

## Images Slip Unnoticed into the Brain

**From:** law and psychology discussion list [mailto:PSYLAW-L@listserv.unl.edu] **On Behalf Of** Michael Lamport Commons

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**To:** PSYLAW-L@listserv.unl.edu

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Robert Karl Stonjek wrote:

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## Hidden memories guide choices

Images slip unnoticed into the brain.

Heidi Ledford

*Volunteers were shown kaleidoscopic images during the tests. Nat. Neuroscience*

Memories that we are not aware of may be just as accurate as those we recall, researchers have found. And they might also provoke unique changes in the brain's electrical activity during recall.

The researchers have looked at a type of memory called 'implicit' memory. Whereas 'explicit' memory is full of the things we consciously remember, implicit memory contains memories we do not realize we have formed. The phenomenon has been demonstrated in patients with amnesia, who can, with training, learn to solve specific puzzles more quickly despite insisting that they have never seen the puzzle before.

In a study published in *Nature Neuroscience*, Joel Voss from the Beckman Institute for Advanced Science and Technology at the University of Illinois, Urbana-Champaign, and Ken Paller of Northwestern University in Evanston, Illinois, report that implicit memory may be at work when we recall images that we have seen before<sup>1</sup>.

"What is exciting is they are sort of bringing an experimental lens to the most twilight aspects of our memory," says neuroscientist John Gabrieli of the Massachusetts Institute of Technology in Cambridge.

### Have I seen you before?

Voss and Paller showed 12 people a series of kaleidoscopic images. Participants were allowed to devote their full attention to half of the images, but were distracted by a number task while viewing the remaining half. That distraction made it harder to consciously remember the pictures.

Then, 45 seconds after studying the images, participants were tested on how well they could distinguish an image they had previously seen from a new, but very similar picture.

Each time they selected an image, they were asked to gauge how certain they were of the choice. Did they clearly remember the picture? Was it merely familiar? Or was it simply a guess?

Overall, it seemed that a guess was not always a guess. When tested on the images they had seen, participants 'guessed' correctly more often than they 'remembered' correctly. But Voss says it is too soon to tell whether the findings will have implications for real-world scenarios — such as exposure to subliminal messages. So far, he has only tested the phenomenon using non-sensical, kaleidoscope images. And he has only given subjects a choice between the image they had seen before and a very similar one. Images that bear some meaning, for example, would be more likely to be remembered explicitly.

## Electrical connection

The authors have reported similar results before<sup>2</sup>. But this time, Voss and Paller also measured changes in electrical signals in the brain as the people completed their tests. They found that a unique signature appeared 200 milliseconds after the image was shown that was associated with correct 'guessing' of an image originally viewed while distracted.

"The timing is interesting," says Gabrieli. "This effect is occurring in the early push of processing, as opposed to when more time passes and you have more time to think about it." A brain-imaging experiment, such as functional magnetic resonance imaging to observe changes in blood flow to different regions of the brain, could provide more information about where in the brain these signals are originating, he adds.

The results are "striking", says Daniel Schacter, a professor of psychology at Harvard University. An earlier imaging study<sup>3</sup> conducted by Schacter and Scott Slotnick, who is now at Boston College, found differences in brain activity when participants correctly or incorrectly believed that they had seen an image before. Those differences were found in the visual cortex, a region of the brain that processes images, and Schacter speculates that the electrical signature Voss and Paller observed has similar origins.

## References

1. Voss, J. L. & Paller, K. A. Nature Neuroscience. Advanced online publication doi: 10.1038/nn.2260 (2009).
2. Voss, J. L., Baym, C. L. & Paller, K. A. Learn. Memory. 15, 454–459 (2008). | [Article](#) | [PubMed](#) |
3. Slotnick, S. D. & Schacter, D. L. Nature Neuroscience. 7, 664–672 (2004). | [Article](#) |

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Robert Karl Stonjek