Medical Xpress

Can brain scans read your mind? Neuroscientists provides new insights

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Russell Poldrack at UCLA's Ahmanson-Lovelace Brain Mapping Center

(PhysOrg.com) -- "If you could read my mind, love, what a tale my thoughts could tell" -- Gordon Lightfoot

Can neuroscience read people's minds? Some researchers, and some new businesses, are banking on a brain imaging technique known as functional magnetic resonance imaging (fMRI) to reveal hidden thoughts, such as lies, truths or deep desires.

New research by neuroscientists at UCLA and Rutgers University provides evidence that fMRI can be used in certain circumstances to determine what a person is thinking. At the same time, the research suggests that highly accurate "mind reading" using fMRI is still far from reality. The research is scheduled to be published in the October 2009

issue of the journal Psychological Science.

In the study, 130 healthy young adults had their brains scanned in an MRI scanner at UCLA's Ahmanson-Lovelace Brain Mapping Center while they performed one of eight mental tasks, including reading words aloud, saying whether pairs of words rhyme, counting the number of tones they heard, pressing buttons at certain cues and making monetary decisions. The scientists calculated how accurately they could tell from the fMRI brain scans which mental task each participant was engaged in.

"We take 129 of the subjects and apply a statistical tool to learn the differences among people doing these eight tasks, then we take the 130th person and try to tell which of the tasks this person was doing; we do that for every person," said lead study author Russell Poldrack, a professor of psychology who holds UCLA's Wendell Jeffrey and Bernice Wenzel Term Chair in Behavioral Neuroscience.

"It turns out that we can predict quite well which of these eight tasks they are doing," he said. "If we were just guessing, we would get it right about 13 percent of the time. We get it right about 80 percent of the time with our statistical tool. It's not perfect, but it is quite good — but not nearly good enough to be admissible in court, for example.

"Our study suggests that the kinds of things that some people have talked about in terms of mind reading are probably still pretty far off," Poldrack said. "If we are only 80 percent accurate with eight very different thoughts and we want to figure out what you're thinking out of millions of possible thoughts, we're still very far away from achieving that."

Poldrack's study is one of the first to show that neuroscientists can make these kinds of predictions on new people, whose brain patterns the researchers have never seen before. In most previous studies, researchers

made predictions about a person's mental state after having already studied that person's brain to understand its particular patterns.

"Our study indicates that different people's brains work very similarly," Poldrack said. "We often tend to focus on how different each person's brain is, but our study suggests that most healthy people's brains work in very similar ways; otherwise, this approach wouldn't work.

"We can tell a lot about what you're thinking using functional MRI, even though we have never seen your brain before," he said. "However, it is limited in that there are only eight things that we are letting you think about in this study."

The tools used in this research come from a scientific field known as machine learning, which is related to statistics and computer science, said Poldrack, who noted that this technology is heavily employed by companies like Amazon to predict what people will buy based on their previous purchases.

Nearly 10 years ago, neuroscientists showed that if they take brain images with fMRI while people look at different objects, such as faces, houses and chairs, they can use the tools of machine learning to predict with high accuracy what object the subjects are looking at — if the scientists first know from studying brain activity how each subject's brain responds to those objects.

Source: University of California - Los Angeles