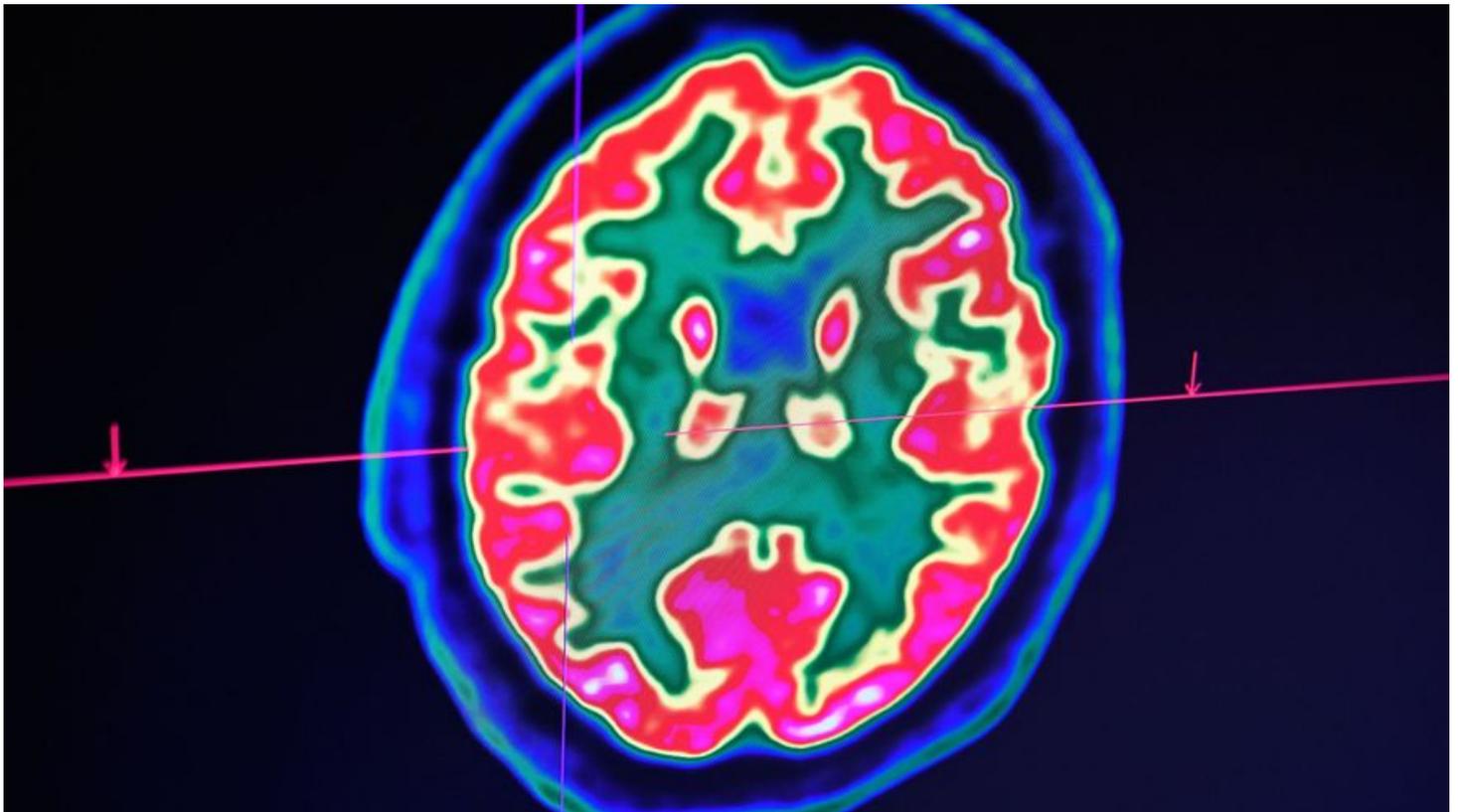


# New system can get a person's speech directly from their brain

By Ian Sample, The Guardian, adapted by Newsela staff on 08.28.19

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A picture of a human brain taken by a positron emission tomography scanner, also called PET scan. Photo by: Fred Tanneau/AFP/Getty Images

Stephen Hawking was a famous scientist. He had to work hard when he wanted to speak. He chose letters and words from a screen controlled by movements of a muscle in his cheek.

However, the slow system he used might soon be replaced. With a different approach, doctors have found a way to get a person's speech directly from their brain.

The breakthrough is the first to show how a person's plan to say specific words can be taken from brain signals and turned into text quickly. It is fast enough to keep up with natural conversation.

The system uses brain-reading software. It works only for sentences it has been trained on. However, scientists believe it could lead to a more powerful system that can quickly know the words a person plans to say.

Doctors at the University of California in San Francisco set out to create a better product. They wanted something that allows people who are paralyzed to communicate more quickly. Today's

devices use eye movements and muscle twitches to control a keyboard.

### **Study Matched Brain Activity To Questions And Answers**

So far, there is no speech system that allows users to interact quickly, as in a conversation, said Edward Chang. He is a doctor and lead scientist on the study. It was published in the journal Nature Communications.

The work was possible thanks to three patients. They had epilepsy. This is a condition that has to do with the nerves. It causes seizures. This is when their body suddenly moves on its own. They were about to have surgery for their condition. Before their operations, all three had a small patch of tiny devices placed directly on their brain for at least a week. It was done to map their seizures.

The patients, all of whom could speak normally, agreed to take part in Chang's study. He used the devices to record brain activity while each patient was asked nine questions. The patients also were asked to read a list of 24 possible responses.

Using the recordings, Chang and his team built computer models. The models learned to match patterns of brain activity to the questions the patients heard and the answers they spoke.

Once trained, the software could identify questions and responses almost instantly. It used only brain signals. It was correct on what question a patient heard 7 out of 10 times. The software identified what response they gave 6 out of 10 times.

### **How Are You Feeling? Are You Warm Enough?**

"This is the first time this approach has been used to identify spoken words and phrases," said David Moses. He is a scientist on the study team. It's important to remember that they did not use many words, he said. They hope to do this in future studies, he said.

The system allowed patients to answer questions about the music they liked and how well they were feeling. They could reply about whether their room was too hot or cold, or too bright or dark. Patients could say when they would like to be checked on again.

Even with the breakthrough, there are hurdles ahead. One challenge is to improve the software so it can translate brain signals into a variety of speech. This will require software trained on a huge amount of spoken language and matching brain signals. These signals will be different from one person to another.

### **Concerns About Exposing Private Thoughts**

Another goal is to read "imagined speech," or sentences spoken in the mind. The system in the study detects brain signals that are sent to move the mouth. However, for some patients these signals may not be enough. More advanced ways of reading sentences in the brain will be needed.

With that could come concerns about speech devices showing people's private thoughts.

Chang said that showing what someone was trying to say was hard enough. Sharing their inner thoughts might not be possible, he said.

"I have no interest in developing a technology to find out what people are thinking," he said. However, if someone wants to communicate and can't, we have a responsibility to help, he said.

