

That gut feeling may actually reflect a reliable memory

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You know the feeling. You make a decision you're certain is merely a "lucky guess."

A new study from Northwestern University offers precise electrophysiological evidence that such decisions may sometimes not be guesswork after all.

The research utilizes the latest brain-reading technology to point to the surprising accuracy of memories that can't be consciously accessed.

During a special recognition test, guesses turned out to be as accurate or more accurate than when study participants thought they consciously remembered.

"We may actually know more than we think we know in everyday situations, too," said Ken Paller, professor of psychology at Northwestern. "Unconscious memory may come into play, for example, in recognizing the face of a perpetrator of a crime or the correct answer on a test. Or the choice from a horde of consumer products may be driven by memories that are quite alive on an unconscious level."

The study links lucky guesses to valid memories and suggests that people need to be more receptive to multiple types of knowledge, Paller said.

Paller and Joel L. Voss, who received his Ph.D. at Northwestern and is now at the Beckman Institute, are co-investigators of the study. "An

Electrophysiological Signature of Unconscious Recognition Memory" will be published online Feb. 8 by the journal *Nature Neuroscience*.

During the first part of the memory test, study participants were shown a series of colorful kaleidoscope images that flashed on a computer screen. Half of the images were viewed with full attention as participants tried to memorize them.

While viewing each of the other images, they heard a spoken number, such as 3, 8 or 4, which they had to keep in mind until the next trial, when they indicated whether it was odd or even. On every trial they had to listen to a new number and press a button to complete the number task.

In other words, they could focus on memorizing half of the images but were greatly distracted from memorizing the others.

A short time later, they viewed pairs of similar kaleidoscope images in a recognition test.

"Remarkably, people were more accurate in selecting the old image when they had been distracted than when they had paid full attention," Paller said. "They also were more accurate when they claimed to be guessing than when they registered some familiarity for the image."

Splitting attention during a memory test usually makes memory worse. "But our research showed that even when people weren't paying as much attention, their visual system was storing information quite well," Paller said.

When implicit recognition took place, EEG signals were recorded from a set of electrodes placed on each person's head. The brain waves were distinct from those associated with conscious memory experiences. A

unique signal of implicit recognition was seen a quarter of a second after study participants saw each old image.

The findings include memory effects and brain-wave effects. The memory effects with kaleidoscopes were found in two groups of 24 people each (published in a prior paper: Voss & Paller, 2008). The brain-wave effects were found in one group of 12 subjects. Both memory and brain-wave effects were also seen in pilot studies not reported in either paper.

"The novel results show that when people try to remember, they can know more than they think they know," Paller said.

The study builds upon a body of research that shows that amnesia victims with severe memory problems often have strong implicit memories.

The study suggests that we shouldn't rely only on conscious memory, Paller concludes. "It suggests that we also need to develop our intuitive nature and creativity. Intuition may have an important role in finding answers to all sorts of problems in everyday life -- including big ones such as our ailing economy."

Source: Northwestern University

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