

NewScientist

November 17, 2007
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Eavesdropping on brain cells could translate thoughts into speech; Signals from an electrode implanted in the area of the brain responsible for speech could help paralysed people to speak again.

FORTY-ONE neurons is a drop in the ocean compared with the hundred billion or so cells that are present in our brains. But those few neurons could help Eric Ramsey talk again. It is eight years since a car accident left Ramsey "locked-in" - aware but paralysed and unable to communicate other than through eye movements. By listening in on a tiny population of cells in his brain, neuroscientists hope to give him back his "voice" - a first for someone with his problems.

Ramsey had a wireless electrode implanted 6 millimetres or so below the surface of his brain in 2004 . The electrode records the electronic pulses sent by 41 neurons that surround it in an area of the brain involved in generating speech. By analysing the signals created when Ramsey imagines speaking, the team has developed software that may one day turn his thoughts into speech.

For now, the team is focusing on the building blocks of words. In a series of experiments over the last few years, Ramsey has imagined saying three vowel sounds: "oh", "ee" and "oo". By watching his brain activity, the researchers have been able to identify distinct patterns associated with the different sounds. Although the data is still being analysed, they believe that they can correctly identify the sound Ramsey is imagining around 80 per cent of the time, says Jonathan Brumberg of Boston University, who presented the results at the Society for Neuroscience meeting in San Diego, California, on 5 November.

Over the coming weeks, a computer will begin analysing and translating Ramsay's thoughts into sounds that he will hear immediately - giving him feedback in real time. That should allow him to tune his thoughts so that he can consistently produce the vowel he wants. "That will be really exciting," says Joe Wright of Neural Signals, a company based in Duluth, Georgia, that has helped develop the technology Ramsey is using. "We hope it will be a breakthrough."

After that, the researchers will extend the range of sounds to other vowels and also consonants, with the ultimate aim of enabling Ramsey to hold conversations. The electrode is implanted in an area of brain that generates the movements of the tongue and mouth when speech is being generated. Since no one else has attempted this before, they acknowledge that there is a long way to go. "Conversation is what we're hoping for, but we're pretty far from that," says Wright.

Ramsey is an ideal person to put this treatment to the test, since he was just 19 at the time of the accident, has a normal life expectancy and is capable of participating in several sessions a week. Previous studies have usually involved people who are locked-in as a result of a terminal illness such as amyotrophic lateral sclerosis, a handful of whom have had electrodes implanted to help them move cursors on a computer screen, for example.

Progress with such volunteers has been steady, says Dawn Taylor, a biomedical engineer at Case Western Reserve University in Cleveland, Ohio, and they can move cursors with a skill approaching that of an able-bodied person.