1. Stronger, longer, smarter, faster

Paul Miller and James Wilsdon

In a packed bar in Nottingham, the temperature of the conversation is rising. We've been talking about the Flynn effect, the fact that human intelligence – as measured by IQ tests when they aren't re-based for each generation – has been steadily improving for the past 100 years. So much so that someone who scored in the top 10 per cent in 1900 would only make it into the bottom 5 per cent in 2000. This is Nottingham's Café Scientifique, one of the most vibrant in the country, where each Monday evening people meet to drink, talk and argue about science.

We go on to discuss drugs that affect the brain. Ritalin (methylphenidate) and other stimulants are now being prescribed to between four and five million school students in the US.[1] Others are borrowing, buying or selling the tablets and taking them to boost their concentration, especially in the run-up to exams. Does this mean they are cheating? And what about the next generation of drugs emerging from the laboratory, which will improve our memories, or overcome the need for sleep? How widespread will the use of such 'Viagra for the brain' become?

Opinion in the bar is divided. 'What's your definition of intelligence?' asks one person.

'I'm not sure I want my memory improving – there are some things you forget for a reason,' says another.

Some see a difference between enhancement technologies that are

available now and those that might alter future generations in more fundamental ways. We talk about the radical end of the enhancement spectrum – the possibility of changing the genetic make-up of our children, of inserting artificial implants into our bodies, or of 'uploading' our brains into a new virtual form. 'Maybe natural selection doesn't work any more,' says one young woman. 'Maybe we need to artificially make ourselves more suited to our environment because genetics can't keep up.' 'Who are we to say that?' counters a middle-aged man. 'How do we know what characteristics are going to be useful in the future?'

Finally, we talk about the possibilities of radical life extension – of living to 150 or beyond. We describe the predictions of Aubrey de Grey, the Cambridge scientist, who argues that there is no reason why people shouldn't eventually live to 1000. It's not a prospect that appeals to everybody. 'It's like that Queen song,' says someone. 'Who wants to live forever? Not me.'

As the crowd in the bar starts to disperse, the sense is that we've only scraped the surface of some pretty complex debates. The appetite for information is greater than we, as the facilitators of the session, can satisfy.

Better definitions

This collection explores the next generation of technologies for human enhancement, and what they might mean for society. Definitions of enhancement vary, but the term usually refers to interventions designed to improve human performance beyond what is required to sustain or restore good health.[2] In the title of one recent book, enhancements aim to make us 'better than well'.[3]

We all share a desire for self-improvement. Whether through education, work, parenthood or adhering to religious or ethical codes, each of us seeks to become a 'better human' in a variety of ways. And for many people, more consumerist pursuits hold the key to self-improvement: working out in the gym, wearing makeup, buying new clothes or indulging in a spot of cosmetic surgery.

The starting point for this collection is that a new set of

possibilities for enhancement is now opening up. Advances in biotechnology, neuroscience, computing, pharmacology and nanotechnology mean that we are in the early stages of a new period of human technological potential. Some of these possibilities are already with us; others remain the preserve of science fiction. Table 1 summarises the current status of the main types of enhancement technology.

As these technologies develop and are shaped by parallel changes in culture and consumer expectation, we may well see a surge in demand for enhancements – surgical, chemical, robotic, genetic – which cannot be categorised as 'medical' but which strengthen our mental or physical capabilities. Some types of enhancement will progress incrementally – for example, new 'smart' drugs – while others are likely to prove more disruptive – for example, nanotechnology or gene therapy.

The question that this collection tries to answer is 'will such enhancement technologies make things better?' not only in terms of human performance but also in terms of our collective well-being and quality of life. As enhancements become more widely available, they will inevitably prompt debate about the limits of their use, and whether they can and should be regulated. At a deeper level, they also force us to address questions of identity, personhood, responsibility and democracy, and about the long-term consequences of altering human nature and capabilities.

The collection is divided into two parts. In the first part, three prominent advocates of enhancement set out their case. Arthur Caplan insists that the new enhancement technologies are merely the logical next step in an ongoing process of using new knowledge to improve ourselves. He criticises the 'anti-meliorists', who argue for 'a distinct essence, a kind of template of humanity that somehow is in there as a core that cannot be touched or changed or manipulated'. On the contrary, he says, 'I find no in-principle arguments why we shouldn't try to improve ourselves at all. I don't find it persuasive that to say you want to be stronger, faster, smarter makes you vain. . . . That's what agriculture is. That's what plumbing is. That's what

Table 1. Current status of the main types of enhancement technology

Name	Function	Examples	Availability
Psychopharmacology	Alteration of brain state or mood	Prozac (enhanced mood), Ritalin (enhances concentration), Provigil (prolongs alert wakefulness)	Now available; other research in progress, eg appetite suppressants
Other pharmacological agents	Alteration of bodily form or function	Growth hormone, Viagra (male sexual function), erythropoietin (athletic performance), steroids (muscle mass)	All now available
Cosmetic surgery	Changes to facial or physical appearance		Now widely available
Preimplantation genetic diagnosis	Enables embryos to be selected for particular genetic traits	Huntingdon's disease, cystic fibrosis[4]	Available for several dozen illnesses; more genetic tests being developed
Gene therapy	Alters genetic make-up of selected cells in the body	Somatic therapy – various experimental treatments	Germline therapy – GM plants; mouse embryo engineering Somatic gene therapy is being used in a number of experimental treatments. Human germline gene therapy is currently illegal in the UK, although the House of Commons Science and Technology Committee has recommended it should be permitted for research purposes[5]

Name	Function	Examples	Availability
Cybernetics	Alteration of mental or physical function by embedding engineering or electronic systems within the body	Kevin Warwick's research at Reading University on human–computer interactions[6]	Research actively being pursued
Nanotechnologies	Similar to cybernetics, but using far higher levels of miniaturisation	Nanodevices to destroy tumours or rebuild cell walls	According to the UK's Royal Society, at least 10 years away[7]
Radical life extension	Combination of techniques enabling human lifespans to reach 150 years or more	Theoretical possibilities hotly debated by scientists such as Aubrey de Grey and S Jay Olshansky	Even the most optimistic predictions (de Grey) suggest we are 25–30 years away from the necessary scientific breakthroughs

clothes are. That's what transportation systems are. They are all attempts by us to transcend our nature. Do they make us less human?'

Nick Bostrom goes further still, arguing that the hardware, software and input/output mechanisms required for 'posthuman' forms of artificial intelligence will be available within 50 years. At this point, we may reach what has been dubbed the 'singularity' – 'a hypothetical point in the future where the rate of technological progress becomes so rapid that the world is radically transformed virtually overnight. . . . Superintelligent machines would then be able to rapidly advance all other fields of science and technology. Among the many other things that would become possible is the uploading of human minds into computers, and dramatic modification or enhancement of the biological capacities of human beings that remain organic.'

And we meet Aubrey de Grey, the self-confessed 'crusader' for human longevity, who suggests that 'we will inevitably be able to address ageing just as effectively as we address many diseases today. . . . I think the first person to live to 1000 might be 60 already.' de Grey argues that society is caught in a 'pro-ageing trance' which leads most of us to defend 'the indefinite perpetuation of what it is in fact humanity's primary duty to eliminate as soon as possible'. He believes that saving a life by deferring unnecessary death is a moral imperative equivalent to that of providing development aid to prevent a child dying from malnutrition.

The world's most dangerous idea?

In the middle of the stage in a darkened lecture hall in Stanford University, all eyes are fixed on a black box, roughly six feet tall and three feet wide. We are at the 2003 Accelerating Change conference – a gathering of the West Coast digerati. And we are waiting for Ray Kurzweil, the celebrated inventor and futurist, to appear before us in 3D holographic form.

Kurzweil is one of the intellectual figureheads of a movement which has come to be known as transhumanism. According to the World Transhumanist Association, this is the belief that 'the human species in its current form does not represent the end of our development but rather a comparatively early phase'.[8] In his most recent book, *The Singularity is Near*, Kurzweil argues that the scope for enhancement will follow an exponential curve, rather than a linear trend. 'Ultimately we will merge with our technology. . . . By the mid 2040s, the non-biological portion of our intelligence will be billions of times more capable than the biological portion.'[9]

In the lecture hall, the audience is growing impatient. We keep expecting Kurzweil to shimmer into view, rather like the projection of Princess Leia from R2D2 in *Star Wars*. But in the end, he never appeared. On this occasion, the technology hadn't accelerated quite enough. In fact it just didn't work. We could hear Kurzweil (well, four words out of five anyway) and we could see his PowerPoint slides (although they kept on crashing), but try as the army of engineers

present did, we still couldn't see him sitting in his office in Boston. In the centre of the stage, the huge piece of kit that was supposed to represent the future stood dormant and useless.

Yet despite the occasional glitch, as Greg Klerkx describes in his essay, the past few years have seen a surge of support for transhumanism. The current generation of thinkers represent 'what might be called transhumanism's third wave'. They are 'sounding a clarion call that radically improved and longer-lived humans are imminent, and they are basing such claims on optimistic extrapolations from relatively new science and technology'. And as the column inches devoted to Kurzweil, de Grey and others demonstrate, these ideas and their charismatic protagonists fascinate the media.

It's easy to laugh at or dismiss the transhumanists as eccentric cranks, inhabiting the outer margins of science. But some serious commentators are ringing alarm bells. Francis Fukuyama, Professor of International Political Economy at Johns Hopkins University, has called transhumanism 'the world's most dangerous idea'. In a 2004 article for *Foreign Policy* he warned: 'Society is unlikely to fall suddenly under the spell of the transhumanist worldview. But it is very possible that we will nibble at biotechnology's tempting offerings without realizing that they come at a frightful moral cost.'[10] Fukuyama is a member of the influential President's Council on Bioethics, which George W Bush set up in 2001. In a series of reports, the Council has advocated a conservative position on enhancement, stem cell research and human cloning, prompting heated responses from the transhumanists.

But it is not only Republican conservatives who feel a sense of unease about enhancement. The second part of this collection features contributions from a range of scientists, social scientists and writers, who raise questions and concerns about the potential implications of these developments. Steven Rose, the prominent neuroscientist, anticipates many positive benefits flowing from advances in his field. But he worries that 'there will also be attempts to develop physical techniques for altering mental processes. These include techniques for direct surveillance of citizen's thoughts, which

could be used for pre-emptive incarceration or medical treatment.'

Danielle Turner and Barbara Sahakian, neuropsychologists at Cambridge University, focus on the effects that smart drugs might have on children and students: 'Is it possible that these drugs could be used to reduce social inequality and injustice in society? Or it is more likely that their use will fuel further disparity based on a lack of affordability? Could cognitive enhancers have unexpected social ramifications, as people are deprived of a sense of satisfaction at their own achievements?'

Sarah Franklin addresses the beginning of life in her analysis of the public debate that surrounds preimplantation genetic diagnosis (or PGD) – which in the media's eyes tends to be equated with 'designer babies'. Like the figure of the human clone, 'the designer baby has become an iconic signifier of the dilemmas and risks posed by new genetic technologies'. But despite fears that we will forfeit our humanity to such advances, Franklin is optimistic about the prospects for genuine deliberation: 'What emerges from a brief scan of PGD and its future, is the extent to which [it] is associated with public debate and regulation, *not their absence*.'

For Jon Turney, it is the prospect of death that raises the deepest questions. He surveys four decades of literary speculation about immortality, and is forced to conclude that: 'a search for immortality seems to me a counsel of despair, not hope. As completely unlimited life is out of the question, what is the appeal of staking all on such a fantasy? If a life limited to 100 years is devoid of meaning, why would living to 200, or even 2000, improve matters? There would still be infinitely many years of non-being to follow.'

Decca Aitkenhead writes about the one form of enhancement that is already booming: cosmetic surgery. 'Cosmetic operations in BUPA hospitals were up by 32 per cent last year, male patient numbers more than doubled, and operations by the British Association of Aesthetic Plastic Surgeons (BAAPS) rose by 50 per cent.' Something that was once regarded as shameful or taboo has been rebranded as mundane, and popularised through TV makeover shows and magazine competitions where the prize is breast augmentation.

The most critical voices in the collection are those of the disability rights campaigners, Rachel Hurst and Gregor Wolbring. In her powerful essay, Hurst argues that the techniques and motivations for human enhancement are akin to eugenics: 'We will never be able to continue building a society based on human rights while genetic advances are directed towards the elimination of disabling impairment. The most important right – the right to life itself – can never be ensured in this climate.' For Wolbring, there is a danger that 'the transhumanist model sees every human body as defective and in need of improvement, such that every unenhanced human being is, by definition, "disabled" in the impairment or medical sense'. This will give rise to a new, unenhanced underclass.

Better democracy

Each of the essays grapples in its own way with the crucial question 'Who should decide?' For most of the authors, as for Demos, the starting point is a commitment to democracy. Yet in order to exercise any democratic oversight of new forms of enhancement, we simultaneously need to 'enhance' our ability to make choices about what we value in our lives. And we need to recognise that being human depends far more on our capability for engaging in meaningful forms of collective deliberation than on any new technology or advance in processing power. This is a point made well by Raj Persaud in his essay, where he points out that enhancement 'requires us not to become different in order to improve, but rather to become more like the good parts of ourselves. Enhanced people are already walking around among us, but we tend to ignore them. We do this at our peril and new technologies will not save us from this mistake.'

This crucial point is often lost in the deterministic predictions of the transhumanists. All too easily, they slide from a discussion of what new technologies *may* make possible to an assumption that these changes *will* happen, without any appreciation of the subtleties of culture and values, or the unpredictable twists and turns of democracy. Dan Sarewitz, the sociologist of science, describes how he

took part in a number of National Science Foundation meetings on human enhancement, where these limitations were apparent.

> *Most of the attendees were highly intelligent white males who worked in the semiconductor industry, at national weapons laboratories or major research universities. At one point, the group got to talking about how we might soon achieve brain-to-brain interfaces that would eliminate misunderstandings among humans. Instead of having to rely on imperfect words, we would be able to directly signal our thoughts with perfect precision.*
> *I asked how such enhanced abilities would get around differing values and interests. For instance, how would more direct communication of thought help Israelis and Palestinians better understand one another? Unable to use the ambiguities and subtleties of language to soften the impact of one's raw convictions, might conflict actually be amplified? A person at one of the meetings acknowledged he 'hadn't thought about values', while another suggested that I was being overly negative. . . . This sort of conceptual cluelessness is rampant in the world of techno-optimism.*[11]

Part of the problem stems from transhumanism's origins in a particular strain of Silicon Valley libertarianism (an ideology described with amusing candour by former *Wired* writer Paulina Borsook in her book *Cyberselfish*[12]). Yet there are now efforts under way from within the transhumanist movement to grapple more seriously with these social and political challenges. One of the most interesting books to emerge recently is *Citizen Cyborg* by James Hughes, executive director of the World Transhumanist Association. Hughes argues that enhancement must go hand in hand with a radically strengthened democracy: 'We can embrace the transhuman technologies while proposing democratic ways to manage them and reduce their risks. . . . We need a democratic transhumanist movement fighting both for our right to control our bodies with technology, and for the democratic control, regulation and equitable distribution of those technologies.'[13] He even suggests that

transhumanism will become the next progressive force, picking up the mantle of human liberation from the movements for gender and racial equality.

Despite this, Hughes occasionally slips back into the familiar mantras of technohype and determinism. And his call for a less polarised debate isn't helped by him labelling all critics of enhancement 'BioLuddites', without making the effort to engage seriously with the substance, texture and motivation of their concerns. Nonetheless, his book is a welcome contribution, particularly as it has sparked a great deal of debate within the transhumanist movement itself.

Better policy

Hughes also points to where discussions about enhancement need to go next. The transhumanist movement, insofar as it exists as a defined community, can no longer own or manage the terms of these debates. These technologies have the potential to affect all of us, and they must now be opened up to wider processes of democratic scrutiny and debate. In particular, there needs to be a distinctively European discussion of these issues, as opposed to a wholesale import of debates from the US, where the religious right tends to set the terms of critical discussion. Is it possible to look afresh at some of the social and ethical dilemmas raised by enhancement from a more progressive European stance? A forthcoming conference organised by Oxford University's James Martin Institute is a positive step in this direction.[14]

This links to the wider question of how we improve our social readiness and the resilience of our systems of governance to cope with these changes. We close with three practical suggestions.

1. Upstream public engagement

As Demos has argued elsewhere, there is a need to move public engagement 'upstream', to an earlier stage in processes of research and development.[15] A number of experiments are now under way in this regard in the UK, born out of recognition that earlier controversies,

such as those around genetically modified crops, have created a window of opportunity to improve the governance of science and technology.[16]

Enhancement technologies are an area where dialogue is urgently required between scientists, policy-makers, bioethicists, healthcare professionals, educationalists, NGOs, disability groups and the wider public. Such discussions should address not only narrowly framed 'impacts', but also the wider social and ethical context in which such innovations may occur, for example, how to define the benefits of different forms of enhancement in terms of well-being and life satisfaction. Or how to determine what constitutes a good death, as well as an enhanced life. This dialogue should be facilitated by key players within government and the scientific community, such as the Office of Science and Technology and the Royal Society. The UK government should also look seriously at the option of establishing a Commission on Emerging Technologies and Society, which could provide an institutional hub for 'public engagement and social assessment of technologies'.[17]

2. The new old

If even a handful of the predictions of the transhumanists are accurate, we face the prospect of life expectancy in our already ageing society rising far more dramatically than current models suggest. By and large, this will be a very positive development – potentially allowing more people to live fuller and healthier lives into their 80s, 90s and beyond (far beyond if you accept the arguments of Aubrey de Grey!).

But it will also create some challenges. In the UK, one only has to look at the fierce response from some quarters to the proposal by Lord Turner's Pensions Commission to raise the retirement age from 65 to 69 over the next 30 or 40 years to see just how far we have to go if we are to face up to the potential for a life-extended society.[18] A much steeper retirement 'escalator' may be required, with a retirement age of 80 or 90 becoming necessary well within the lifetime of Lord Turner's proposals.

As these proposals are now the subject of further consultation and debate, we suggest that further analysis is carried out by HM Treasury and the Office of Science and Technology about the potential implications of more radical forms of enhancement and life extension.

3. Education epidemic

Finally, there is a need to look seriously at the implications of enhancement for our education system. On the positive side, advances in neuroscience mean that we are developing a more sophisticated understanding of how young people's brains develop and learn, and this knowledge can inform educational policy and practice.

More negatively, the widespread use of Ritalin and the potential for new types of pharmacological enhancement threaten to undermine systems of fair assessment. The response to this should take two forms. First, it requires us to rethink the role of competitive exams in our education system, which are likely to encourage the use of cognitive enhancers, and instead place greater emphasis on individual learning pathways that equip students for a lifetime of learning.[19]

Second, efforts to restrict recreational drug use in schools, for example through random drug testing, will need to broaden their scope to cope with a new generation of drugs, whose educational impact is potentially far more significant than drugs such as cannabis or Ecstasy. Whereas recreational drugs tend to be taken without the support of parents and teachers, we face the prospect of enhancement drugs being actively 'pushed' to under-performing students by teachers or parents. Just as the scandal of drugs in sport led to the creation of the World Anti-Doping Agency in 1999, with its motto 'play true', so the government should consider creating a schools and universities anti-doping agency (with the motto 'learn true') to promote a drugs-free education system.

The most important thing we can do when confronted with the new possibilities for human enhancement is to get people talking. We may not have accurate foresight but we can have forethought. And scientists or self-proclaimed transhumanists cannot retreat into their

own neatly defined boxes. Rather, they have to roll up their sleeves and get stuck in to a meaningful dialogue with citizens and policy-makers about what might happen, and how those trajectories can still be shaped and changed.

The aim of this collection is just that: to encourage a wider debate before these technologies are a done deal. And to start more of the kinds of discussions that took place in that bar in Nottingham.

Paul Miller is a Demos associate and James Wilsdon is head of science and innovation at Demos.

Notes

1 L Diller, *Running on Ritalin: A physician reflects on children, society, and performance in a pill* (New York: Bantam, 1999).
2 See, eg E Juengst, 'What does "enhancement" mean?' in E Parens (ed), *Enhancing Human Traits: Ethical and social implications* (Washington DC: Georgetown University Press, 1998).
3 C Elliott, *Better Than Well: American medicine meets the American dream* (New York: W Norton & Co, 2003).
4 The Human Fertilisation and Embryology Authority website includes a list of diseases for which PGD is licensed in the UK; see: www.hfea.gov.uk/Home (accessed 12 Jan 2006).
5 House of Commons Science and Technology Committee, *Fifth Report: Human reproductive technologies and the law* (London: House of Commons, March 2005).
6 See www.cyber.reading.ac.uk/people/K.Warwick.htm (accessed 12 Jan 2006).
7 Royal Society and Royal Academy of Engineering Nanoscience and Nanotechnologies: opportunities and uncertainties (London: Royal Society/RAE, July 2004).
8 http://transhumanism.org/index.php/WTA/faq/ (accessed 12 Jan 2006).
9 R Kurzweil, *The Singularity is Near: When humans transcend biology* (New York: Viking, 2005).
10 F Fukuyama, 'Transhumanism', *Foreign Policy*, Sep/Oct 2004.
11 D Sarewitz, 'Will enhancement make us better?', *Los Angeles Times*, 9 Aug 2005.
12 P Borsook, *Cyberselfish: A critical romp through the world of high-tech* (London: Little Brown, 2000).
13 J Hughes, *Citizen Cyborg* (Cambridge, MA: Westview Press, 2004).
14 See www.martininstitute.ox.ac.uk/jmi/forum2006/ (accessed 12 Jan 2006).
15 J Wilsdon and R Willis, *See-through Science: Why public engagement needs to move upstream* (London: Demos, 2004); J Wilsdon, B Wynne and J Stilgoe, *The Public Value of Science* (London: Demos, 2005).

16 For example, see www.demos.co.uk/projects/currentprojects/nanodialogues/ (accessed 12 Jan 2006).
17 For more on this proposal, see Wilsdon et al, *The Public Value of Science*.
18 See www.pensionscommission.org.uk (accessed 12 Jan 2006).
19 For more on this, see P Skidmore, *Beyond Measure: Why educational assessment is failing the test* (London: Demos, 2003).

After a decade behind bars for a murder he did not commit, Ryan Ferguson learned that physical strength and confidence are keys to survival â€“ he now shares his strength secrets in Stronger, Faster, Smarter--the smartest, realest, and most doable fitness guide youâ€™ll ever read. How many of us really understand that every moment counts, and that physical strength and confidence enable our mind and spirit to make the most of our lives? Ryan Ferguson does.Â How could a jury convict me with no evidence? How long would it take to right this obvious wrong?Â I purchased this 162 page soft cover (Stronger, faster, smarter: A guide to your most powerful body by Ryan Ferguson) book and found it to be a compelling read. Stronger, Faster, Smarter He believes that the more we exercise, the smarter and more healthy our brain will be. His Proof: Dr. Hillman conducted an experiment to test grade school kids' intelligence based on their fitness testing scores. Ones who scored high on fitness, also.Â Exercise can be done anywhere. Even in school. As long as we are getting it. It can make you, well, stronger, faster, and smarter!!! In Conclusion So why are jocks dumb? Stronger, longer, smarter, faster. possibilities for enhancement is now opening up. Advances in biotechnology, neuroscience, computing, pharmacology and nanotechnology mean that we are in the early stages of a new period of human technological potential.Â As these technologies develop and are shaped by parallel changes in culture and consumer expectation, we may well see a surge in demand for enhancements surgical, chemical, robotic, genetic which cannot be categorised as medical but which strengthen our mental or physical capabilities. Some types of enhancement will progress incrementally for example, new smart drugs while others are likely to prove more disruptive for example, nanotechnology or gene therapy.