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## **Man Who Is Paralyzed Communicates By Imagining Handwriting**

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MARY LOUISE KELLY, HOST:

An experimental device that turns thoughts into text has allowed a man who is paralyzed to type messages on a computer. NPR's Jon Hamilton reports the device is able to decode signals in the brain that are usually used for handwriting.

JON HAMILTON, BYLINE: The man was left unable to move his arms and legs after an accident, says Dr. Jaimie Henderson, a neurosurgeon at Stanford University.

JAIMIE HENDERSON: He was taking out the garbage, slipped, fell and instantly became quadriplegic. So he's essentially completely paralyzed.

HAMILTON: Henderson says a few years ago, the man agreed to take part in a study of an experimental system that allows people to control computers and other devices using only their thoughts. Henderson says the system relies on electrodes implanted inside the skull.

HENDERSON: The electrodes are placed just over the motor cortex of the brain, which is the outer part of the brain that controls movement.

HAMILTON: Henderson and a team of scientists had the participant imagine that he was holding a pen and handwriting individual letters on a sheet of paper. A computer monitored the man's brain activity. And Krishna Shenoy of Stanford and the Howard Hughes Medical Institute says eventually the machine learned to decode signals associated with every letter of the alphabet.

KRISHNA SHENOY: And then we can determine if the letter he wrote is an A or B or C, and then plop that up on the screen. And you're able to spell out words and sentences and so forth, one letter at a time.

HAMILTON: The system produced the correct letter 95% of the time, so Shenoy and the team decided to see how fast it was.

SHENOY: And what we found, surprisingly, is that we can decode this information quite rapidly so that you're able to type at about 90 characters per minute.

HAMILTON: That's a bit slower than most people can text on a smartphone, but it's more than twice the speed of an earlier approach that had participants use their thoughts to point and click at letters on a screen. Jaimie Henderson says that because handwriting is a skill most brains already know, it was easy for the man to learn to control the computer.

HENDERSON: He was very happy when he was able to write out messages in response to some of the questions that we asked him. He was pretty excited about this.

HAMILTON: Henderson says the ability to communicate this way would be most valuable to someone unable to move or speak.

HENDERSON: We can also envision someone who may have had a spinal cord injury, for example, like our current participant, who wants to use email or say, a computer programmer who wants to go back to work or somebody who wants to produce text of any kind.

HAMILTON: Both Henderson and Shenoy have a commercial interest in the technology.

Decoding imagined handwriting is just the latest success in a long-standing effort to link computers to the human brain. John Ngai directs the NIH BRAIN Initiative, which has played a key role in funding the research. He calls the idea for the study brilliant, but he says the approach is probably still a long way from widespread use.

JOHN NGAI: At the moment, it's a great demonstration of proof of principle, but it was only on one subject in a laboratory setting.

HAMILTON: Ngai says even so, he's optimistic that so-called brain-computer interfaces will eventually help people who've had strokes or spinal cord injuries.

NGAI: I was introduced to this concept over 10 years ago, and I thought it was quite a bit of science fiction. Well, roughly about five years later, it was shown not to be such science fiction after all. So I think we're seeing a progression along this curve. It's really quite exciting.

HAMILTON: The research appears in the journal Nature.

Jon Hamilton, NPR News.

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