

## The Government Is Trying to Wrap Its Mind Around Yours

By Nita Farahany  
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Imagine a world of streets lined with video cameras that alert authorities to any suspicious activity. A world where police officers can read the minds of potential criminals and arrest them before they commit any crimes. A world in which a suspect who lies under questioning gets nabbed immediately because his brain has given him away.

Though that may sound a lot like the plot of the 2002 movie "Minority Report," starring [Tom Cruise](#) and based on a Philip K. Dick novel, I'm not talking about science fiction here; it turns out we're not so far away from that world. But does it sound like a very safe place, or a very scary one?

It's a question I think we should be asking as the federal government invests millions of dollars in emerging technology aimed at detecting and decoding brain activity. And though government funding focuses on military uses for these new gizmos, they can and do end up in the hands of civilian law enforcement and in commercial applications. As spending continues and neurotechnology advances, that imagined world is no longer the stuff of science fiction or futuristic movies, and we postpone at our peril confronting the ethical and legal dilemmas it poses for a society that values not just personal safety but civil liberty as well.

Consider Cernium Corp.'s "Perceptrak" video surveillance and monitoring system, recently installed by [Johns Hopkins University](#), among others. This technology grew out of a project funded by the [Defense Advanced Research Projects Agency](#) -- the central research and development organization for the [Department of Defense](#) -- to develop intelligent video analytics systems. Unlike simple video cameras monitored by security guards, Perceptrak integrates video cameras with an intelligent computer video. It uses algorithms to analyze streaming video and detect suspicious activities, such as people loitering in a secure area, a group converging or someone leaving a package unattended. Since installing Perceptrak, Johns Hopkins has reported a 25 percent reduction in crime.

But that's only the beginning. Police may soon be able to monitor suspicious brain activity from a distance as well. New neurotechnology soon may be able to detect a person who is particularly nervous, in possession of guilty knowledge or, in the more distant future, to detect a person thinking, "Only one hour until the bomb explodes." Today, the science of detecting and decoding brain activity is in its infancy. But various government agencies are funding the development of technology to detect brain activity remotely and are hoping to eventually decode what someone is thinking. Scientists, however, wildly disagree about the accuracy of brain imaging technology, what brain activity may mean and especially whether brain activity can be detected from afar.

Yet as the experts argue about the scientific limitations of remote brain detection, this chilling science fiction may already be a reality. In 2002, the [Electronic Privacy Information Center](#) reported that [NASA](#) was developing brain monitoring devices for airports and was seeking to use noninvasive sensors in passenger gates to collect the electronic signals emitted by passengers' brains. Scientists scoffed at the reports, arguing that to do what NASA was proposing required that an electroencephalogram (EEG) be physically attached to the scalp.

But that same year, scientists at the University of Sussex in [England](#) adapted the same technology they had been using to detect heart rates at distances of up to 1 meter, or a little more than three feet, to remotely detect changes in the brain. And while scientific limitations to remote EEG detection still exist, clearly the question is when, not if, these issues will be resolved.

Meanwhile, another remote brain-activity detector, which uses light beamed through the skull to measure changes in oxygen levels in the brain, may be on the way. Together with the EEG, it would enhance the power of brain scanning. Today the technology consists of a headband sensor worn by the subject, a control box to capture the data and a computer to analyze it. With the help of government funding, however, that is all becoming increasingly compact and portable, paving the way for more specific remote detection of brain activity.

But don't panic: The government can't read our minds -- yet. So far, these tools simply measure changes in the brain; they don't detect thoughts and intentions.

Scientists, though, are hard at work trying to decode how those signals relate to mental states such as perception and intention. Different EEG frequencies, for example, have been associated with fear, anger, joy and sorrow and different cognitive states such as a person's level of alertness. So when you're stopped for speeding and terrified because you're carrying illegal drugs in the trunk of your car, EEG technology might enable the police to detect your fear or increased alertness. This is not so far-fetched: Some scientists already are able to tell from brain images in the lab whether a test subject was envisioning a tool such as a hammer or a screwdriver or a dwelling, and to predict whether the subject intended to add or subtract numbers. Just last month, scientists announced a new study aimed at decoding visual imagery in the brain.

Although brain-based lie-detection technology has been quite controversial and has only been tested on a limited basis, early researchers have claimed high accuracy at detecting deception. But there's a problem: Most brain-based lie-detection tests assume that lying should result in more brain activity than truth-telling because lying involves more cognition. So these lie-detection methods may fail in sociopaths or in individuals who believe in the falsehood they're telling.

Whether such technology will be effective outside the laboratory remains to be seen, but the very fact that the government is banking on its future potential raises myriad questions.

Imagine, for example, a police officer approaching a suspect based on Perceptrak's "unusual activity" detection. Equipped with remote neural-detection technology, the officer asks her a few questions, and the detection device deems her responses to be deceptive. Will this be enough evidence for an arrest? Can it be used to convict a person of intent to commit a crime?

Significant scientific hurdles remain before neurotechnology can be used that way, but given how fast it's developing, I think we must pause now to ask how it may affect the fundamental precepts of our criminal justice system.

Americans have been willing to tolerate significant new security measures and greater encroachments on civil liberties after the terrorist attacks of Sept. 11, 2001. Could reports of significant crime reduction such as that seen by Johns Hopkins, or incidents such as the student shootings last year at [Virginia Tech](#) or more recently at Northern Illinois University, be enough to justify the use of pre-crime technology? Could remote neural monitoring together with intelligent video analytics have prevented those tragedies? And if they could, should they be allowed to?

These are just some of the questions we must ask as we balance scientific advances and the promise of enhanced safety against a loss of liberty. And we must do it now, while our voices still matter. In a world where private thoughts are no longer private, what will our protections be?

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