Plans for brain implants blur lines between humans and machines

by Laurent Belsie in the August 28, 2019 issue

It sounds far-fetched: with a computer chip implanted in their brain, humans could boost their intelligence with instant access to the Internet, write articles like this one by thinking rather than typing, and communicate with each other without saying a thing—what entrepreneur Elon Musk calls “consensual telepathy.”

Of course, it’s not really telepathy. It’s radio waves transmitting data from one chip to another. And it’s still futuristic. But it raises important ethical questions, as academic researchers and computer industry scientists pursue a path that could lead to the merging of human thought with artificial intelligence through the routine use of brain implants.

Doctors, academic researchers, and scientists have radically different reasons for planting increasingly sophisticated technology into the brain.

For doctors and many academics, the goal is to mitigate the effects of disease. For some four decades, they have worked on implants that stimulate portions of the brain to treat, for example, the symptoms of Parkinson’s disease and depression. More than 100,000 patients worldwide now have these implants. The devices are relatively straightforward. They zap the brain with small amounts of electricity.

Medical researchers are now working on more sophisticated systems that can detect and record when the brain’s neurons fire and, hopefully, interpret what it means. Early work with rats and monkeys suggests that paralyzed people could move a limb or control a computer to be able to communicate.

A host of companies are moving in to supply this medical market with simple implants that carry 100 or so electrodes. Musk’s company Neuralink has created a 3,000-electrode implant that it says it can scale up to 10,000 electrodes. That jump in capacity should allow its device to capture far more neuron activity.

Neuralink also demonstrates a robot that can connect the electrodes to the brain more accurately than a human can. Musk wants permission from the Food and Drug Administration to have one of his chips implanted in a human patient by the end of

next year.

The role of private companies in this kind of research and development is controversial. On the one hand, companies can routinize products and services that improve quality control and, thus, safety. And the influx of funds can speed up the research and deployment of devices, researchers and neuroscientists say. On the other hand, by focusing on products and profits, there's a risk that companies will give lower priority to patient safety.

That's one reason François Berger, a neuro-oncologist now at a teaching hospital in Grenoble, France, left his job as director of a public-private partnership known as Clinatec. The safeguards for patients in the entrepreneurial environment weren't high enough, he said in a 2018 interview. "We have an obligation to a slow science."

"The thing that worries me is if they make a bad mistake," says John Donoghue, a widely recognized neuroscientist, now at Brown University, who founded an early startup to work on computer-brain interfaces. "When somebody does something wrong, it can shut down the enthusiasm for the entire field, even when it's not warranted."

The medical market is now large enough for companies to make a profit, Donoghue says. But some visionaries, like Musk, dream of a much larger market sometime in the future when ordinary people might opt for a brain implant to boost their intelligence in the way some now have their eyes lasered to improve their eyesight. For Musk, such technology is imperative if humanity is going to keep up with artificial intelligence.

"Even in a benign AI scenario," Musk said, humans will be left behind. But "with a high-bandwidth brain-machine interface, I think we can actually go along for the ride and we can effectively have the option of merging with AI."

"It's different worlds," says Helen Mayberg, a neurologist at Mount Sinai in New York who pioneered the use of deep-brain stimulation for treatment-resistant depression. To her, the imperative to move forward is clear: she says she gets multiple emails a day from people diagnosed with the disease wanting to receive the technology.

"Why are we talking about enhancement [of people who are well] when we're not doing such a great job of even having delivery of care and parity of mental-health services?" she asks. "That's a disconnect for me."

And it may be a longer way off than many of the optimists believe. Even given the advances in AI, linking it with a human brain will require solving multiple problems, including such mundane things as finding materials capable of functioning inside a body for a decade or more, says Donoghue. Then there’s the market challenge: Will the technology add enough value that people will really want it?

“I honestly believe in the separation between money and academic research,” said György Buzsáki, a neuroscientist at New York University’s School of Medicine who has worked in both worlds. “And the reason for that is that the moment money is involved, then that controls a lot. I’m not saying it’s overriding morals, but history says [that] most of the time it does.” —*The Christian Science Monitor*