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Nitah Farahany

When technology can read minds, how will we protect our privacy?

In the months following the 2009 presidential election in Iran, protests erupted across the country. The Iranian government violently suppressed what came to be known as the *Iranian Green Movement*[1], even blocking mobile signals to cut off communication between the protesters. My parents, who emigrated to the United States in the late 1960s, spend substantial time there, where all of my large, extended family live. When I would call my family in Tehran[2] during some of the most violent crackdowns of the protest, none of them dared discuss with me what was happening. They or I knew to quickly steer the conversation to other topics. All of us understood what the consequences could be of a perceived dissident action. But I still wish I could have known what they were thinking or what they were feeling. What if I could have? Or more frighteningly, what if the Iranian government could have? Would they have arrested them based on what their brains revealed? That day may be closer than you think.

With our growing capabilities in neuroscience, artificial intelligence and machine learning[3], we may soon know a lot more of what's happening in the human brain. As a bioethicist, a lawyer, a philosopher and an Iranian-American, I'm deeply concerned about what this means for our freedoms and what kinds of protections we need. I believe we need a right to cognitive liberty[4], as a human right that needs to be protected. If not, our freedom of thought, access and control over our own brains and our mental privacy will be threatened.

Consider this: the average person thinks thousands of thoughts each day. As a thought takes form, like a math calculation or a number, a word, neurons are interacting in the brain, creating a miniscule electrical discharge. When you have a dominant mental state, like relaxation, hundreds and thousands of neurons are firing in the brain, creating concurrent electrical discharges in characteristic patterns that can be measured with electroencephalography, or EEG[5]. […]

This is extraordinary. Through a simple, wearable device, we can literally see inside the human brain and learn aspects of our mental landscape without ever uttering a word. While we can't reliably decode complex thoughts just yet, we can already gauge a person's mood, and with the help of artificial intelligence, we can even decode some single-digit numbers or shapes or simple words that a person is thinking or hearing, or seeing.

Despite some inherent limitations in EEG, I think it's safe to say that with our advances in technology, more and more of what's happening in the human brain can and will be decoded over time. Already, using one of these devices, an epileptic can know they're going to have an epileptic

[1] *Iranian Green Movement*: a protest movement
[2] the capital of Iran
[3] *machine learning*: the science of getting computers to act independently
[4] *cognitive liberty*: (here) free thinking
[5] *electroencephalography, or EEG*: recording electrical activity in the brain

seizure before it happens. A paraplegic[6] can type on a computer with their thoughts alone. A US-based company has developed a technology to embed these sensors into the headrest of automobiles so they can track driver concentration, distraction and cognitive load while driving. *Nissan*, insurance companies and *AAA* have all taken note. You could even watch this choose-your-own-adventure movie *The Moment*, which, with an EEG headset, changes the movie based on your brain-based reactions, giving you a different ending every time your attention wanes.

This may all sound great, and as a bioethicist, I am a huge proponent of empowering people to take charge of their own health and well-being by giving them access to information about themselves, including this incredible new brain-decoding technology. But I worry. I worry that we will voluntarily or involuntarily give up our last bastion of freedom, our mental privacy. That we will trade our brain activity for rebates or discounts on insurance, or free access to social-media accounts... or even to keep our jobs. In fact, in China, the train drivers on the Beijing-Shanghai high-speed rail, the busiest of its kind in the world, are required to wear EEG devices to monitor their brain activity while driving. According to some news sources, in government-run factories in China, the workers are required to wear EEG sensors to monitor their productivity and their emotional state at work. Workers are even sent home if their brains show less-than-stellar concentration on their jobs, or emotional agitation.

It's not going to happen tomorrow, but we're headed to a world of brain transparency. And I don't think people understand that that could change everything. Everything from our definitions of data privacy to our laws, to our ideas about freedom. In fact, in my lab at Duke University, we recently conducted a nationwide study in the United States to see if people appreciated the sensitivity of their brain information. We asked people to rate their perceived sensitivity of 33 different kinds of information, from their social security numbers to the content of their phone conversations, their relationship history, their emotions, their anxiety, the mental images in their mind and the thoughts in their mind. Shockingly, people rated their social security number as far more sensitive than any other kind of information, including their brain data. I think this is because people don't yet understand or believe the implications of this new brain-decoding technology. After all, if we can know the inner workings of the human brain, our social security numbers are the least of our worries.

Think about it. In a world of total brain transparency, who would dare have a politically dissident thought? Or a creative one? I worry that people will self-censor in fear of being ostracized by society, or that people will lose their jobs because of their waning attention or emotional instability, or because they're contemplating collective action against their employers. That coming out will no longer be an option, because people's brains will long ago have revealed their sexual orientation, their political ideology or their religious preferences, well before they were ready to consciously share that information with other people.

I worry about the ability of our laws to keep up with technological change. Take the First Amendment of the US Constitution, which protects freedom of speech. Does it also protect freedom of thought? And if so, does that mean that we're free to alter our thoughts however we want? Or can the government or society tell us what we can do with our own brains? Can the NSA spy on our brains using these new mobile devices? Can the companies that collect the brain data through their applications sell this information to third parties? Right now, no laws prevent them from doing so. It could be even more problematic in countries that don't share the same freedoms enjoyed by people in the United States. What would've happened during the *Iranian Green Movement* if the government had been monitoring my family's brain activity, and had believed them to be sympathetic to the protesters? Is it so far-fetched to imagine a society in which people are arrested

[6] a person who is unable to move

based on their thoughts of committing a crime, like in the science-fiction dystopian society in *Minority Report*[7]. Already, in the United States, in Indiana, an 18-year-old was charged with attempting to intimidate his school by posting a video of himself shooting people in the hallways... Except the people were zombies and the video was of him playing an augmented-reality video game, all interpreted to be a mental projection of his subjective intent.

This is exactly why our brains need special protection. If our brains are just as subject to data tracking and aggregation[8] as our financial records and transactions, if our brains can be hacked and tracked like our online activities, our mobile phones and applications, then we're on the brink of a dangerous threat to our collective humanity.

Before you panic, I believe that there are solutions to these concerns, but we have to start by focusing on the right things. When it comes to privacy protections in general, I think we're fighting a losing battle by trying to restrict the flow of information. Instead, we should be focusing on securing rights and remedies against the misuse of our information. If people had the right to decide how their information was shared, and more importantly, have legal redress[9] if their information was misused against them, say to discriminate against them in an employment setting or in health care or education, this would go a long way to build trust. In fact, in some instances, we want to be sharing more of our personal information. Studying aggregated information can tell us so much about our health and our well-being, but to be able to safely share our information, we need special protections for mental privacy. This is why we need a right to cognitive liberty. This right would secure for us our freedom of thought and rumination, our freedom of self-determination, and it would insure that we have the right to consent to or refuse access and alteration of our brains by others. This right could be recognized as part of the *Universal Declaration of Human Rights*, which has established mechanisms for the enforcement of these kinds of social rights.

During the *Iranian Green Movement*, the protesters used the internet and good old-fashioned word of mouth to coordinate their marches. And some of the most oppressive restrictions in Iran were lifted as a result. But what if the Iranian government had used brain surveillance to detect and prevent the protest? Would the world have ever heard the protesters' cries? The time has come for us to call for a cognitive liberty revolution. To make sure that we responsibly advance technology that could enable us to embrace the future while fiercely protecting all of us from any person, company or government that attempts to unlawfully access or alter our innermost lives.

Thank you.

(2018)

[7] *Minority Report*: film by Steven Spielberg, 2002

[8] (here) storing of data

[9] compensation