

## 3 Questions: John Gabrieli on studying traumatic memories

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Graphic: Christine Daniloff

Starting just days after the Sept. 11, 2001, terrorist attacks, MIT neuroscientist John Gabrieli (who was then at Stanford University) and colleagues around the country undertook a large-scale survey of how people remembered the attacks. For decades, psychologists have theorized that such traumatic events become imprinted into the brain, creating memories much more vivid than our usual everyday ones. However, some studies have shown that these memories are not as accurate as we may believe them to be. Here, Gabrieli, the Grover Hermann Professor of Health Sciences and Technology and Cognitive Neuroscience, discusses what the 9/11 study tells us about such “flashbulb” memories.

Q. How did you and your colleagues decide to undertake this survey? What did you hope to learn from it?

A. Like everybody else, we were moved by the tragedy of 9/11. As [memory](#) researchers, we were aware that important public events like 9/11 offer a rare opportunity to examine scientifically how people remember emotionally powerful events over time. (We cannot create such events in a laboratory, and other emotionally powerful experiences occur in private and highly variable ways in each person's life). So Elizabeth Phelps, at New York University, and I reached out to our colleagues in memory research across the nation in places that were directly attacked (New York and Washington); a place that was involved (Boston, where flights originated); and four other cities across the country.

We asked about 3,000 people for specific information about their experiences on 9/11, such as details of the attacks, details about how they learned about the attacks, where they were, who they were with and what emotions they felt. Then, we asked the same questions to the same people about a year later and again about three years later; we are now doing a 10-year follow-up.

When people have a very emotional experience, they feel they have a “flashbulb memory” that is highly accurate and detailed, and one that they will never forget. We wanted to know in what sense that is accurate or inaccurate — what specific aspects of an emotionally powerful experience are accurately remembered over time. Bill Hirst at the New School for Social Research and [Phelps] led the analyses and reporting of the findings.

Q. How do the emotions experienced during a traumatic event such as 9/11 influence how we recall what happened?

A. In general, emotions substantially enhance our memory for experiences. Indeed, there is a [brain](#) structure, the amygdala, which seems to be specialized for the enhancement of memory on the basis of emotion and arousal.

But two other aspects of emotionally charged memories have been noted in multiple laboratory and real-life studies. First, the natural focus on the ... emotional experience often decreases memory for other aspects of that experience. Second, because the event is so powerful, people are often overconfident that their memory for all aspects of the experience is highly accurate. We may agree that we remember little about Sept. 3, 2001, but we feel we remember a lot about our experience on Sept. 11, 2001, with great certainty.

Q. What did your survey reveal about how accurate those memories are?

A. Of course, people were highly accurate in remembering the general events of 9/11, although to what extent this comes from that day itself versus the many subsequent news reports and discussions about 9/11 since then is difficult to ascertain.

But the other specific and personal details reported by people days after 9/11 were not immune from forgetting. People were 67 percent accurate in recollecting those details a year later, and 57 percent accurate three years later. So, the content of the memories appeared to stabilize after a year, but still, after three years, about half of the details were inaccurately remembered.

People were least accurate in remembering their feelings at the time, around 40 percent accurate. But, they remained highly confident about the accuracy of all their memories, typically rating their confidence over a 4 on a scale of 1 to 5.

Overall, these findings support the everyday experience that emotions enhance our memories and demonstrate that such emotions can make us overconfident — so that we think we remember things we have actually forgotten. They also show that emotional reactions to an event are remembered less well than non-emotional aspects of an experience, such as where and from whom we learned about such an event.

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