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Consciousness and Beyond

NEUROSCIENCE

Could We One Day Upload Our Minds to a Computer?

The trouble with transhumanism.

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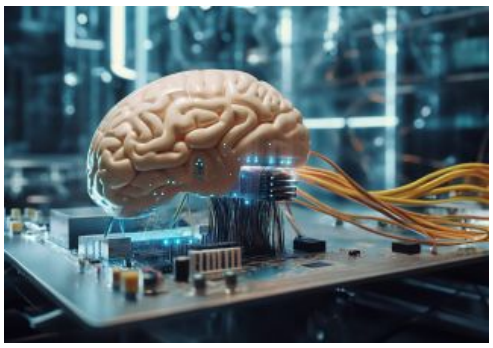
KEY POINTS

- Transhumansim aims to technologically enhance humans beyond biological limits, raising many ethical concerns.
- Uploading our minds to a computer is widely discussed but remains far beyond our technological abilities.
- The complexity of the brain means that we are still far away from understanding it, let alone copying it.



Transhumanism and immortality

The idea of uploading our minds to a computer sounds like the stuff of science fiction but it has also

2015; Koene, 2012).

Transhumanism describes the idea of using technology to enhance human capabilities beyond biological limitations—or to "liberate the human race from its biological constraints" (Fukuyama, 2004). This may not be as eerie as it sounds: Most would agree that electronic hearing aids and glasses are a good thing (Trippett, 2018). Even bionic limbs have become widely accepted and even celebrated (Meyer & Asbrock, 2018). However, the eerie part returns as we dive deeper into the *uncanny valley* (Mori, 1970/2012). The idea of having our minds implemented on a computer falls into the eerie category for many—although others view it as a promising pathway to immortality. In fact, some have invested huge sums of money to ensure that their bodies (or at least their brains) will be cryogenically preserved in the hope of a future resurrection through technology (Germain, 2022).

An ethical and philosophical quagmire

Transhumanism creates a plethora of ethical concerns including about equity and access, consent, safety concerns, loss of human identity, and unintended consequences, to name just a few (Ebbets, 2021; Koch, 2010; Vigo, 2018). Opinions are sharply divided, with some seeing it as a pathway to a blissful future while others express concern that it may be akin to Frankenstein's creation of an uncontrollable monster. There are other philosophical concerns: Would uploading a copy of our mind result in the existence of two separate people or can the self be transferred? Can the mind function in a disembodied way? Would a computer mind be conscious? Although these issues are being actively debated, there is no widespread consensus on any of them. We simply don't know the answers to most of these questions. These discussions

to a computer is still merely a fictional concept unlikely to be feasible any time soon, if ever.

Staggering complexity and mystery

While there is some benefit in discussing such foundational questions, we are still very far away from trying to upload a mind to a computer. Two of the main limitations have to do with the **incredible complexity of the human brain (see Pang, 2023a)** and the current state of neuroscience: Although supercomputers are inching their way toward competing with human brains in terms of raw computing power, we are still far away from being able to accurately simulate the more than 100 trillion connections inside each human brain (Caruso, 2023; Zimmer, 2011). The other problem is that even if we could simulate such complex interactions, there is no way for us to currently measure all the states of a brain. Think of it as a photocopy machine: Even the best printing technology cannot produce a copy without an accurate scanner attached. The largest ever research project in Europe (500 scientists working for 10 years with a budget of €600 million; Naddaf, 2023) failed to completely map the human brain—that is, to describe its basic structure: It did not even attempt to record the states of its components at all. At the moment, we don't even have a roadmap or basic understanding of how it would be possible in the future to scan a brain in sufficient detail to upload its information to a computer. But there is an even bigger challenge: We still have no idea how consciousness works (**Pang, 2023b**; **Pang, 2023c**). Even if we managed to upload all the information inside our brains onto a computer, there is no clear evidence that that information alone would be sufficient to produce consciousness. Our brain is a complex biological organ and while a lot of what the brain does

What creates our conscious experiences. Information fills the content of our experiences but what exactly it means to experience something remains a mystery.

Conclusion

The idea of uploading our mind to a computer has been gaining popularity but remains firmly in the realm of science fiction: We are still very far from even mapping the human brain, let alone measure the state of every part of it and replicating it on a computer. We also don't understand what makes us conscious and have no evidence that simply uploading the information present in a brain to a computer would generate subjective experiences. At this stage, it does not look like something that would be possible any time soon but it raises interesting philosophical and ethical questions about what makes us human and what the limits of technology should be.

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