

LD and electrical stimulation



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Researchers have figured out how to make people aware of themselves during a dream: by zapping their sleeping brains with a weak electric current.

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The sensation of "Hey, this is a dream!" is known as lucid dreaming. Those who naturally become lucid while dreaming, probably a small segment of the population, also report adventures that are impossible in the real world, such as flying, that feel completely real. Some can even change a dream's narrative twists and turns to make it less scary—or even more exhilarating. (Related: "[Why Do We Dream? To Ease Painful Memories, Study Hints.](#)")

Lucid dreaming is exciting not only for dreamers but also for neuroscientists, who consider it a window into the study of consciousness. But until now, researchers have been hampered by how hard it is to provoke lucid dreaming in people who don't do it naturally. A new method published today in *Nature Neuroscience* might get around this difficulty, making it easier to stimulate lucid dreaming at will.

"We can really quite easily change conscious awareness in dreams," said lead investigator [Ursula Voss](#), a clinical psychologist at Frankfurt University in Germany. She does this, she said, by delivering mild electrical stimulation to the sleeping person's brain. (Related: "[Electric Jolt to Brain Boosts Math Skills](#).")

Zapping While Napping

In this study, Voss and her team recruited 27 healthy young adults who had never experienced lucid dreaming. Each participant slept overnight in the lab on several occasions. Two minutes after reaching the REM (rapid eye movement) stage of sleep, which is when dreaming happens, the subjects received a weak electrical current (2 to 100 Hertz) to the frontal lobe for 30 seconds, or a sham current with no electricity.

The sweet spot was 40 Hertz. Zapping sleeping volunteers at this frequency, part of the so-called gamma wave band, led their brains to produce brain waves of the same frequency, the researchers found,

which triggered lucidity 77 percent of the time, as determined by self-reports from the dreamers after they were awoken. (Related: "[Dreams Make You Smarter, More Creative, Studies Suggest.](#)")

Stimulations of 25 Hertz, at the low end of the gamma wave band, also sparked lucidity 58 percent of the time. In contrast, subjects who received sham or low-frequency stimulations never became lucid.

Voss had previously identified the 40-Hertz currents as the possible key to lucidity. In a 2009 study, she and her colleagues studied six individuals who were trained lucid dreamers, and found that during episodes of lucidity they produced brain waves in the brain's frontal area of around 30 to 40 Hertz—much higher than is found in typical REM sleep. But the scientists did not know if the gamma waves were a cause of the lucidity or a consequence of it. The new study suggests the former.

Gamma Wave of the Future?

"I'm really impressed, particularly since the effects are so specific for these frequencies," said [Martin Dresler](#), a neuroscientist at the Donders Institute for Brain, Cognition and Behavior in Nijmegen, the Netherlands, who was not involved in the new work.

Gamma frequencies are especially intriguing, he added, because other studies have linked them to consciousness during wakefulness.

The study might have clinical implications for treating conditions such as post-traumatic stress disorder and nightmares, said [Tore Nielsen](#), a dream and nightmare researcher at the University of Montreal. Once a nightmare has begun, for instance, the dreamer could be zapped with gamma waves, become lucid, and potentially change the circumstances of the dream to make it less frightening. "That would be remarkable," Nielsen said. (Related: "[Can Phobias Be Cured in Our Sleep?](#)")

Nielsen also envisions a coming bonanza of brain-stimulation gizmos that allow people to become lucid-dreaming adventurers. "People are going to be scrambling to put together home lucid dreaming induction devices based on this 40-Hertz stimulation procedure," he said. "I wouldn't be surprised if we see products fairly quickly."

Whether or not DIY lucidity becomes a reality, Voss said what's great about lucid dreams is that they help illuminate the human condition. "Being able to reflect upon yourself, to think about your past and plan your future—this is something that only we humans can do."