

This response was submitted to the consultation held by the Nuffield Council on Bioethics on *Novel neurotechnologies: intervening in the brain* between 1 March 2012 and 23 April 2012. The views expressed are solely those of the respondent(s) and not those of the Council.

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General Questions

4- What are the most important ethical challenges raised by novel neurotechnologies that intervene in the brain?

The most urgent ethical debates arising from these technologies are as follows:

Safety

A thorough risk/benefit analysis must take place before considering any other ethical issues that these technologies might bring about. Ensuring that these technologies are safe and that the health risks and side effects of the interventions are minimised is paramount.

Consent

The issue of personal health risks to the individual, as outlined above, leads to the important issue of ensuring that proper consent is obtained before an intervention takes place. Patients must be able to make a fully informed decision and be made aware of the risks linked to each of the neurotechnologies described in the report.

Personal Identity and our concept of the self.

Altering ourselves by means of BCIs, neurostimulation or insertion of neural stem cells may have an effect on our concept of personhood leading us to revisit what it means to be human. Is there a point in which we become something other than human? Is our humanness linked to an idea of naturalness that would be tainted by the artificial modification of the self? The answer to these questions may well be negative, however further discussion is desirable so that we can identify any personal identity issues at an early stage.

Societal Impact.

It is clear that the use of these technologies could be used for the benefit of society in general, such as the eradication or treatment of Parkinson and Alzheimer disease, alleviation of mood and cognitive impairments or even easing the deployment of humanitarian missions, for example by enabling the supply of goods to disaster zones remotely and thus ensuring delivery at minimal personal risk.

However, these benefits will come hand in hand with less positive outcomes derived from the uses of these technological advances. They will for instance provide us with opportunities to enhance our military powers potentially leading to more effective ways to achieve destruction of human lives.

Liability and Personal Responsibility

There is a danger that the modification of human capacities via external or internal means will lead to an erosion of personal responsibility and accountability for our actions. In the case of BCIs an individual may feel that responsibility may reside in the artificial limb/remote weaponry used, or focusing on neurostimulation and neural stem cells we might claim that our personality has been changed by those interventions to such a degree that we cannot justifiably be held responsible for our actions.

Coercion

The possibility of acquiring enhanced perception and cognitive capacities could lead to indirect and direct coercion for the individual to be enhanced in different ways. Indirect coercion could come from the peer pressure to be smarter and with higher sensory capacities. As technologies become safer, more affordable and therefore more widespread, there will be more and more people willing to undergo these modifications. These will likely lead to pressure for the

'unenanced' members of society to follow suit and use these technologies to keep up with their friends and colleagues.

A more direct form of coercion could come from employers discriminating against those who choose not to enhance. In order for these interventions to be ethically acceptable we need to make sure that our choice is completely autonomous and not impaired by external societal pressures.

Medicalisation of the 'Human Condition'

Some critics will argue that the wide implementation of these novel technologies may carry the risk of medicalization of the human condition, with a society constantly striving to be more than human. However, it is I believe part of the human condition to always to be better, to work towards breaking any boundaries which limit our established capabilities. For this argument to stand, we will need to denounce the scientific advances achieved so far by those refusing to be constrained by any boundaries such as the discovery of penicillin, and immunisation against killers such as chicken pox and rubella.

Access to technologies – Ensuring fair distribution

Although perhaps this is not an immediate ethical concern, we need to ensure that if they prove to be successful (particularly when used for enhancement purposes) these technologies are made accessible following fair rules of distribution.

There is a danger that the high cost of these technologies will make them affordable to only the already privileged sectors of society. This is likely to bring issues of unfairness, inequality widening the gap between classes even more.

9. Are there any particular ethical or social issues associated with BCIs?

All the ethical issues discussed in question 4 will also apply to a lesser or greater extent to the use of Brain- Computer interfaces.

It is worth mentioning that issues of personal identity and moral responsibility may be more prominent when applying this type of technology.

Within the area of personal identity we need to be particularly aware of the relationship of the individual with his/her link to the artificial device in question and whether this will have an effect on how this would affect their sense of personal identity. For instance when it comes to controlling an artificial limb will this feel as a part of who they are and be fully integrated within their concept of self without any tension?

Particular linked to the military use of BCIs is also the issue of moral accountability and responsibility associated with the use of BCIs for military purposes. The use of BCIs would potentially mean that soldiers could control weapons placed miles away, making the act of killing and destruction detached from any feelings of guilt, remorse or sense of responsibility towards those affected, in effect making the soldier the ideal killing machine. The difficulty would be in determining the final moral agency and responsibility of an act which resulted in devastating suffering and loss of human lives.

Neurotechnologies would therefore be contributing to warfare in a way that may force us to re-define the rules of war.

14. Are there any particular ethical or social issues associated with neurostimulation?

All the ethical issues discussed in question 4 will also apply to a lesser or greater extent to the use of neurostimulation via TMS or DBS interventions.

Focusing on TMS technologies, the threat of coercion may be of particular interest. It has been suggested that the process of solving a mathematical problems can be improved by wearing a special cap that applies small electric impulses to the brain¹. As discussed above, should this type of technology become more widely available individuals may feel pressured to be enhanced in such a way against their wishes.

¹ <http://www.bbc.co.uk/news/health-11692799>

18. Are there any particular ethical or social issues associated with neural stem cell therapy?

All the ethical issues discussed in question 4 will also apply to a lesser or greater extent to the use of neural stem cell therapies.

An ethical concern particularly applicable to this kind of technology is whether the results achieved via neural stem cell therapy will be passed to future generations. We do have a moral responsibility towards those not yet born and therefore unable to consent. It is our responsibility to assess the effects of any changes done to the genome of future generations and ensure that their wellbeing will not be compromised.