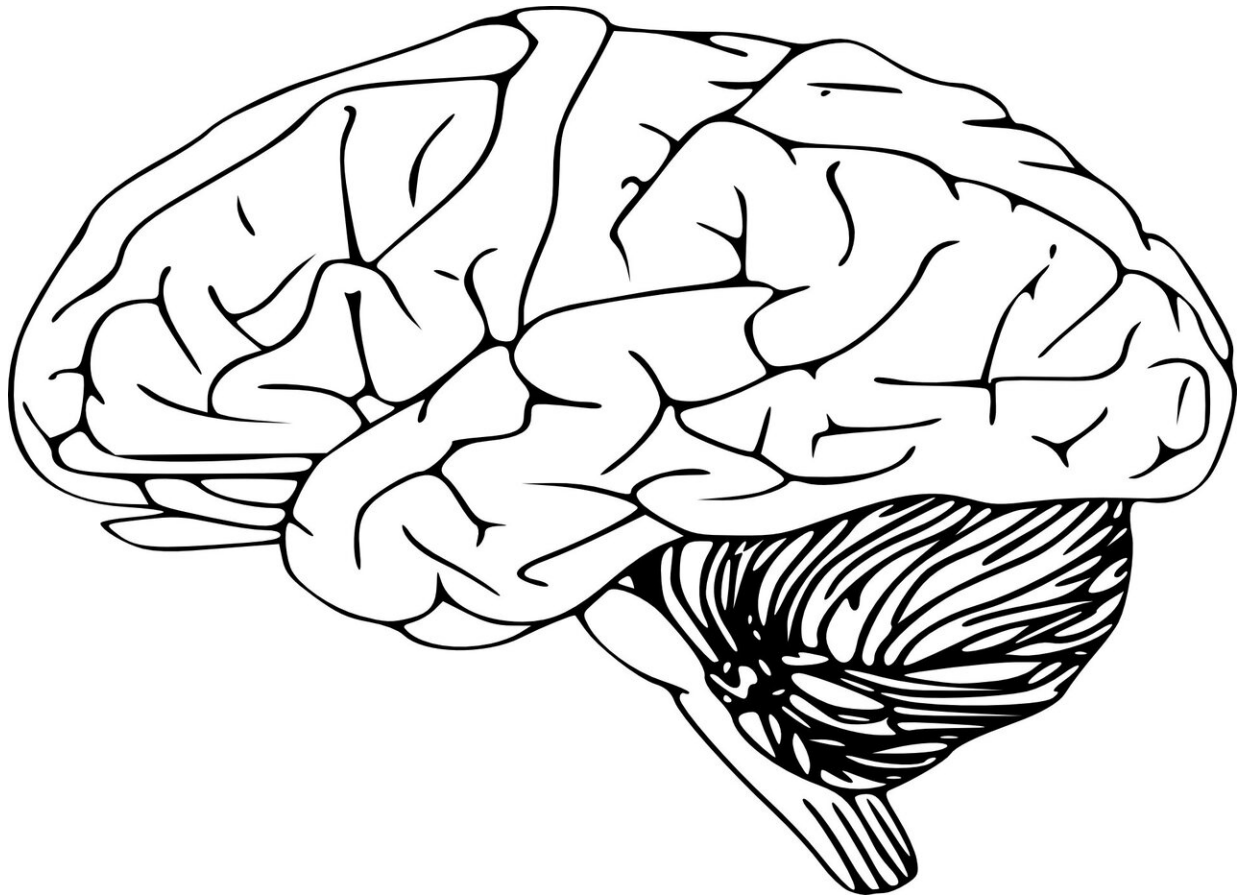


Can 'brain painting' help ADHD patients? Research looks for answers

July 11 2022, by Sam Ogozalek



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It was like a scene in "Stranger Things."

A student at the University of South Florida put on a cap covered with [tiny sensors](#) that record electrical signals in the [brain](#). Then he began to stare at a computer screen.

The student, Tyree Lewis, was stoic. He folded his hands in his lap and silently looked forward.

But as Lewis sat motionless, a blank canvas on the nearby screen started to fill up with shapes: red circles and triangles, green squares.

Lewis was creating art with just his mind. It's a process called "brain painting," when an individual mentally selects colors and shapes to make abstract digital images. It requires intense concentration.

USF computer science and engineering professor Marvin Andujar is studying whether college students diagnosed with attention-deficit/hyperactivity disorder, or ADHD, can use this futuristic technology to improve attention spans and reduce the need for [prescription drugs](#), which can have side effects.

Lewis, a doctoral student who's assisting with the project in Andujar's lab, performed a June demonstration of the brain exercise for Tampa Bay Times reporters. He does not have ADHD.

"The overall goal of this project," Andujar said, is to eventually get the brain-painting tool "into the hands of people outside the lab."

"How can we help them create some sort of habit (where), while they're improving their attention, at the same time they're also improving their emotional state?"

'We need this'

Andujar, a computer scientist in the USF College of Engineering and director of the Neuro-Machine Interaction Lab, previously focused on developing mind-controlled drones using [brain-computer interfaces](#).

They allow users to operate drones with an electronic headband known as an electroencephalography system, which reads electrical signals in the brain. Those signals are translated into commands that prompt the drones to move. This process requires the participants' complete attention to be successful.

In 2019, when showing off his drones at a business and technology summit in Tampa, Andujar said people with ADHD approached him and asked about the technology, saying it might help them improve their short attention spans. College students with ADHD also expressed interest after seeing it used elsewhere.

"The community ... would tell me, 'We need this. This is useful,'" Andujar said.

ADHD is one of the most common mental health conditions, according to the World Health Organization. It's typically diagnosed in children and often lasts into adulthood. In 2016, an estimated 5.4 million kids ages 2 to 17 had ADHD in the U.S., accounting for about 8% of the age group.

At least 60% of children with the neurodevelopmental condition will experience symptoms as adults, researchers say. An estimated 2% to 8% of [college students](#) have ADHD.

Symptoms include hyperactivity, impulsiveness and difficulty paying attention. The condition is usually treated with behavioral therapy and prescription drugs such as Adderall, a medication that helps people concentrate.

Common Adderall side effects include decreased appetite and sleeping problems.

During a German study in 2010, a group of patients with amyotrophic lateral sclerosis, or ALS, used brain-computer interface technology to brain paint. It offered them a new form of creative expression.

So Andujar wondered: Could those with ADHD use brain painting to improve their attention spans and emotional well-being—and minimize the amount of medication they need?

Experimental art

In 2020, the National Science Foundation funded Andujar's brain-painting research with an \$80,000 grant. He and his lab have since collected data on eight USF students who each used the brain-painting technology six times. Two of the participants had ADHD. The rest said they have struggled with their attention spans.

Here's how the brain exercise works: An individual straps on a \$20,000 electrode cap dotted with sensors, then sits in front of a [computer screen](#). Sometimes, the subject also wears an Oculus Rift headset to paint in virtual reality.

The screen displays color, shape and control options. The sensors detect [electrical signals](#) in the brain when a participant is staring at a specific option, eventually prompting a blank canvas to fill up with their selection.

Users must be totally focused on their painting, Andujar said. They shouldn't chat with friends or check their texts. If they do, they probably won't be able to paint what they want. That's because the sensors won't detect them concentrating on their chosen option.

The process can be tiring for first-time participants, Lewis said.

Early results are promising, Andujar said. Five of the eight students have noted slight improvements in their attention spans.

Participants need an hour or two to create an initial brain painting. But the more they use the technology, he said, the faster they become.

The researchers plan to recruit more USF students to keep collecting data. The team also must secure additional funding because most of their grant has been spent, Andujar said.

At some point, he wants to host an art exhibit to showcase brain paintings.

But above all else, Andujar said he hopes to turn the technology into an effective and affordable therapy for those with ADHD.

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