BBC NEWS SCIENCE & ENVIRONMENT

By Melissa Hogenboom
Science reporter, BBC News

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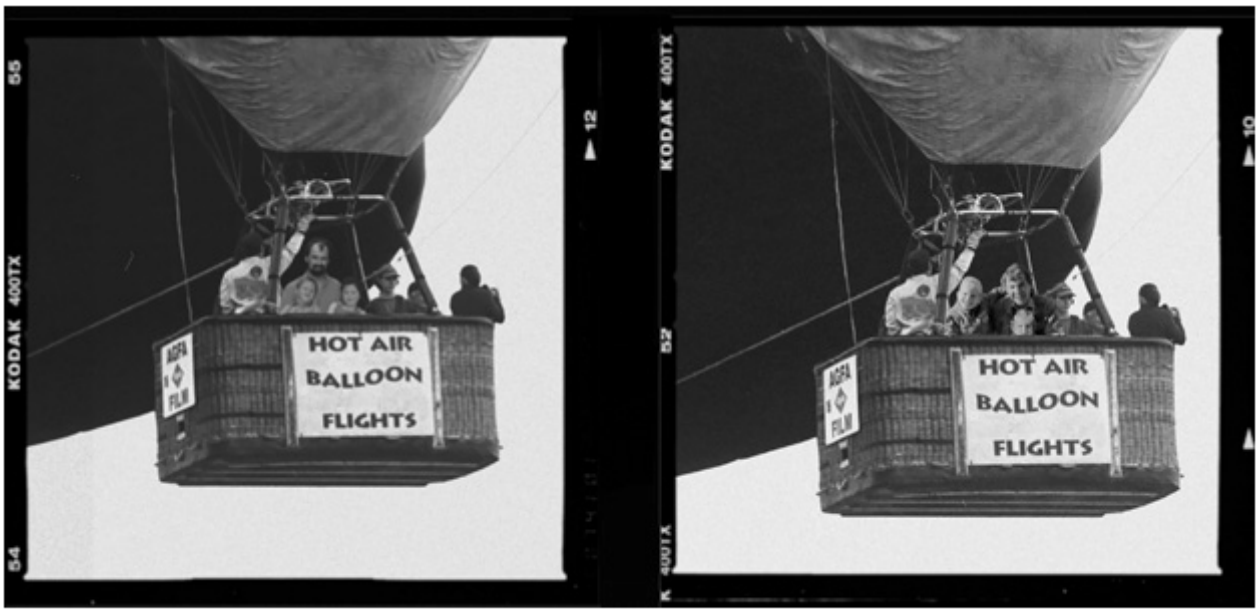
Why does the human brain create false memories?



A doctored photo made many people believe they had been on a real hot air balloon ride

Human memory constantly adapts and moulds itself to fit the world. Now an art project hopes to highlight just how fallible our recollections are.

All of us generate false memories and artist AR Hopwood has been "collecting" them.

For the past year he has asked the public to submit anecdotes of fake recollections which he turns into artistic representations.

They have ranged from the belief of eating a live mouse to a memory of being able to fly as a child.

One man who wrote in wrongly believed his girlfriend had a sister who died while at the dentist. So strong was his conviction that he kept all his dentist visits secret.

He wrote: "Over dinner one day she said she was going to the dentist the next week. It all went quiet at the table and my mum said it must be hard for her to visit the dentist after what had happened."

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This is hardly a rare case. Neuroscientists say that many of our daily memories are falsely reconstructed because our view of the world is constantly changing.

Imagination trick

Subtle cues can easily steer our memories in the wrong direction.

A famous experiment carried out by Elizabeth Loftus in 1994 revealed that she was able to convince a quarter of her participants they were once lost in a shopping centre as a child.

Another similar experiment in 2002 found that half of the participants were tricked into believing they had taken a hot air balloon ride as a child, simply by showing them doctored photographic "evidence".

The false memory archive

A selection of anonymous false memories:

I remember biting into a mouse when I was four [and living] in Indonesia in order to make my brother be quiet... A mouse ran by and I bit into it. Blood filled my mouth and ran down my face.

I remembered that I saw a green comet on the sky through the window.

Watching the first Moon landing. I clearly remember it, from inside a playpen. But... I was three, and asleep in another room.

I can remember being able to fly as a small child. For years, in my teens I really struggled to accept that this wasn't a real memory.

Submit your own false memories

Participants readily believed they had once been lost in a shopping centre when presented with "evidence"

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This work was carried out by Kimberley Wade at the University of Warwick, UK. For the current project she was asked by Mr Hopwood to take part in a real hot air balloon ride, video and images of which are now exhibited in his show. She says she was very excited to take part.

"I've been studying memory for more than a decade, and I still find it incredible that our imagination can trick us into thinking we've done something we've never really done and lead us to create such compelling, illusory memories," she says.

The reason our memories are so malleable, Kimberley Wade explains, is because there is simply too much information to take in.

"Our perceptual systems aren't built to notice absolutely everything in our environment. We take in information through all our senses but there are gaps," she adds.

"So when we remember an event, what our memory ultimately does is fills in those gaps by thinking about what we know about the world."

Lost keys

For the most part false memories are about everyday situations with no real consequences except the occasional disagreement with a friend or partner about trivial things like who lost the keys, again.

But sometimes, false memories can have more serious ramifications. For example, if an eyewitness testimony in court contributes to a false conviction.

Forensic technology has now led to many such convictions being overturned. **The Innocence Project** in the US campaigns to overturn eyewitness misidentification and lists all the people who have subsequently been acquitted.

The project reports that there have been 311 post-conviction DNA exonerations in the US, which includes 18 people who were sentenced to death before DNA evidence was able to prove their innocence.

Christopher French of Goldsmiths University in London says there is still a lack of awareness of how unreliable human memory is, especially in the legal system.

A simple test

- Say the following words to a friend: *bed, rest, awake, tired, dream, wake, snooze, blanket, doze, slumber, snore, nap, peace, yawn and drowsy*
- Later, ask your friend to recall the words they heard
- How many incorrectly listed *sleep* as one of the initially given words?

A study found that participants recall the word sleep with about the same probability that they remember other words from the list.

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"Although this is common knowledge within psychology and widely accepted by anybody who has studied the literature, it's not widely known about in society more generally," he says.

"There are still people who believe memory works like a video camera as well as people who accept the Freudian notion of repression - that when something terrible happens the memory is shoved down into the subconscious."

But the evidence of repressed memories, he adds, is "very thin on the ground".

A psychologist's memory of her hot air balloon ride features in the exhibition

Prof French was also involved in the memory project. He hopes it will create more awareness of the malleability of human memory.

So too does AR Hopwood. He says he was fascinated to learn that people could strongly believe in an entirely imagined event.

"What's interesting is that the submissions become mini-portraits of the person (albeit anonymously) yet the only thing you are finding out about this person is something that didn't actually happen. So there's a lovely paradox there which I'm very drawn to as an artist," he says.

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Saving us from the tiger

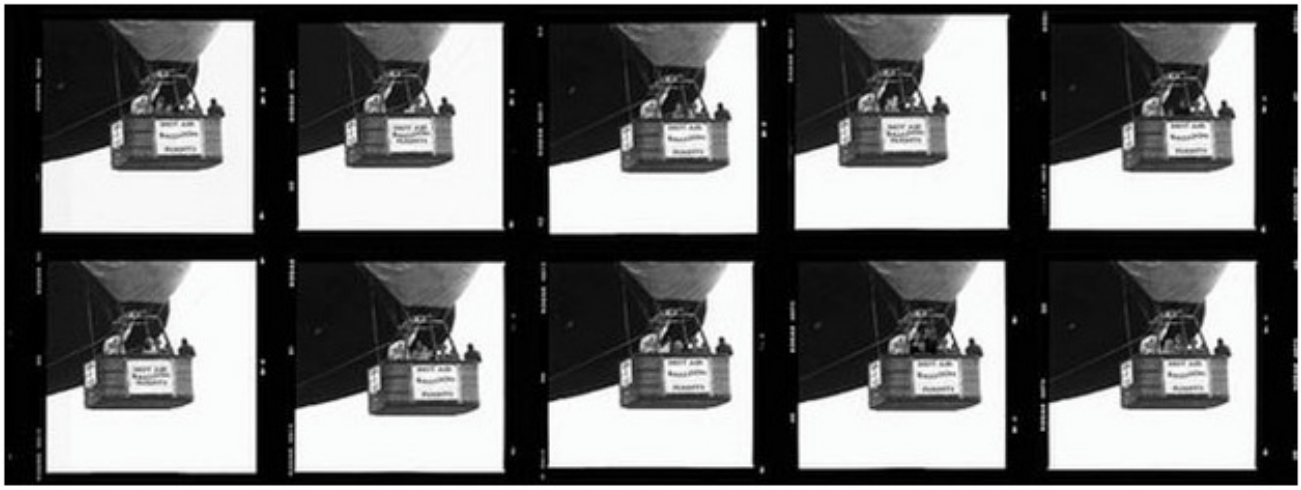
According to another researcher, the errors the human brain makes can sometimes serve a useful purpose.

Sergio Della Sala, a cognitive neuroscientist at the University of Edinburgh, UK, says it can be thought of in the following way. Imagine you are in the jungle and you see some grass moving. Humans are likely to panic and run away, with the belief that there could be a tiger lurking.

A computer, however, might deduce that 99% of the time, it is simply the wind. If we behaved like the computer, we would be eaten the one time a tiger was present.

"The brain is prepared to make 99 errors to save us from the tiger. That's because the brain is not a computer. It works with irrational assumptions. It's prone to errors and it needs shortcuts," says Prof Della Sala.

False memories are the sign of a healthy brain, he adds. "They are a by-product of a memory system that works well. You can make inferences very fast."



The False Memory Archive, supported by the Wellcome Trust, opened at The Exchange in Penzance on Saturday 28 September