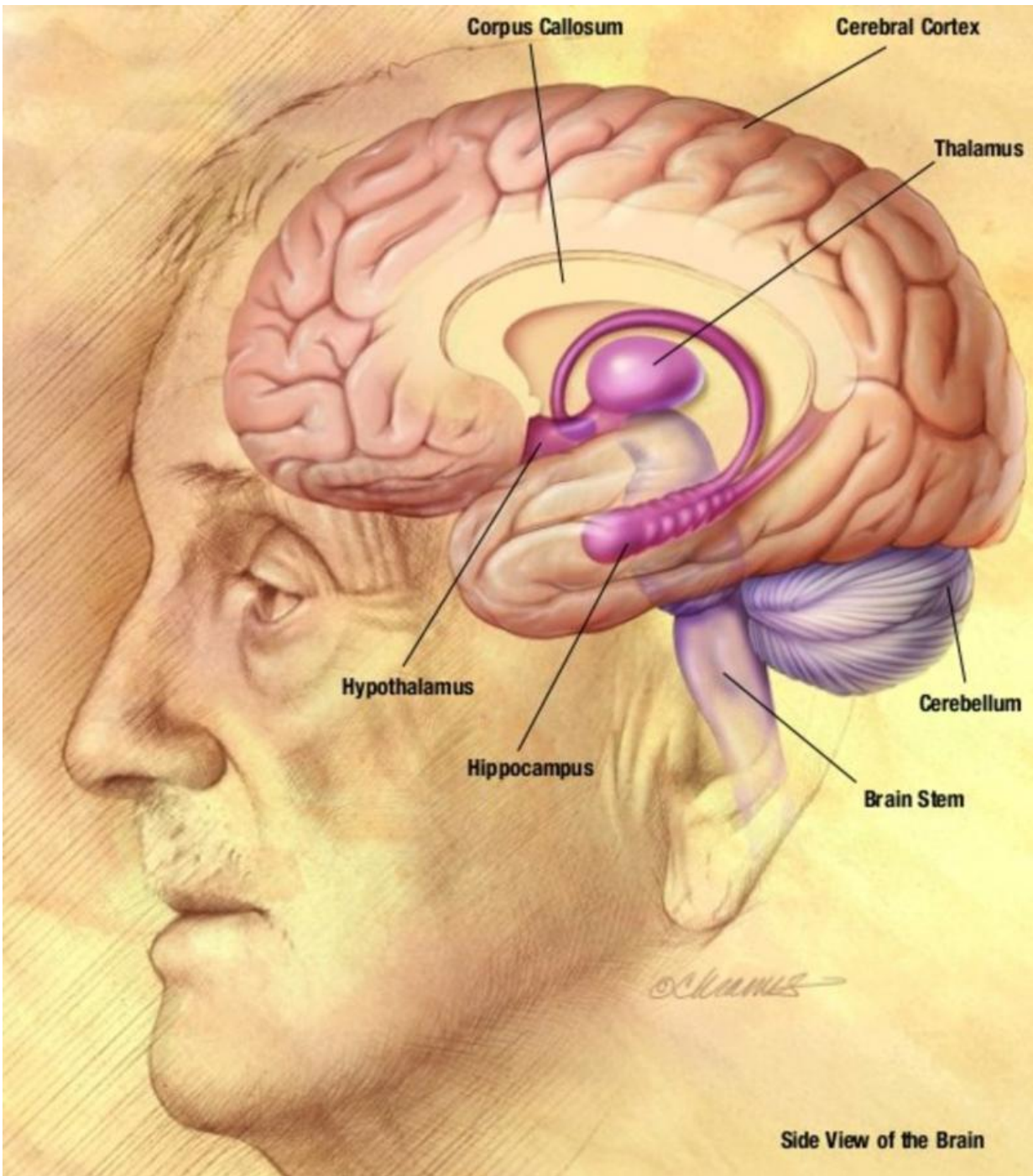
## How brains remember

Since the early neurological work on memory in the 1950s and 1960s, studies have demonstrated that [memories](#) are not stored in just one part of the [brain](#). They're widely [distributed across the whole brain](#), particularly in an area called the cortex.

Contrary to the popular notion, our memories are not stored in our brains like books on shelves in specific categories. They're actively reconstructed from elements scattered throughout various areas of the cortex by a process called encoding.

As we experience the world through our eyes, ears and so on, various groups of [neurons](#) in the cortex fire together to form a neural pathway from each of these senses and encode these patterns into memories. That's why the aroma of cornbread may trigger a Thanksgiving dinner memory at grandmother's house many years ago, or the sound of a car backfiring may trigger a panic attack in a war veteran.

A structure called the hippocampus, located within the cerebral cortex, plays a vital role in memory. We find the [hippocampus is damaged](#) in conditions that affect memory [such as Alzheimer's disease](#).



Brain structures involved in memory. Credit: National Institute for Aging

Forgetting, then, is an inability (either temporary or permanent) to [retrieve](#) part of the [neural pathway](#) that's been encoded in the brain. Increasing forgetfulness is a normal part of the aging process, as the [neurons](#) start to lose their connections and pathways start to wither off. Ultimately the brain shrinks and becomes less effective at remembering. The hippocampus is one of the first areas of the brain to [deteriorate with age](#).

## **Some things are better left forgotten**

I believe that forgetting is almost as critical as remembering.

I study the brain and examine how language, communication and hence memory are represented in the brain and the influence disorders such as stroke and [post-traumatic stress disorder](#) (PTSD) have on it. While human memory is dynamic and flexible, it's also susceptible to distortions arising from aging and pathological processes.

But forgetting isn't just a loss that comes with age. It's a normal part of the memory process. We don't need to remember a lot of what happens to us – what we made for dinner two years ago, where we left the car the last five times we parked in this lot. Those are examples of things that aren't useful to remember anymore.

There's also the question of memories that are actively hindering our lives. Research suggests, and my work with memory-related conditions corroborates, that some people have an inability to forget traumatic events. This characteristic is partially responsible for conditions [including depression](#) and [PTSD](#).

When memories of terrible events don't fade naturally, can we move on with our lives?





If an elephant never forgets, is that necessarily good? Credit: Vin Crosbie, CC BY-ND

A patient diagnosed with PTSD-related depression in one of my studies wanted to suppress all memories of his combat experience. He lost two friends in a particular battle and has had difficulty getting past that experience. It appears that we cannot willfully eliminate memories.

He tells me that yes, he would like to recall where he put his car keys and would like to remember his children's birthdays, but would rather

eliminate the traumatic memories of his combat experience.

Developing technology for total recall may sound wonderful and time-saving for improving daily living. Never forget an appointment, never spend precious minutes looking for misplaced keys, perhaps never even need a calendar to remember important events. And, of course, an implantable brain chip would be a huge boon for those whose memories have been destroyed by disease or injury. But there's a hitch to total recall that doesn't allow us as individuals and as a society to forget.

Perfect memory engenders stasis – the legacy of any failures (personal or in others) won't be allowed to fade and therefore we cannot move past them. Forgetting allows for new beginnings and for personal and societal healing and forgiveness. It is critical for a war veteran to advance past a traumatizing event from the battlefield, or a spouse with hurt feelings to be able to let go of that experience to repair a relationship. We all need to let some memories go; it's part of the process that allows us to appreciate the proverbial forest of our existence while not getting too bogged down with the trees of our daily lives.

For better or worse, technology for not ever forgetting may be here sometime soon. Whatever form this imagined external [memory](#) enhancement takes, it will be interesting to see how a new way of remembering changes us in return.

Perhaps some of us may have to add one more thing to our list – remember to forget.

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