

# Study finds that memory works differently in the age of Google

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The rise of Internet search engines like Google has changed the way our brain remembers information, according to research by Columbia University psychologist Betsy Sparrow published July 14 in *Science*.

“Since the advent of search engines, we are reorganizing the way we remember things,” said Sparrow. “Our brains rely on the Internet for memory in much the same way they rely on the memory of a friend, family member or co-worker. We remember less through knowing information itself than by knowing where the information can be found.”

Sparrow’s research reveals that we forget things we are confident we can find on the Internet. We are more likely to remember things we think are not available online. And we are better able to remember where to find something on the Internet than we are at remembering the information itself. This is believed to be the first research of its kind into the impact of search engines on human memory organization.

Sparrow’s paper in *Science* is titled, “Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips.” With colleagues Jenny Liu of the University of Wisconsin-Madison and Daniel M. Wegner of Harvard University, Sparrow explains that the Internet has become a primary form of what psychologists call transactive memory—recollections that are external to us but that we know when and how to access.

The research was carried out in four studies.

First, participants were asked to answer a series of difficult trivia questions. Then they were immediately tested to see if they had increased difficulty with a basic color naming task, which showed participants words in either blue or red. Their reaction time to search engine-related words, like Google and Yahoo, indicated that, after the difficult trivia questions, participants were thinking of Internet search engines as the way to find information.

Second, the trivia questions were turned into statements. Participants read the statements and were tested for their recall of them when they believed the statements had been saved—meaning accessible to them later as is the case with the Internet—or erased. Participants did not learn the information as well when they believed the information would be accessible, and performed worse on the memory test than participants who believed the information was erased.

Third, the same trivia statements were used to test memory of both the information itself and where the information could be found. Participants again believed that information either would be saved in general, saved in a specific spot, or erased. They recognized the statements which were erased more than the two categories which were saved.

Fourth, participants believed all trivia statements that they typed would be saved into one of five generic folders. When asked to recall the folder names, they did so at greater rates than they recalled the trivia statements themselves. A deeper analysis revealed that people do not necessarily remember where to find certain information when they remember what it was, and that they particularly tend to remember where to find information when they can't remember the information itself.

According to Sparrow, a greater understanding of how our memory works in a world with search engines has the potential to change teaching

and learning in all fields.

“Perhaps those who teach in any context, be they college professors, doctors or business leaders, will become increasingly focused on imparting greater understanding of ideas and ways of thinking, and less focused on memorization,” said Sparrow. “And perhaps those who learn will become less occupied with facts and more engaged in larger questions of understanding.”

**More information:** [www.sciencemag.org/content/ear...7/13/science.1207745](http://www.sciencemag.org/content/ear...7/13/science.1207745)

Provided by Columbia University

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