Researchers have figured out how to zap people's brains to make them smarter

Kevin Loria Jul. 26, 2016, 9:33 AM



The foc.us edge headset is marketed as an endurance-boosting stimulation device, based on research that shows stimulation can help reduce fatigue. foc.us

As we learn more and more about the brain, we're getting better at figuring out how to supercharge it.

One of the most promising and at this point, popular ways (at least, among a certain community of mostly-D.I.Y. body-hackers) to directly charge up our mental abilities involves headsets that direct electric or magnetic pulses at specific regions of the brain.

Brain stimulation is not a new technique. Neuroscientists have been experimenting with various forms of brain stimulation in its modern form for at least 15 years.

But now, due to both a growing body of available how-to knowledge and the ability to purchase brain-stimulating devices off the internet, the devices that can do this work are more accessible than ever before. More importantly, more and more research confirms that a bit of electric or magnetic stimulation really can make a difference.

"Indeed, electrical as well as magnetic stimulation shows promise in the enhancement of cognitive functions," Ruairidh Battleday and Anna-Katherine Brem, Oxford scientists who research techniques and drugs that can boost brainpower, tell Tech Insider in an email.

What happens when you wire up your mind

Today, brain stimulation has become so popular that on July 7, researchers published an open letter in the journal Annals of Neurology cautioning D.I.Y. users about some of the risks involved in stimulating the brain.

Basically, stimulation involves targeting specific brain regions with these pulses in order to quiet some mental processes and to activate or enhance others.

There's good evidence that doing so can improve memory, pattern recognition, the ability to pay attention, mathematical abilities, and more. Research has also shown that stimulation may boost athletic performance too, by making athletes feel less fatigued. And that's just the start of what we're getting to know about stimulation's cognitive enhancement benefits in healthy people. But as Battleday and Brem explained, only a small bit of research has focused on what stimulation does to healthy populations — there's still far more to learn there.

From a medical perspective, researchers have found stimulation can be a treatment for depression, anxiety, and other disorders.

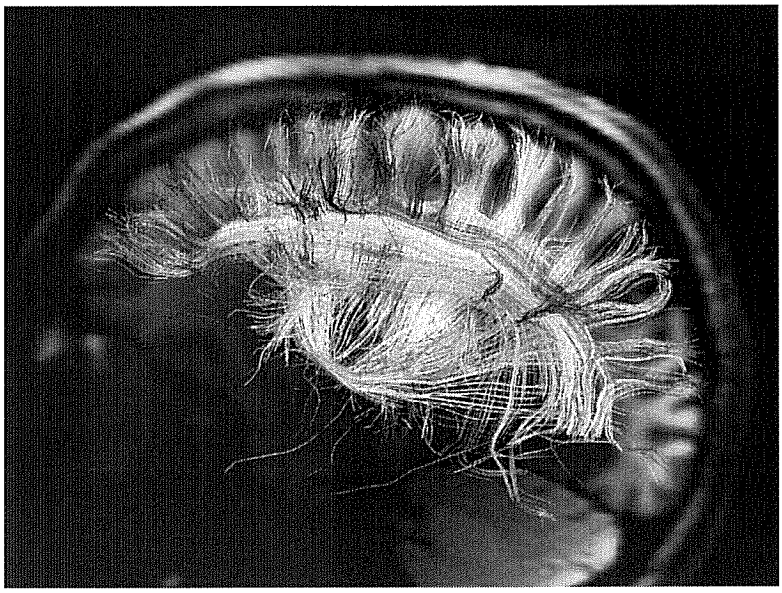
That's pretty powerful. But for now at least, most of our efforts to target specific brain regions, many of which we are still identifying, are not very accurate.

Brain stimulation "is more of a shotgun approach than a scalpel approach," Michael Weisend, a neuroscientist at Wright State Research Institution, told me in November of 2014. And those indirectly or inaccurately targeted regions might usually be harmless, but not always.

As the open letter from worried researchers explained, users might:

- Alter brain regions they didn't intend to touch.
- Have different reactions to stimulation depending on what they are doing at the time. If you are reading a book, your brain does different things than if you were watching TV or playing a video game. The same pulse may have different effects depending on what's happening in your brain.
- Boost one ability that comes with an unexpected trade-off, where another mental process is sacrificed.

It's still early days for this science, and they want to caution users that they shouldn't treat this stuff lightly (if you don't know what you are doing, this is not a safe thing to play around with). Researchers like Weisend tell self-experimenters to steer clear until we know things are safe.



Each pulse of electricity or magnetic force can cause big changes. Human Connectome Project, Science, March 2012.

But the potential that we see so far is fascinating.

The future of brain-zapping

It's not just neuroscientists and body hackers that see the benefit of brain stimulation.

There's a US government initiative at the Intelligence Advanced Research Projects Activity (IARPA) which is supposed to find ways to "improve reasoning and problem-solving in healthy, high-performing adults," and Battleday and Brem say that there's interesting data coming in from that initiative already.

But though many of these tools that might boost our mental ability are intriguing, they are worrisome at the same time. Very real safety questions aside, they also force us to think about who should have access to such enhancements and how a fair society will function with these tools in wide use.

We're seeing that what sounds like a futuristic idea — supercharging your brain — is a real thing, not just a sci-fi concept. Branches of the military are working on it, academic institutions are studying it, and interested civilians are researching and experimenting with it on their own. It's long past time to grapple with the consequences and potential repercussions of this research.

Many people might not want the risks involved, but most everyone wants a chance to be smarter, to be able to push their brain a little further. The science of cognitive enhancement is poised to transform society, for better or worse. The key question is how.

As MIT PhD candidate Anna Wexler wrote in the New York Times earlier this month, this is a science that's moving forward outside established institutions along with inside those research institutions. "The open letter this month is about safety," she wrote. "But it is also a recognition that these D.I.Y. practitioners are here to stay, at least for the time being."