

## CONCLUSION



Ever since the development of rudimentary tools and instruments in ancient history, humanity has used technology to overcome biological limitations. In this context, the original seventeenth-century Enlightenment idea that human beings can build a better future for themselves remains a very powerful and influential position. But it has also given rise to fundamental debates on the purpose of humanity, freedom of scientific enquiry, democratic government and individual liberty.<sup>1</sup> It is from this perspective of serious questioning that discussions concerning the possible biological enhancement of human beings have been taking place – a questioning that may be necessary for individuals to develop in modern society. As Norbert Wiener explains: ‘We have modified our environment so radically that we must now modify ourselves in order to exist in this new environment. We can no longer live in the old one.’<sup>2</sup> This means that the hybridisation between human beings and machines may simply be the next step along the road of technoscientific history.

At the same time, however, it may be appropriate to be careful relating to the expectations of what will be possible in the near future. As the German ethicists Gerd Grübler and Elisabeth Hildt indicate: ‘While an unrealistic understanding of . . . [neuronal interfaces] raises many of the most spectacular questions in ethics and metaphysics, the real existing . . . [neuronal interfaces] render them inadequate and require rather sober and detailed work in applied ethics and philosophical anthropology.’<sup>3</sup>

Yet, at the same time, direct neuronal interface systems already exist and will continue to be developed at a rapid rate by both academic and industrial stakeholders with important applications to:

- the sciences;
- defence and intelligence gathering;
- medicine; and
- the game and toy industry.

As such, it is certain that they will have a profound and significant impact on society. The Spanish biological scientist Rafael Yuste and others explain:

It might take years or even decades until [neuronal interfaces] . . . and other neurotechnologies are part of our daily lives. But technological developments mean that we are on a path to a world in which it will be possible to decode people's mental processes and directly manipulate the brain mechanisms underlying their intentions, emotions and decisions; where individuals could communicate with others simply by thinking; and where powerful computational systems linked directly to people's brains aid their interactions with the world such that their mental and physical abilities are greatly enhanced.<sup>4</sup>

Within this context, however, the ethical challenges of future societies will need to be carefully examined. Yuste explains:

Such advances could revolutionize the treatment of many conditions, from brain injury and paralysis to epilepsy and schizophrenia, and transform human experience for the better. But the technology could also exacerbate social inequalities and offer corporations, hackers, governments or anyone else new ways to exploit and manipulate people. And it could profoundly alter some core human characteristics: private mental life, individual agency and an understanding of individuals as entities bound by their bodies.<sup>5</sup>

What will actually be possible is only beginning to be considered and more discussions should be encouraged with respect to any long-term policy considerations. Moreover, at present, no specific legislations exist, either nationally or internationally, to regulate and control the use of such neuronal interfaces. This is because the technology is new and the current benefits of such systems generally exceed the potential risks, but this may change in the future.<sup>6</sup>

In 1931, Aldous Huxley published a book entitled *Brave New World*, which depicted a society in which human genetic engineering is ubiquitous and where happiness is controlled by biotechnology. A few years later, in 1949, another book was published, this time by the English novelist George

Orwell (1903–1950), entitled *Nineteen Eighty-Four*, which described a society that completely controls all its members in their everyday lives. When this latter book was published, Huxley sent a letter to Orwell indicating that he believed that the *Nineteen Eighty-Four* dystopia ‘is destined to modulate into the nightmare of a world having more resemblance to that which I imagined in *Brave New World*. The change will be brought about as a result of a felt need for increased efficiency’.<sup>7</sup>

However, in 2015, Roger Strand and Matthias Kaiser from the University of Bergen in Norway came to a different conclusion indicating that:

Whereas Orwell’s 1984 mainly thematises violent oppression, *Brave New World* creates the scenario of a world in which violent oppression no longer is needed because human desires for rights and freedoms have changed. Identity, dignity and integrity as we know it, have ceased to exist. We believe that the type of scenario presented by *Brave New World* is neither unthinkable nor necessarily unlikely anymore.<sup>8</sup>

This may mean that society should begin to earnestly examine, reflect and discuss the ethical dilemmas and possible social consequences arising, in the near future, from developments in neurotechnologies. Indeed, what was unthinkable by society at some stage in history often becomes reality more quickly than envisaged. As Braude explains:

The temptation to improve society through improving mental capacity, or even shore up political power through neural interventions, is an issue that might seem futuristic but that requires close ethical foresight. The traditional bioethics principles of autonomy, beneficence, and justice are not penetrating enough to deal with these issues that may transform the neurobiological foundations of human liberty, instead they require sustained reflection in terms of biopolitics.<sup>9</sup>

With new developments in direct neuronal interface systems, it may indeed be possible in the future to control behaviour and thoughts by manipulating the brain under the initial pretext of enhancing the cognitive faculties of human beings. It may also be feasible for the mind of an individual to develop in cyberspace, raising questions about the identity, dignity and integrity of this person. As a result, there is certainly a need to consider any risks to freedoms that may arise from such new technologies. This is all the more complex because, as O’Brolchain and Gordijn explain, it may be possible for neuronal interfaces to be used for dual use, meaning that: ‘Whilst they will offer many therapeutic and social benefits, they will also provide those with malevolent aims with greater control and knowledge, and thus with greater capabilities to cause harm.’<sup>10</sup>

In a pertinent essay entitled ‘Dreaming with Diderot’, written in 2007, the American sociologist and bioethicist James Hughes looks back at the book *D’Alembert’s Dream*, written in 1769 by the French philosopher Denis Diderot, in order to discuss future possibilities. Accordingly, Hughes highlights the fictional philosophical dialogues between Diderot, his friend d’Alembert, a physician called Bordeu and an educated woman called Mademoiselle de L’Espinasse. In the discussion, Diderot suggests that since human consciousness is a result of the brain, the human mind can, in theory, be deconstructed and rebuilt to give the original.<sup>11</sup>

But whether Diderot’s proposal may eventually be realised with the development and convergence of disciplines such as neurobiology, computer science, artificial intelligence and neuronal interfaces is an open question. However, what is certain is that human brains will increasingly be integrated with advanced computers because of the advantages these may offer. Human beings may then experience greater levels of sensations, such as sights and sounds, or be able to improve their memories and intelligence, while also avoiding fatigue and inattention. They may even be able to better control their emotions while being more resistant to depression, compulsion and mental disorders.

In addition, as artificial intelligence merges into human minds, it may be possible for humanity to deconstruct, rebuild and redesigned itself in a manner that cannot yet be predicted.<sup>12</sup> D’Alembert asks: ‘[I]f everything is in a state of flux, as the spectacle of the universe shows everywhere, what might not be the result here and elsewhere of several million years of changes?’<sup>13</sup> In Diderot’s book, the educated lady also points out that since the mind is connected by nerves to the body, all minds in the universe could be interconnected to one another (like a Universe Wide Web), to which the doctor responds that if such a web were to develop, it would be comparable to God.<sup>14</sup>

In a way, Diderot’s discussion of such a possibility seems to herald many other later suggestions that humanity should aim to develop interconnectivity with machines and between individuals to form a community or collective.

However, it is impossible to predict whether such a community of all that exists would represent a utopian paradise or a dystopian nightmare in which the very individuality of a person is lost, absorbed or controlled by the collective.<sup>15</sup> The educated woman questions: ‘Who knows what new species may once again evolve from such a huge mass of sensitive and living particles?’<sup>16</sup>

## Human Autonomy

While there is much to welcome in the development of neuronal interfaces, especially when new biomedical applications are being developed, it is true

that human bodies (including the brains) are beginning to be seen as things to master, take control over, redesign and enhance according to humanity's own desires. It is also worth noting that any influence of technology on the human brain goes to the very core of who a person is in society. As Blank explains: 'Neuroscience findings require a reevaluation of democratic concepts of equality, individual autonomy, freedom, and responsibility.'<sup>17</sup>

Yet, with respect to the way in which autonomy may be changed, the British social commentators Ed Brooks and Pete Nicholas explain that the virtual world may become attractive to individuals because they may be able to shape their own identity and be the person they want to be:

In this world you are free from the constraints of your past and commitments of the present. You must decide for yourself who you are and what path you will follow. Let nothing get in the way. You are free to direct your own journey through life. You can avoid all those places that you would rather not travel to: places called failure and frustration and loneliness and loss and grief and guilt and disappointment.<sup>18</sup>

But risks also exist. For instance, if a government decided to influence and even control the way in which some members of the general public make decisions, this could be seen as a form of personal abuse. Moreover, if it is possible to read the intentions of a person to commit a crime, why should it not then be possible to act pre-emptively through a procedure where future criminals are arrested based on foreknowledge?

Yet, at the same time, there will always be limits to neurotechnology. As Cheshire points out: 'Although neuroscience has shed considerable light on the functions of the brain, it lacks the ability to explain the phenomena of consciousness, personal agency, conscience, moral responsibility, the continuity of identity over time, or human purpose.'<sup>19</sup>

It follows that if certain human aspects, such as free will and autonomy, involve more than the ability to just perform certain functions, then neuronal interface implants, whether they be therapeutic or enhancing, would not necessarily influence these aspects. This means that if a person's cognitive faculties, such as intelligence or memory, are enhanced through neuronal interface implants, this may give him or her more abilities, but not necessarily more free will. A depressed patient may be made to feel better through brain stimulation using a neuronal interface and this may represent a mood enhancement, but it does not modify his or her capacity to make independent decisions.<sup>20</sup>

Thus, full control of the human brain is unlikely to be achieved. It is only if an individual is completely taken over by a machine or another person in cyberspace that he or she would eventually become an automaton. But at the same time, caution is required since neuronal interfaces may still be able

to affect an individual's sense of making his or her decisions. Consequently, developments in understanding the human mind and how it can be controlled should constantly be monitored.<sup>21</sup>

Similarly, with new applications of direct neuronal interfaces, it is important to consider the concepts of responsibility and sense of realism in terms of what can be achieved. Of course, this is already true in the realm of clinical applications, but should also be present in the military and gaming industries, since the risks may be considerable yet remain largely unknown.<sup>22</sup> This is one of the reasons why a continued engagement in cyberneuroethics is crucial.

### **Resistance to Such a Development**

The possibility that some resistance in society may develop in relation to a continued evolution towards full-blown enhancement technologies and going beyond what is presently seen as normal in humanity should also not be underestimated. Thus, criticism may arise, expressing apprehension that becoming more than human undermines the very concept of humanity, with unforeseen consequences.<sup>23</sup> Similarly, concern may exist that humanity could eventually be affected by a sense of pride, or hubris, by what it can do, without examining all the possible risks and consequences.

On the other hand, a more positive approach may be considered if Enlightenment ideas are accepted, suggesting that the human mind is a direct consequence of the brain and that any concept of humanity should be seen as existing in a constant state of flux. If human beings then decide to go beyond the present notion of humanity, this could be seen as something that should be welcomed as progress and a natural development.<sup>24</sup> As Diderot indicated, one of the central themes of this debate is whether the human mind is unique to humanity and whether the concept of 'being human' has any moral relevance.<sup>25</sup>

### **Risks of Neuronal Interfaces**

Of course, examining the proportionality between the risks and advantages of neuronal interfaces, and their applications in creating connections between the human mind and cyberspace, may seem slightly premature. Indeed, it is only recently that such interfaces have been applied to human beings and it is still difficult to appraise all the possible risks and side-effects of the new technologies against their perceived advantages. This means that many legitimate questions remain.

It is also impossible to predict how individuals would behave. For example, if it was possible to decrease suffering or increase life extensions, it is difficult to determine what kind of risks persons may be prepared to take. Diderot suggests that: ‘Vouchsafe a man, I don’t say immortality, but only twice his normal span, and see what will happen!’<sup>26</sup>

But real and practical applications already exist, which need to be considered. For instance, even if at present some interface systems are nonintrusive and reversible, their effects on the brain may themselves be irreversible, making it important to inform any potential users of their consequences. Moreover, the fact that some brain implants are less intrusive than other forms of treatment, such as neurosurgery, is not sufficient from an ethical perspective for them to be used without further questioning.

Neuronal interfaces and their applications in creating a connection between the human mind and cyberspace should also not be used in a manner that may undermine the very meaning of being a person, such as when the free will of an individual is taken away. This means that non-consensual treatment or compulsion can only rarely, and only in the most extreme circumstances, be justified for an individual patient or a wider class of patients or persons. Limiting autonomy can only be considered as a result of clear and objective medical criteria while respecting human dignity and the appropriate procedural safeguards.<sup>27</sup>

Another concern relates to the way in which this new technology is accessed, since it should not just be restricted to a rich minority who can afford it. Instead, it should be offered to as many individuals as possible so that societal inequalities can be redressed. For instance, if it is proved to be safe, wider access to cognitive enhancements procedures should be available to all who have cognitive limitations, even if they only have limited financial resources.

In the same way, any potential changes to a human being should always be considered in the light of protecting humanity as such. The educated lady in Diderot’s dialogue considered the possibility of deconstructing a mind of a genius for storage, and then reconstructing it to examine ‘memory, ability to make comparisons, judgement, reason, desires, aversions, passions, natural aptitudes, talent, and lo! My man of genius again’.<sup>28</sup>

However, creating geniuses who live forever without experiencing suffering cannot be the final aim of humanity if it is to remain human. Indeed, if suffering was completely eliminated through science and technology, important human capacities such as empathy, responsibility and even certain forms of sacrificial love would also be lost.

The French philosopher Simone Weil (1909–43) discussed the difficulty in recognising that science is the master of everything in the universe while still believing that there is a certain value and worth in humanity. As such,

she warns that there is a very real danger of dehumanising individuals if science and technology are left to reign supreme as a force that cannot be constrained. In this she quotes the German politician and despot Adolf Hitler (1889–1945) in *Mein Kampf*,<sup>29</sup> who died after her, when he argued that humanity must never be so naive as to believe that it can be lord and master of the laws of Nature. Instead, he indicated that human beings must understand and accept the fundamental necessity of Nature’s rule where physical scientific force alone is forever master. In other words, Hitler believed that there could be no special laws for humanity outside the laws of Nature.<sup>30</sup>

In this regard, Weil explains that such a belief expresses the only reasonable conclusion if a world is closed into, and reduced to, physical science. And, in a way, the whole of Hitler’s life was nothing more than the implementation of this conclusion and what he believed to be true. Weil then suggests that those with a similar belief in the mastery and domination of the laws of Nature, science and technology may simply be fooling themselves in thinking that they are on a different road from him.<sup>31</sup> This implies that a different ethical view is necessary for humanity to flourish – one that does not imprison or reduce itself to science.

Society therefore needs to be careful in terms of always seeking to protect human dignity. That not everything will be positive in the future with the widespread use of neuronal interface systems should be acknowledged. Indeed, in Diderot’s dialogues, his friend d’Alembert recognises that with some of these new technologies, human beings could eventually become some ‘great, inert, motionless sediment’.<sup>32</sup> Similarly, James Hughes warns against the risks of a dystopian future, stressing that:

We need guidelines and policies to steer human evolution away from dead ends of radical selfishness and addictive absorption, and towards greater sociability, self-awareness and reason. Even self-chosen brain engineering could make us all less than human, and we need instead to encourage one another to enhance the virtues that we value.<sup>33</sup>

Haraway also comments on the risk of ‘fusion’ of the different leading to ‘confusion’ by an undermining of clear differences.<sup>34</sup> At the same time and in discussing the ‘cybernetic’ term borrowed by Wiener, the British theologian and technology commentators, Scott Midson, asks: ‘[A]re humans still the steersmen of these [cyborgian] technologies; are humans still in control?’<sup>35</sup>

Careful and prudent discussions in cyberneuroethics are, therefore, necessary for humanity to protect itself from losing its humanity through the use of new direct neuronal interfaces. This means that society must remain vigilant in the face of future prospects, while trying to understand why it wants a different future from the present and, if it does, what kind of future it really wants.



## Notes

1. Hughes, 'Dreaming with Diderot'.
2. Wiener, *The Human Use of Human Beings*, 56.
3. Grübler and Hildt, 'Introduction', 1.
4. Yuste et al., 'Four Ethical Priorities for Neurotechnologies and AI', 160.
5. Ibid.
6. Tracey, 'Neural Interfaces and Brain Interference', 31–37.
7. Letter from Aldous Huxley sent a letter to George Orwell, 21 October 1949, found at *Letters of Note*. Retrieved 21 October 2018 from <http://www.lettersofnote.com/2012/03/1984-v-brave-new-world.html>.
8. Strand and Kaiser, 'Report on Ethical Issues', 36.
9. Braude, 'Enhancing Cognition in the "Brain Nation"', 141.
10. O'Brolchain and Gordijn, 'Brain–Computer Interfaces and User Responsibility', 174.
11. Diderot, *Rameau's Nephew/D'Alembert's Dream*, 158.
12. Hughes, 'Dreaming with Diderot'.
13. Diderot, *Rameau's Nephew/D'Alembert's Dream*, 179.
14. Ibid., 184–85.
15. Hughes, 'Dreaming with Diderot'.
16. Diderot, *Rameau's Nephew/D'Alembert's Dream*, 176.
17. Blank, *Intervention in the Brain*, 78.
18. Brooks and Nicholas, *Virtual Humanity*, 81.
19. Cheshire, Jr., 'The Sum of All Thought', 139.
20. Barker, 'Health Care/Medical Treatment', 68–69.
21. Strand and Kaiser, 'Report on Ethical Issues', 4.
22. Nuffield Council on Bioethics, *Novel Neurotechnologies*, 173.
23. Hughes, 'Dreaming with Diderot'.
24. Ibid.
25. Diderot, *Rameau's Nephew/D'Alembert's Dream*, 180–82.
26. Ibid., 164.
27. Barker, 'Health Care/Medical Treatment', 66–67.
28. Diderot, *Rameau's Nephew/D'Alembert's Dream*, 219.
29. Hitler, *Mein Kampf*, vol. 1, Chapter 10.
30. Ibid.
31. Weil, *Lenraciment*, 156–59.
32. Diderot, *Rameau's Nephew/D'Alembert's Dream*, 176.
33. Hughes, 'Dreaming with Diderot'.
34. Haraway, 'Staying with the Trouble', 104.
35. Midson, 'Cyborg Theology', 101.

## Bibliography

- Barker, H. 2004. 'Health Care/Medical Treatment', in Secretariat of the EGE, European Group on Ethics in Science and New Technologies to the European Commission, *The Ethical Aspects of ICT Implants in the Human Body: Proceedings of the Roundtable Debate*, Amsterdam, 21 December.
- Blank, R.H. 2013. *Intervention in the Brain: Politics, Policy, and Ethics*. Cambridge, MA: MIT Press.

- Braude, H. 2016. 'Enhancing Cognition in the "Brain Nation"', in F. Jotterand and V. Dublević (eds), *Cognitive Enhancement*. Oxford: Oxford University Press.
- Brooks, E., and P. Nicholas. 2015. *Virtual Humanity*, Nottingham: Inter-Varsity Press.
- Cheshire, W.P. Jr. 2015. 'The Sum of All Thought: Prospects of Uploading the Mind to a Computer', *Ethics & Medicine* 31(3), 135–41.
- Diderot, D. 1966. *Rameau's Nephew/D'Alembert's Dream*, trans. L. Tancock. London: Penguin.
- Grübler, G., and E. Hildt. 2014. 'Introduction', in G. Grübler and E. Hildt (eds), *Brain–Computer Interfaces in Their Ethical, Social and Cultural Contexts*. Dordrecht: Springer.
- Haraway, D.J. 2016. *Staying with the Trouble*. Durham, NC: Duke University Press.
- Hitler, A. 1925. *Mein Kampf*, vol. 1. Munich: Eher Verlag.
- Hughes, J.J. 2007. 'Dreaming with Diderot', *Cyborg Democracy*, 14 January.
- Midson S.A. 2018. *Cyborg Theology: Humans, Technology and God*. London, New York: I.B. Tauris & Co. Ltd.
- Nuffield Council on Bioethics. 2013. *Novel Neurotechnologies: Intervening in the Brain*. London: Nuffield Council on Bioethics.
- O'Brolchain, F., and B. Gordijn. 2014. 'Brain–Computer Interfaces and User Responsibility', in G. Grübler and E. Hildt (eds), *Brain–Computer Interfaces in Their Ethical, Social and Cultural Contexts*. Dordrecht: Springer.
- Strand, R., and M. Kaiser. 2015. 'Report on Ethical Issues Raised by Emerging Sciences and Technologies', written for the Council of Europe Committee on Bioethics, *Centre for the Study of the Sciences and the Humanities*, University of Bergen, Norway.
- Tracey, I. 2011. 'Neural Interfaces and Brain Interference', in Royal Society, *Brain Waves Module 1: Neuroscience, Society and Policy*. London: The Royal Society.
- Weil, S. 1949. *L'ennraciment : Prélude à une déclaration des devoirs envers l'être humain*. Paris: Gallimard.
- Wiener, N. 1988. *The Human Use of Human Beings: Cybernetics and Society*. Boston, MA: Da Capo Press.
- Yuste, R. et al. 2017. 'Four Ethical Priorities for Neurotechnologies and AI', *Nature* 551(7679), 159–63.