

Psychology

How accurate is our memory?

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ABSTRACT

Our memories often feel like records of the past. But the dominant view among scientists is that our personal memories are highly prone to error and not to be trusted. How accurate is memory, really? No need to be pessimistic – our study suggests that memory, while not a perfect record, is much more accurate than scientists think.



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Cast your mind back to an experience from your past. For example, the last time you ate dinner at a restaurant. Take a minute or two to recall as many details as you can – who you were with, where you sat, any stray recollections of sights, smells, or thoughts. How you got some hummus on your pants, perhaps, or arrived late. This remarkable ability to mentally time travel to a specific past event is called episodic memory. But how much of what you just recalled is *wrong*? And how would you know? In a new study, we explored how faithful our episodic memory is.

On the one hand, we implicitly believe that our own memories correspond to the reality of the past, and this belief is core to our very sense of self. Our shared

belief in the accuracy of each others' memories grounds our collective social fabric and affects the outcomes of our justice system. On the other hand, we all know that memory is not a perfect record of the past – remembering is reconstructive process. Most obviously, we forget. Memories that are at first vivid inevitably fade or disappear altogether. And more dramatically, we sometimes remember *incorrectly*, warping or augmenting the details of past events.

Earlier studies have revealed a variety of factors that affect false remembering. For example, extremely emotionally arousing events can produce memories that are erroneous even when vivid. Additional factors also increase memory distortions: for

example, misleading information, interference, and leading questions. As a result of these findings, the prevailing view in memory science is now that our memories are highly error-prone and untrustworthy. Yet these studies are usually conducted under relatively artificial conditions in the laboratory – people may study a list of words, or pictures, or watch short video clips and then perform a recall test seconds or minutes later, with conditions often designed to encourage memory errors. As a consequence, very little is known about the accuracy of memories for first-person real-world experiences, the kind that make up our lives outside the laboratory. Furthermore, we know that memory errors can occur – but without experimental manipulations, how often *do* they actually occur in real-life settings?

This question has been surprisingly difficult to answer. Although each of us has a seemingly infinite bank of personal memories spanning our life history, these memories are almost always unverifiable. To address this issue, we assessed participants' memories for two different 'staged events' – extended, immersive, real-life experiences that were nonetheless controlled and verifiable. The events were a respiratory mask-fitting procedure that was mandated for all employees in hospital (this was before COVID-19), and an audio-guided art tour designed for the purposes of this experiment. Younger and older adult participants freely recalled these events, describing their experiences in as much detail as they could, after delays ranging from two days to two years.

We decomposed these memories into their constituent details (e.g., actions, perceptual features, spatial and temporal details, information unrelated to the events, etc.), and then measured the accuracy of each verifiable detail against the ground truth. This approach allowed us to tease apart memory accuracy (what proportion of details

were accurate) from memory quantity (how many unique details were recalled) – variables that are often confused with each other. So, what did we find? Memory errors were detectable (76% of participants made at least one), but accuracy was very high overall (93-95% of all verifiable details were accurate). Moreover, this level of accuracy did not decline in older participants nor in older memories, even though memory quantity and vividness did. So, although our memories fade with age and time, the memories we do recall remain highly accurate. But is this surprising?

It is – in a survey describing the methods of our study, we asked memory scientists (and other academics) to predict the level of accuracy we would observe. Like memory accuracy itself, the perception of memory accuracy is important, too – particularly in the courtroom. Survey respondents were consistently highly pessimistic about the fidelity of memory, estimating the recall error rate to be over 50% (contrasted with our observed error rate of 5-7%). This suggests that experimental evidence for the malleability of memory may have led to an overcorrection in scientists' views on memory accuracy in general. In other words – memory is more accurate than we thought.

It is important to highlight that our findings speak to the accuracy of memory under relatively 'clean' retrieval conditions, without misinformation, other highly confusable events, or leading cues and questions from investigators. Future work may reveal important new insights about how memory accuracy change in neuropsychiatric disorders and dementia, and how our brains retain traces of the past in the first place ([read also the Break: *Where is the Engram?*](#)).

So, you can go ahead and trust your memories. Including, unfortunately, the ones about showing up late and getting hummus on your pants.