

This response was submitted to the consultation held by the Nuffield Council on Bioethics on Emerging biotechnologies between April 2011 and June 2011. The views expressed are solely those of the respondent(s) and not those of the Council.

Hopefully this response will be of some use.

First up – not so interested in definitions – leave that to you. However Human Enhancement I understand to be enabling a human to have abilities beyond the human norm – I do not consider human enhancement to be e.g. restoring an eye to a person who is blind (yes it is enhancement for them as an individual, but I see this as therapy in a general context).

My own experimental research into implant technology has taken a number of courses:

1. Implant technology for identification/tracking/monitoring – My first implant was an RFID (in 1998) which allowed my building's computer to switch on lights, open doors, say hello – do things for me. As a form of enhancement, if technology recognizes an individual uniquely, then it can do things for them. This can be also used for therapy – e.g. what medication to give an individual with epilepsy – the implant can inform. Subsequent implant tech of this genre can be used for tracking (e.g. via a wide area network).
2. My second implant self-experiment involved a direct neural connection with the internet + computers – this enabled me to have an extra (ultrasonic) sense, to control tech with my brain over the internet (e.g. a robot hand from US to UK), to communicate in a direct (brain to brain) way. Potentially in the future will allow for thought communication. This type of enhancement can open up new opportunities with memory enhancement. Of course there are many uses of this technology for therapy – e.g. the ultrasonic sense to assist people who are blind.
3. Present studies with Parkinson Disease patients who have received Deep Brain Stimulating electrodes in the sub thalamic nucleus – by the use of AI, tremor onset can be predicted accurately – essentially AI monitoring electrodes can predict what the human brain is going to do, quite some time before it does so, with lots of potential applications.
4. Several of my students now have magnets implanted in their fingertips – we are investigating sensory substitution – converting such as ultrasonic (distance to objects) information into vibrations in the magnets – latest involves remote sensing of heat through the magnets (infrared detection) – a wide range of potential new sensory inputs can be achieved this way.
5. I presently have a student who is communicating by sending small electrical pulses into his tongue – this follows on from the pioneering work of Paul Bach-Y-Rita, directional indications and patterns can successfully be communicated this way.

For all above experiments there are potential therapeutic purposes that go along with enhancement purposes. But a distinct line between them does not (in reality) exist – to

draw a line you would need to define a human norm limit – which would be silly. Please, as a committee, do not conclude that this technology is OK for therapy but questionable for enhancement – I would consider that to be naïve in the extreme – merely pampering to political correctness and expectations.

In each case there exist enormous commercial opportunities. As an example consider ‘thought communication’ – already the first basic experiments have indicated the possibilities – no reason here that we should not all have the opportunity to enhance our (primitive) communication abilities through the use of implant technology.

I am also involved in culturing neurons and giving them a robot body – at present the abilities of such cultures are limited – driving a wheeled robot around a corral – but there is no reason they could not be much more powerful in future – I have attached a paper on this – not sure where it fits into your scheme – even when human neurons are employed, it’s not really human enhancement.