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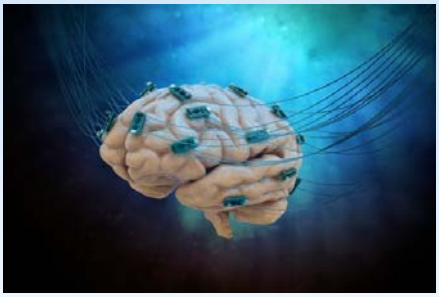
The Ethics of Neuroimplants and Brain-Computer Interfaces

"Brain-Computer Interfaces could offer important medical and therapeutic uses in the future, they also are poised for dubious or clearly immoral uses."



Neuralink, a company run by Elon Musk, announced in September that it had received approval to implant wireless brain-computer interfaces (BCI) into human volunteers.

A BCI is a neural device that translates a person's brain activity into external responses, enabling, for example, the movement of a prosthetic limb via brain signals.

The goal of Musk's study is to enable people with paralysis to use their thoughts to control external devices, especially computers, through the BCI.

While this end is clearly worthwhile, some future uses of BCI technology will probably not be equally praiseworthy, and some foreseeable applications of this technology will likely be unethical.

In an *MIT Technology Review* article, Professor John Donoghue at Brown University mentions how as a child he spent time in a wheelchair, which later motivated him to try to help individuals who were paralyzed.

One time after he delivered a speech at Google, he was surprised to encounter an engineer who was an avid gamer who wanted to know if it would be possible to have a "third thumb."

"That's taking things to an extreme," commented Donoghue.

> I don't want to implant electrodes into people so they can be better gamers. I always challenge all of these ideas because I don't see what it gets you. But I don't dismiss it, either... that is what is driving people. It's the cool factor, that you could have this new interface.

Restoring lost function offers an obvious benefit, but enhancing people's abilities beyond their typical talents raises ethical concerns. When it comes to "therapies" vs. "enhancements," the former will generally be OK, but the latter will often be problematic.

Yet such a distinction, for all its usefulness, still falls short.

For example, consider a hypothetical device that, when implanted into the brain of a person with advanced dementia, would improve his or her ability to remember and recall facts at a level similar to pre-dementia times. Suppose further that in a healthy person, the same device would confer a new ability, the power of a photographic memory. Would this mean it would be ethical to use it for the dementia patient, but not for the healthy one?

Suppose there were a BCI that not only improved hand-to-eye coordination and motor control for Parkinson's patients having movement deficits, but also improved the acuity and coordination of healthy

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athletes, so a professional pitcher could now throw a baseball even more accurately. Would it be OK to use the BCI for the Parkinson's patient but not for the athlete?

What if the therapeutic implant for the Parkinson's patient not only restored his ability to move in a coordinated way, but also gave him the ability to play baseball essentially as a professional, something he had never been able to do at any point prior in his life?

The apparent blurring of the distinction between therapy and enhancement by BCIs can become complicated to sort out.

As BCIs become more sophisticated, they may be able to capture and interpret more and more intimate aspects of a person's thoughts. When it comes to the collection of brain data from sensors, it seems fitting to require that such data be protected like other medical information. The confidentiality of our neurodata will need to be assured, even as we seek to safeguard and expand the notion of mental privacy.

What if students in the future had BCIs that allowed for the monitoring of the pupils' attention in class by scanning or recording their brain activity? What if workers in a factory could be monitored in this way for lapses of attention? Could BCIs enable the modulation of sleep patterns, so employees could be made to put in extra hours of work time?

It seems that coercive scenarios involving BCIs might arise relatively easily.

What about the non-voluntary implantation of BCIs, enabling control of some individuals by others without their consent? One could envision forced implantation of chips to "neuter" a criminal's bad behavior, for example.

Furthermore, the degree to which a neuroimplant would interfere with human autonomy would be vital to assessing its morality. A BCI might serve to increase or decrease human autonomy. If someone addicted to drugs, for example, received a brain implant that generated specific stimulation patterns to break his addiction, this could be therapeutic and helpful. But what if the setting were adjusted, and it instead became possible to dial in an electrically-induced "high" that provided an experience far more intense than any illegal drug?

Using BCIs to mimic the effects of recreational drugs, or to pursue more intense erotic experiences, for example, by directed neural stimulation, could contribute to the enslaving of future generations through novel addictive behaviors, generating a raft of new concerns. Moral objections invariably arise any time men and women experience a loss of freedom or "personal agency" on account of addictions or other compulsive behaviors.

In sum, while BCIs could offer important medical and therapeutic uses in the future, they also are poised for dubious or clearly immoral uses. Careful ethical discernment around selective deployment of this technology, therefore, will be essential going forward.

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