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## Listen up: new tool to help people who are locked in

15:15 09 November 2013 by [Alyssa Botelho](#)

People who are paralysed and unable to speak may soon be able to communicate simply by focusing on voices saying "yes" or "no" while their brain is monitored.

"Locked-in syndrome", can be the result of motor neurone (Lou Gehrig's) disease, multiple sclerosis or a devastating brain injury. People who are locked in often communicate via tiny eye movements or facial twitches. But sometimes even this may be impossible. Soon they may be able to communicate just by listening.

Neuroscientist [Jeremy Hill](#) aims to use hearing to open up lines of communication for even these most isolated patients. He and his team at the New York State Department of Health have developed a new brain-computer interface. It can detect if someone is paying attention to one spoken word or another by measuring the pattern of electrical activity in the brain.

In the new system, users wear headphones and listen to alternating voices: a male saying "no" in the left ear, and a female saying "yes" in the right. The act of paying attention to the "yes" voice over the "no" produces a distinct electrical brainwave pattern. That can be picked up by electrodes on the scalp, and translated by Hill's algorithms to create a computerised "yes" output.

"Listening is a very private mental act that doesn't necessarily have an outward sign," says Hill, who presented this work at the [2013 Society for Neuroscience conference](#) in San Diego. "But with this brain-computer interface we're finding that listening can become an act that influences the world in a very direct way."

### Ears never get tired

In [previous studies](#), Hill and his team used two different beeps, instead of voices, as stimuli. But subjects complained the beeps were unpleasant and sometimes difficult to match to the response they wished to convey. Hill hopes that this latest approach takes the interface closer to becoming an everyday device.

In the latest work, they tested the new system on 14 healthy volunteers. They found that on average, the algorithms had an accuracy of about 76 per cent. And responses from two people with advanced Lou Gehrig's disease were processed just as well.

Though assistive technologies using visual responses such as eye movement are more versatile than auditory ones at the moment, this could add one more tool to ease communication for people who are locked in, Hill says. He cites one Lou Gehrig's user in the study, who normally communicates via eyebrow movements, welcoming the approach and telling researchers: "My eyes get tired, but never my ears."

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Hill's team is now developing an app to allow a smartphone to sync with the system.

Locked-in syndrome expert [Steven Laureys](#) of the University of Liege in Belgium is supportive of the new approach. "I think it's very important to offer alternative tools that do not depend on eye movements. We need to adapt to the specific sensory impairments of each individual patient," he says.

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