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Perspectives

The Hybridization of the Human with Brain Implants: The Neuralink Project

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In July 2019, the American billionaire Elon Musk revealed the new objectives for his Startup "Neuralink" ("Neuralink Launch Event"): to develop a cerebral implant that will help an individual to control different technological devices, such as a computer, solely using the electrical activity of neurons. This technology will be used to help individuals with various forms of physical disability. For example, for walking by controlling an exoskeleton, for communication by way of a neuroprosthesis for minimally conscious individuals, or those with complete locked-in syndrome (LIS). Recent studies have shown that external devices controlled from decoded intracortical activity become seamlessly embedded as an extension of the body, the user being able to control the device effortlessly just by thinking about it.[1] It will not be a question of acting with the force of physical movements, but with the electrical activity of the brain. This presents us with a type of thought between the wholly mental and the physical, that could be called "neural thought."[2] This expression refers to a thought that can be observed from the outside (by the scientists and their instruments to capture the neural signals and to decode them), and to define the correlation between mind and brain.

The main applications of these kinds of developments concern the domain of health. For instance, an individual with LIS (a condition in which a patient is aware and possesses consciousness, but cannot move or communicate verbally), would be able to control a computer to communicate. By capturing the neural activity associated with inner speech (also known as "covert speech" or "verbal thinking"),[3] the cerebral implant transmits inner speech to a computer that in turn transmits it as a form of synthetic speech after its treatment by an artificial neural network.[4] However, this technology does not enable a patient with LIS to recover their natural use of speech. Cerebral implantation is rather a technology of compensation, or of replacing lost abilities, even if a therapeutic dimension is possible, as shown by Grégoire Courtine's studies.[5,6] Cerebral implant developments could become essential for many patients with severe disabilities in their daily lives, and for this reason, one can see the benefits of the 1 billion dollar price tag of Neuralink.

However, Musk's presentation in July 2019 is not noteworthy for this reason. During the first few minutes of his talk, he explained that humans would be soon be surpassed by artificial intelligence (AI). He suggested they (we) would even become subjugated to it. It is important to recall that Elon Musk co-signed with Stephen Hawking an open letter in 2015 to alert people to the serious threat that AI poses ("Research Priorities for Robust and Beneficial Artificial Intelligence: An open Letter"). Given this threat, Musk

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envisions merging human intelligence with AI. The idea is as follows: the result of this hybridization would result in a type of human intelligence that is superior to AI. Therefore, human-free will would be preserved. This kind of hybridization would be possible with brain implants developed by Neuralink. This point in Musk's presentation has not only attracted much attention, but has also led to negative pushback, especially from the international scientific community. The question has been posed: Is the American billionaire creating the conditions to produce a transhuman, half-human half-machine entity, with superior cognitive capacities?

Beyond the contradictions of Musk's reasoning (e.g., developing AI to limit its advancement), the anthropological dimension and the enormous financial costs (costs beyond the means of academic research), have created both strong negative and positive reactions. If we take a small step back to before Musk's announcement, three issues rarely analyzed in the literature arise that ought to be looked at more closely.

A Research Axiology Inspired by Capitalism

The first point is that Neuralink is a startup. In other words, its existence and its ability to achieve its objectives are dependent on the economic gains made by the startup. Even though Musk can dispute that he made an advertisement-lecture in July 2019, we can observe that there is a large difference in the realization between the medical side to the project ("Understanding and treating brain disorders") and the enhancement project ("Enhance your own brain"). It is reasonable to question whether the enhancement project is not more of a marketing strategy, possibly to support the medical part, but most probably, to buttress Musk's ego. AI development is an important growth area, and in this important market, dominated by the big players like Google, Amazon, Facebook, Apple, and Microsoft, it is necessary to be seen and heard. Naturally, Neuralink must also adhere to this mantra of the liberal economy.[7,8]

The academic scientific community may act as an amplifier for transhumanist announcements, perhaps despite itself, in reacting to them. In a context of frenetic media attention, however, reaction may be difficult to conceal. By criticizing the American billionaire's speech, and thus increasing the controversy surrounding it, the academic community in effect becomes one of the soundboards of a technoscientific, social, and political project that serves primarily Neuralink's shareholders. Musk's announcement can be compared to those made for research on human immortality, and we must to ask ourselves: If the idea of immortality was not so lucrative, would transhumanists still want to be immortal? If the development of AI did not bring so many benefits, would Musk still want to merge it with human intelligence? It is also interesting to note caution in his speech: "It will take a lot of time, and it will be done little by little." Certainly, no one can reasonably predict when a major discovery will occur but saying "a lot of time" is so vague as to be virtually meaningless. This is the second point that deserves to be highlighted.

The Confusion Between Ontology and Epistemology

The question of deciding whether the hybridization project with AI is morally desirable (it is a question of applied ethics) should not hide other important questions. In particular, we must ask ourselves about the scientific justification for this project. We ought to ask: Is

promising to fuse AI with human intelligence, somewhat equivalent to that of making a space journey at the speed of light? In other words, it may be a project that is totally unrealistic. But Musk has already achieved important technological achievements, for example, "Space X." We cannot deny that with this project, Musk has participated in significant advances in the development of space travel. That notwithstanding, sending a rocket into space has been possible since the second part of the 20th century. If "Space X" has contributed to an improvement in this technology, it has been through adding value to technology that already exists, at great expense. Certainly, AI also exists, but its hybridization with human intelligence is not only a question of transferring technological competencies. To develop an AI is not enough. It is also necessary to create a new technology, as a bridge between a biological organism and a machine. This technological bridge does not yet exist.[9]

We can now better understand the American billionaire's cautionary approach. But in addition to the issue of scientific justification, there is also an epistemological question: Are the concepts and theories that we use to understand and explain what intelligence is, appropriate for creating this new neurotechnology? According the philosopher Maurizio Ferraris, the natural sciences are disciplines meant to reveal regularities in experiments.[10] But in the natural sciences, surprising and unexpected phenomena are often revealed. In experimentation, something can always happen that is not predictable, because between ontology (being) and epistemology (knowledge), there is an important difference. On the one hand, our conceptual schemes are revisited with scientific progress (epistemological rupture); on the other hand, reality is not determined by our concepts that are in fact only interpretations of reality. Consequently, if we work from the assumption that human intelligence is essentially a computational phenomenon (thinking is a system of rule enforcement), we may forget that this remains an interpretation. Knowledge ought not to be confused with being in contexts like this. We may recall Searle's strong comments against computationalism, which showed that calculating is not understanding.[11] There are many essential differences between what exists and what we know about it. This kind of confusion is also illustrated in Latour discussing the case of Rameses II. According to Latour, the Egyptian king could not have died of tuberculosis, because the *Bacilli* responsible for this disease were not discovered until 1882.[12,13] Reality always remains independent of our concepts that we use to understand it.[10] Nevertheless, this does not minimize the effectiveness of technologies in knowledge translation. Neuralink will surely have scientific and social repercussions. But it is extremely difficult to anticipate what will happen. That is the last point we want to highlight.

The Difficulty in Anticipating the Impacts of Technology

Between the world we want and the world that exists, there is a big gap. The future is not as we often imagine it. The flying car is a case in point. In the middle of the 20th century, we imagined that it would be the most prevalent vehicle of the 2000s. In the 1980s, we imagined the same thing, as illustrated by Steven Spielberg's famous *Back to the Future* trilogy. It is amusing to observe that the most popular "vehicle" in the 2000s was actually the "kick-scooter," whose market continues to grow and to be very profitable, especially with the development of its electric version. The

flying car is still very far from occupying the city skies.

If it is very difficult to predict what tomorrow's technological objects will be it is also very difficult to anticipate the social impacts of the technological objects we currently use. According to D. Collingridge, it is necessary that a technology be widely disseminated and used to perceive its effects on society. And once the effects are understood, it is not possible to go back.[14] The internet is a good example. The first objective was to create a better means of communication between four American universities: (Stanford University, University of California at Los Angeles, University of California at Santa Barbara, and University of Utah). To do this, a computer network called ARPANET (1969) was set up. It did not resemble the current internet, but it allowed scientific data to be shared between different scientific communities. But at the time of its creation, it was not possible to predict that ARPANET would eventually evolve into the internet. Indeed, who would have imagined today's internet, with its social media, such as Facebook, or the malevolent prevalence of fake news, and deliberately planted conspiracy theories.

It is therefore the technologies of the present that must be taken into account in preparing for the future, and not future technologies that do not yet exist and that no one can really predict. Where the technologies of tomorrow are currently being developed, we must engage in ethical reflection on the scientific strategies implemented, and the policy orientations of the research institutions involved. In other words, we need to develop ethical reflection within scientific laboratories, by way of dialogue between ethicists and scientists. For example, during the conception of a technological object, we should examine the purposes and the values it contains (epistemic values), and how it is capable of changing the human condition.[15] In laboratories, it is by increased reflection on ethical and social issues that scientific responsibility takes on its full meaning and importance, before technological objects enter the mainstream of the social world. This integration of ethical reflection into scientific research helps technologically advanced society resist domination by a logic of instrumentality.

But there is one condition on making this a reality. The doors of laboratories must be kept open to the recruitment of philosophers and other experts in the human and social sciences. In reality, scientists are already convinced—this is not the problem—rather the problem lies with administrators or even politicians whose primary concerns lie with budgets and finances.[16] The support of democracies depends more on education geared toward critical judgment, rather than on an educational strategy geared toward competition and profit.[17] Beyond the infrequent reality of collaborations between natural science and human science laboratories (most often during workshops), we are quite right to ask again and again for a significant recruitment of philosophers, anthropologists, and sociologists by scientific laboratories where technological objects are designed and developed.

Conclusion

One could easily come to the conclusion that this opinion supports Musk's message and that it suffers from the same contradictions. This, however, would be a mistake. The main objective of this article is to highlight some infrequently discussed issues on the reality of Neuralink's scientific research, and the reality of academic research. In fact, the reality is that it is becoming increasingly difficult to compete with companies that are investing a lot of money in neurotechnologies. The financial resources available

to university researchers are not comparable to those of Neuralink. Certainly, the vision of the Human of Tomorrow in transhumanistic projects is under discussion, but good discussion requires an approach open to all perspectives, in order not to create narrow or polemic approaches. The objective here was essentially to discuss three issues not commonly analyzed concerning the Neuralink project: a scientific project as a market strategy, a difficult scientific justification, and a difficult scenario concerning the integration of ethical reflection in the relevant scientific laboratories.

Notes

1. Collinger JL, Wodlinger B, Downey JE, Wang W, Tyler-Kabara EC, Weber DJ, *et al.* High-performance neuroprosthetic control by an individual with tetraplegia. *The Lancet* 2013;381(9866):557–64.
2. Hocquet T. *Cyborg Philosophie: Penser Contre Les Dualismes. L'ordre Philosophique*. Paris, France: Seuil; 2011, at 368.
3. Alderson-Day B, Fernyhough C. Inner speech: Development, cognitive functions, phenomenology, and neurobiology. *Psychological Bulletin* 2015;141(5):931–65.
4. Rainey S, Maslen H, Mégevand P, Arnal LH, Fourneret E, Yvert B. Neuroprosthetic speech: The ethical significance of accuracy, control and pragmatics. *Cambridge Quarterly of Health Care Ethics* 2019;28(4):657–70.
5. Courtine G, Sofroniew MV. Spinal cord repair: Advances in biology and technology. *Nature Medicine* 2019;25(6):898–908.
6. Courtine G, Micera S, DiGiovanna J, Millán JDR. Brain-machine interface: Closer to therapeutic reality? *The Lancet* 2013;381 (9866):515–7.
7. Hottois G. *La Science Entre Valeurs Modernes et Post-Modernité*. Paris, France: Vrin; 2005.
8. Resnik DB. Ethics of science. In: Curd M, Psillos S, eds. *The Routledge Companion to Philosophy of Science*. London, UK: Routledge; 2015.
9. Harris JP, Tyler DJ. Biological, mechanical, and technological considerations affecting the longevity of intracortical electrode recordings. *Critical Reviews in Biomedical Engineering* 2013;41(6):435–56.
10. Ferraris M. *Manifiesto del Nuevo Realismo*. Beri, Italy: SEDIT; 2012.
11. Searle, JR. (1980) Minds, brains, and programs. *Behavioral and Brain Sciences* 3 (3): 417–457
12. Latour B. Ramsès II est-il mort de la tuberculose? *Recherche* 1998;307 (30):225–248.
13. Latour B. Why has critique run out of steam? From matters of fact to matters of concern. *Critical Inquiry* 2004;307:84–85.
14. Mayne AJ, Collingridge D. The social control of technology. *Journal of the Operational Research Society* 1982.
15. Xavier G. *Philosophie des Nanotechnologies*. Paris, France: Hermann; 2014, at 342.
16. Larousserie D. Le blues des chercheurs français. *Le Monde.fr* [Internet]. available at https://www.lemonde.fr/sciences/article/2019/10/14/le-blues-des-chercheurs-francais_6015488_1650684.html (last accessed 18 Oct 2019; published 14 Oct 2019).
17. Nussbaum MC. Not for profit: Why democracy needs the humanities. *The European Legacy* 2012;17(1):104–5.