

Special Edition
“Technology, Learning, and
the Brain”

Editorial

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Learning and the Brain in the Age of Artificial Intelligence

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Artificial intelligence (AI) has been an intriguing theme across science fiction films dating back to *The Original Star Wars Trilogy*, *Blade Runner*, *2001: A Space Odyssey*, and *Alien* to more recent films such as *The Matrix*, *Transformers*, *Her*, and Pixar's *Wall-E*. As AI is essentially intelligence exhibited by machines, researchers are considering how it might manifest in the future of industry and education. Just over 65 years ago, Alan Turing famously asked the question, “*Can machines think?*” Since his essay, *Computing Machinery and Intelligence*, published in *Mind* in 1950, leaders in the technology and education industries as well as futurists and philosophers have begun to warn the possible unforeseen repercussions of AI computing and its effects on the general public.

In 2014, Elon Musk, CEO of SpaceX and Tesla Motors, compared building AI to “Summoning the Demon.” He stated that “*we should be very careful about artificial intelligence*” and that “*there should be some regulatory oversight . . . to make sure we don't do something very foolish.*” As a futurist, Musk's warnings should not be taken lightly as AI exponentially advances with some degree of unknown conclusions. The notion of regulatory bodies attempting to harness a very powerful super-intelligence movement should be acknowledged as a real concern. In the age of rapid AI development, experts along with Musk and famed scientist Stephen Hawking have urged caution to the long-term associated risks.

Dr. Nick Bostrom, renowned professor at the University of Oxford and Director of the Future of Humanity Institute first coined the term “existential risks” with AI in response to disasters that might lead to the end of humanity. However, concern over artificial intelligence is old news dating back to 1847 when people first questioned whether calculators might one day do harm. The truth is that I also didn't trust them in 1982 when I was required to purchase one for my 6th grade math class. I rather preferred doing long division and even complex analysis on paper as I could see the computations and, ultimately, be responsible for any mistakes. Thirty-five-years later, I use a calculator so seamlessly on my smartphone, I no longer distrust them, but wholeheartedly utilize the technology as second nature.

But, we have traveled light years past calculators to superintelligence and human-level machine intelligence. Technological growth has been exponential, yet there are many factors about human-intelligence that we have yet to understand, particularly how we represent, reason, and understand the world around us. Hector Levesque, a former professor of computer science at the University of Toronto and AI researcher argues that a computer won't be intelligent like a human being until it can think in the abstract and perceive something instead of simply viewing it. However, we are getting closer to these perceptual findings and experts believe human-level machine intelligence will likely be achieved within the next century.

Musk has recently announced in a report in *The Wall Street Journal* his new “neural lace” technology touted to implant small electrodes in the brain that will upload and download thoughts. Neural Lace was first coined by the science fiction author Iain M Banks in his *Culture* novels, and refers to electronic input-output devices that grow to become part of a human's brain. Contrary to Musk's 2014 statement, his accelerated ideas appear to be approaching the present tense and, although his influence on futurist science fiction and colonizing other planets

may become reality, he remains terrified of the implications of artificial intelligence. Just how far he and other futurists go remains to be seen.

As educators and scientists, it is still critical to acknowledge the inherent and unforeseeable implications of AI technology, particularly when considering the accessibility of such resources from a social justice perspective and a superhuman byproduct. Will the increasingly wealthy continue to advance and achieve with the assistance of technology that may not be available to less resourced populations. We have observed this same phenomenon with the advent of the world wide web (WWW) and global access to the internet. Of the current 7.5 billion people on the planet, there are roughly around 52% who do not have internet access today.¹ In 1995, that figure was less than 1% and the number of internet user has increased tenfold from 1999 to 2013.² The implications for human-level machine intelligence may unfold in the same manner where access is everything and lack of resources may lead to risks that we currently do not see as threats. As education is always a priority and investment in the future around the globe, we should keep our ears to the ground with newer technology that may assist, yet potentially threaten our very existence. The time is now to better understand the benefits and consequences of AI as it appears we are living in one of the most conscientious, yet groundbreaking times with technology and its profound influence on education. As we progress, we'll no doubt continually be reminded that the truth is often stranger than science fiction.

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