

Researchers reveal how the mundane can be meaningful—and remembered

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It's not surprising that our memories of highly emotional events, such as 9/11 or the birth of a child, are quite strong. But can these events change our memories of the past? In a study published in the journal *Nature*, NYU researchers report that emotional learning can lead to the

strengthening of older memories.

"We're continuously monitoring our environment, and, in the process, accumulating countless details," observes study lead author Joseph Dunsmoor, a post-doctoral fellow at NYU. "We forget most of these details, but these new findings suggest that meaningful or [emotional events](#) can selectively preserve memory for previously encountered information that seemed insignificant at the time."

In a series of experiments, NYU's team examined the fate of seemingly inconsequential information that was, or was not, later made more meaningful—with the aim of understanding if and how past memories are updated with new emotional learning.

Participants were asked to identify a series of images of animals and tools. Approximately five minutes later, [shock](#) electrodes were attached to the wrists of the participants and they were shown new images of animals and tools that also required identification. However, upon being shown one category of images—either animals or tools—they received a mild shock. This commonly used procedure was designed to make one category of images emotionally meaningful.

Memory was then tested, either immediately or after a delay, for all the images seen during the experiment. Not surprisingly, memory for the images paired with shock was better than for the images not paired with shock. For example, those who received the shock while viewing animal images were better able to recall those images than they were images of the tools, which they saw without the shock.

However, the researchers also discovered that this emotional learning reached back in time to influence memory for the images seen before the learning procedure—when no shocks were possible. Specifically, those who received a shock while viewing tool images at a later time

were better able to recall tool images seen earlier than they were animal images. Likewise, those who received a shock while viewing animal images paired with shock were better able to recall animal images seen earlier than they were tool images.

In other words, subjects were able to recall an ordinary memory because it was later categorically linked ("animal" or "tool") to [emotional learning](#). This enhanced memory for prior mundane events was only observed after a delay, suggesting that this retroactive memory enhancement occurs by facilitating long-term memory storage.

"These new findings highlight the highly adaptive nature of our [memory](#) system and suggest that our memories not only can travel back in time to retrieve events from the past, but that it can update past memories with important new information or details " explain authors Lila Davachi and Elizabeth Phelps, both professors of psychology and neural science whose labs jointly conducted this research.

More information: Emotional learning selectively and retroactively strengthens memories for related events, *Nature*, [DOI: 10.1038/nature14106](#)" target="_blank">nature.com/articles/[DOI: 10.1038/nature14106](#)

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