

I argue that the technology to attempt to create posthumans is much closer than many realize and that the right to become posthuman is much more complicated than it might first appear.

## Two Radical Experiments in Cognitive Enhancement

It is foreseeable that some time this century genetic technologies, nanotechnology or computer-implants could be used to attempt to enhance human biology in a number of ways, e.g., to make humans smarter, longer-lived or more virtuous (Stock, 2002; Overall, 2003; Walker, 2004b). Evidently, much of this potential is prospective, e.g., nanotechnology and computer-human integration are still comparatively theoretical, but potentially they could be used to enhance human nature later this century (Hughes, 2004; Freitas, 1999; Moravec, 1998). The fact that some of these developments lay in the future should not distract us from the fact that there are at least two quite different types of experiments we could perform *today* in an attempt to radically enhance our intelligence. Let me briefly describe them.

The first takes its cue from a procedure that is currently being employed for therapeutic treatment of Huntington's disease – a debilitating and eventually fatal neurological disease. Thomas Freeman and colleagues treated Huntington's patients by grafting donor fetal striatum tissue (fetal neurons) into the basal ganglia of adult patients. They summarize their research thusly: "This study supports the use of implanted fetal striatal tissue as a possible treatment for [Huntington's disease]. Preliminary data from the cohort of seven patients involved in this open-label trial demonstrates that human fetal striatal grafts may at least provide short-term clinical benefit" (Freeman, et al., 2000: 13881). In addition to the encouraging report on the improved behavioural response of the patients, further grounds for optimism came from the results of an autopsy of a patient who died (for reasons unrelated to Huntington's) 18 months after the implant. Examination revealed that the implanted fetal tissue showed no signs of immune rejection, and the implanted tissue successfully integrated into the patient's brain.

While this surgery was intended solely to attempt to repair lost cognitive function, it is suggestive of a possible means to enhance cognitive functioning of normal human brains: fetal neural tissue could be implanted into the neocortex of a healthy subject. The neocortex is an obvious area of the brain to attempt augmentation, since it is responsible for many "higher" cognitive functions, and shows a great

amount of plasticity in its wiring – unlike many of the “older” parts of the brain (Storfer, 2000; Neville and Bavelier, 2000).

An obvious objection to this is that at best this research demonstrates possible therapeutic applications for donor fetal tissue; it does not demonstrate that enhancement is possible. This observation must be admitted, but it is not the least bit telling, for it simply points out what is admitted from the start: such surgery is an *experiment* in creating greater intelligence. Like any experiment, we cannot know its outcome in advance of its performance. Furthermore, there are several theoretical grounds for thinking that such procedures could eventually succeed in enhancing cognitive functions.

As intimated, it is thought that the brain has a certain amount of ability to rewire itself, i.e., set-up new synaptic connections during the process of learning. This leads to the conjecture that new neurons could be functionally integrated into this process of recruitment during learning (Edelman, 1987, 1989). This conjecture, in turn, is partly supported by observations on subjects with severed nerve connections between the brain and a sense organ or body extremity. Sometimes the associated area of the brain, rather than lying fallow, is recruited and “rewired” to assist with some other task. For example, there has long been anecdotal evidence that persons who lose the use of a sensory modality may have an increase in functioning in their remaining sensory modalities. This anecdotal evidence has been backed up by a number of studies that show that the blind have increased speed in language processing tasks (Röder et al., 2000), and that the congenitally blind have increased speed in auditory discrimination (Röder et al., 1999). A long-standing hypothesis is that this increased ability is due to reorganization in the brain, specifically, in areas normally devoted to visual information processing. This hypothesis has received support in neuro-imaging studies of blind individuals. Thus, auditory tasks (Weeks et al., 2000) and Braille reading (Sadato et al., 1996) have been shown to activate areas of the neocortex normally associated with visual processing (see Kahn, 2002, for further review). The fact that the neocortex can rewire itself in such instances lends support to the idea that it might be possible to augment, with additional neurons, those areas of the neocortex devoted to higher reasoning, and have the implanted neurons functionally integrated in a manner that improves cognitive performance – e.g., perhaps increasing our reasoning abilities in philosophy (Walker, 2002) or science (Walker, 2004a). With donor fetal neurons and an adult test subject, we could perform such an experiment today.

A second type of experiment involves genetically engineering human zygotes for much larger brains. This sounds difficult but, again, we in fact have the technology to attempt such experiments today. For a start, there is no *technical* reason why we could not attempt germline engineering on humans; we have managed germline engineering on other mammals such as mice, and recently monkeys (Chan, et al., 2001). Admittedly, genetic engineering to date has had a low success rate, but this simply means that a number of embryos would have to be genetically engineered to ensure a decent chance of success. Of course genetic engineering techniques are helpful only if we know which genes to engineer. As it turns out, we already have a pretty good idea about which genes to manipulate to achieve greater brain volume. In particular, we have discovered a special class of genes, homeobox genes, that act like “master switches” in that they control the growth and development of large segments or parts of an organism, e.g., there are homeobox genes that control the development of the growth of the wings of fruitflies. By regulating a single gene scientists have been able to coax fruitflies to develop a complete second set of wings. In terms of our specific interest, there are homeobox genes that control the size of different areas of brain development in reptiles and mammals (Holland, Ingham, and Krauss, 1992; and Finkelstein and Boncinelli, 1994). Experimenters have, for example, tweaked the expression of genes that control the growth of a frog’s brain to make frog zygotes with abnormally large brains as well as abnormally small brains (Boncinelli and Mallamaci, 1995). By genetically engineering the expression of one or more of the homeobox genes it may be possible to attempt to create subjects with much larger brains than the current human norm. In fact, there are any number of experiments that might be done here because there are different homeobox genes that influence brain development in a variety of ways. The gene X-Otx2, for instance, is very general in its scope and when scientists increase its expression it creates a frog embryo with a larger mid and forebrain. Emx1 controls the growth of a more specific area of the neocortex, and so increasing its expression would localize additional growth in just the neocortex. Thus, by increasing

the expression of just one, or several homeobox genes, quite different patterns in brain growth are likely to result.

Suppose we were to attempt either of these experiments. What might the result be? Conceivably, experimental subjects might have the same or even less intelligence than normal humans. Perhaps humans are at the apex of what is possible in terms of biological intelligence, and a larger brain only impedes intelligence. Conversely, the most dramatic possibility is this line of experimentation leading to the creation of persons who stand to humans in intelligence as humans do to apes. Arguably, such individuals would comprise a new species: *Homo bigheadus*. Alternatively, such technologically enhanced persons are sometimes referred to as “posthumans.” So, the possibility exists that one or more of these experiments could lead to the creation of the first posthumans. As noted, we do not know what the outcome of such experiments will be, but even if we assign a very small probability to the outcome where a posthuman with vastly greater intellectual abilities is created, such a result is so profound that it should make us sit up and take notice.

### **Two Moral Routes to Becoming Posthuman**

What should we make of these experiments? One thing we should notice is that there is a major moral difference between the two types of experiments stemming from a difference in the capacity for autonomous decision-making on the part of experimental subjects. Decisions are understood to be autonomous when made by a rational and informed person in the absence of coercion (Dworkin, 1998). This moral difference is apparent in our reaction to a more familiar case: suppose an adult patient agrees to be part of a clinical study looking to test the effects of a new antibiotic. Imagine at this stage of the investigation the experimenters are looking at its effects on healthy adults. Typically we would respect the autonomous decisions of healthy adults to put themselves at some risk in participating. Yet, we might be *less* inclined to automatically think that it is morally permissible for a parent to enrol a healthy child in such a study. In general, it seems that it is less morally problematic to permit adults to autonomously act in a manner that may negatively impact their health and life than it is to make such choices for children. This proposition is generally recognized in the literature on experimenting on children (McIntosh, Bates, Brykczynska et al., 2000).

By parallel reasoning, there is something less morally problematic in cognitive enhancement experiments on adults as compared with attempting such experiments on children or zygotes. As we have said, it is one thing for a rational adult to agree to research that may have terrible health risks – we are talking about experimenting with patients’ brains, after all – it is quite another thing entirely to perform such research on children (or zygotes who grow into children) who have no say in whether they are willing to participate or not. Just to be clear: I am not saying that it is, or is not, permissible to conduct such research on children or adults. I am making a much more modest point: in the case of experimenting on consenting adults, the experiments are less morally problematic in just the same way as efficacy trials of a new antibiotic are less morally problematic (other things being equal) on adults as compared with children. In fact, because of this difference it seems that if we were to conduct experiments in creating posthumans, it would be best (if possible) to proceed in the first instance with adult volunteers. Consider that if the experiment goes horribly wrong we could say in the adult case that the test subject was not coerced when he gave informed consent to be part of the experiment, and that this is something (presumably) that the subject clearly and dearly wanted to do. We could not make the same claim if a child (or a foetus that grows into a child) is harmed during the experiment.

### **The Identity Objection**

Our interim conclusion is that for moral reasons we should (other things being equal) conduct experiments in creating posthumans first (and perhaps always) with adults who consent to the experiment, rather than with children. I want to explore a line of argument that says that these two moral routes might not be as distinct as they first appear. The nub of the argument goes back to Aristotle. Aristotle asks us to suppose that we are going to wish the best for our friend. To be a god

seems to be the very best thing, says Aristotle, and so it seems that you ought then to wish for your friend to be a god. But if a “man wishes his friend’s good for his friend’s sake, the friend would have to remain the man he was. Consequently, one will wish the greatest good for his friend as a human being” (1962:1159a). Aristotle’s reasoning seems to be this: If your friend turned into a god then she would no longer be the same person, so what seems to be a wish for what is best for her, is in fact to wish her out of existence; and to wish that she be replaced by a god.

To bring Aristotle’s example around to our concerns we need to modify it somewhat. First, Aristotle’s example is made in the third person. The concerns we have might be better expressed in the first person. Suppose I want to wish what is best for me, and I wish to become a god. According to this line of argument, I would then be wishing for my own destruction. If I were to wish for something for my own good, then according to Aristotle, I would have to wish for something for myself “as a human being.” No doubt, Aristotle would agree that you could consistently wish for yourself great wealth and power, or even to become as smart as the smartest human being. What is prohibited is wishing for something as radically different as godhood. Second, rather than speaking about wishing to be a god, we might express the same worry about wishing to become a posthuman. The modified Aristotelian reasoning here says that if I were to wish to become a posthuman, then I would in fact be wishing for my own destruction, for the human that I was would no longer be. Even if most (or all) of my biological matter were incorporated into this new posthuman being, I would cease to exist.

Accepting this line of argument seems to suggest that what looked like two moral routes to becoming posthuman collapse into one. For in both cases we are in effect creating a person who is a posthuman who did not consent to being created. Now it may be remarked that none of us consent to being born, and so there is no special difficulty in creating posthumans. It is certainly true that none of us consented to being born, but it does not affect the point that, if Aristotle’s argument is correct, I cannot claim that I have consented to becoming posthuman. At best, I can consent to dying and having some (or all) of my biological matter recycled to create a new posthuman person. So, this case would not differ significantly, morally speaking, from creating a posthuman through (say) genetically engineering a human zygote. In either case, new persons are created, persons who did not consent to the experiment.

One way to further elucidate the problem here is if we think of moral reasoning for biological enhancement based on claims about rights. If I have a moral right to biological enhancement then my right ends where I end. My right to enhance does not imply, for example, that I have a right to enhance you – my right ends where I end. The same point applies to my children – my right to enhance myself does not imply a right to enhance them. Perhaps I have some *other* right to enhance my children, for example, I might assert a parental right to create a child of my own choosing – but this right is clearly distinct from the right to enhance myself. So, if we accept the Aristotelian argument, becoming posthuman could never be based on “my right” to become a posthuman.

I think accepting this line of argument would be a serious (but not necessarily fatal) blow for the moral case for enhancement. We have a long tradition of recognizing persons’ rights to autonomy<sup>1</sup>, and the right to do in and to their body what they will. Biological enhancement, arguably, is a logical extension of these rights. The use of plastic surgery to enhance our looks, for example, is sometimes defended in terms of the right to bodily integrity, and so it looks like a plausible means to defend other biological enhancements such as greater intelligence. Parental rights to create a child of one’s own choosing are *much* more problematic: consider the reaction to a parent who wants to purposely create a blind child (perhaps having a surgeon remove the child’s eyes in utero). Not surprisingly, then, this right is not nearly as well recognized, and indeed, because of such cases is not likely to be so in the future. But herein lies the rub: the Aristotelian identity argument says that there is a limit to how much can be logically defended under “my right to autonomy” or “my right to bodily integrity,” namely, it covers only those sorts of biological enhancements where the right-holder remains one and the same person after biological enhancement. Some changes may be so drastic that they will mean

that I cease to exist, so such changes cannot be grounded in my right to bodily integrity or said to flow from my right to autonomy. If we believe the identity objection then what looked like two moral routes to *radical* enhancement are at root only one.

It is worth emphasizing that this applies only to more radical type changes, changes that affect what philosophers call personal identity. Getting a “nose job” does not count as changing one’s personal identity – you are still you after the nose job even though your body has been altered. On the other hand, if you wish to become a bacterium then you are wishing for your own destruction. This is of course not to deny the possibility of building a large bacterium out of all the molecules that make up your body, but you would not survive this re-arrangement of molecules. Whatever makes you, *you*, will be gone. Specifying exactly what makes you, you, leads to the philosophical problem of personal identity. However, to make the Aristotelian case, it is not necessary to provide such a theory of personal identity; it is enough to point to a clear case where one does not survive some proposed change. So long as we agree that we could not be said to survive the change to become a bacterium, the Aristotelian argument has at least some applicability, e.g., I cannot assert a right to become a bacterium.

### **Overcoming the Identity Objection**

The general point that individual rights extend only as far as the individual seems unassailable. If we accept it specifically with reference to radical cognitive enhancement then it seems we must renounce all hope of asserting our right to become posthuman. (Again, this is different from the issue of whether it is permissible to create a posthuman.) Nevertheless, I want to suggest that even if we accept the general point about identity, there are reasons for thinking that we can survive a transition from being human to being posthuman. However, issues involving personal identity are complex and contested, so, given present limitations, I can only provide a hint of how further developments might go.

In thinking about Aristotle’s identity argument, one thing we might question is whether he is in fact correct that it is not even logically possible for us to become gods. There are theological traditions that explicitly postulate the divinisation of humanity (Meyendorff, 1979). I suspect that, given his metaphysics (which we will not go into here), Aristotle would reject such a theology. Indeed, I suspect that Aristotle would argue that if I am to preserve my identity then I must retain membership in my (biological) species. Here the argument would go that for me to continue to be me, I must remain a *Homo sapiens*, but reengineering human biology in some cases will lead to the creation of a new species, a posthuman. There are a number of things we might question about this line of argument, not the least of which is whether I must preserve my membership in a certain biological category (namely *Homo sapiens*) in order to preserve my identity. Consider this thought experiment: imagine I suffer from a flesh-eating disease that requires amputation of my legs. Kind scientists from Mars replace my legs with super-advanced prosthetics that function just as well as my old legs. As the disease progresses over the years more and more of my body must be replaced with artificial parts, e.g., it is not long before I need an artificial stomach, an artificial heart and so on. Eventually the disease works its way to the base of my brain and so a few neurons are replaced by biomechanical neurons. And of course you see where this is going: we can imagine all of my biological matter eventually being replaced by biomechanical devices that exactly duplicate the functions of the biological parts they are intended to replace. To everyone who knows me I seem to be the same person as before, even though now I am not a biological being (and so not a *Homo sapiens*), but a biomechanical being. My point here is that *if* the Aristotelian argument relies on the idea that individuals must retain their species membership to preserve their identity, then it relies on a very controversial claim.

We can also approach the Aristotelian argument from a slightly different angle. It seems that part of whatever persuasiveness Aristotle’s position has turns on the fact that we might be implicitly assuming that your friend (or you) would change into a god in an instant. So, we might wonder then whether this assumption about rapid change may be responsible for at least some of the intuition that we would not survive such a change. For suppose the divinisation happened gradually, over years or even decades. If you gradually became wiser and wiser we might be less inclined to think that you

have ceased to exist. Picture the changes happening so gradually that they are imperceptible from day to day. People who know you don't notice you getting smarter from one day to the next, but over time it is apparent that you are becoming smarter. We might think that the possibility of you gradually growing into a posthuman does not seem any more implausible than a human zygote growing into an adult human being. Both are radical changes, but they happen slowly.

Let us think of this as "gradualism": the view that one's identity might be preserved through radical changes – from human infant to adult human, or adult human to posthuman – so long as the changes happen gradually. If we must accept gradualism then the worst consequence is that it seems to slow down the process whereby one might become a posthuman, it does not prohibit it. In terms of the neural surgery experiment, we might imagine that if too many neurons are added to your brain at once you will cease to exist, but if neurons are gradually added your identity will be preserved. Accepting this means that I could not demand as a right to be upgraded to a posthuman overnight, but I could consistently demand as "my right" the right to a number of small interventions that would eventually lead to me becoming a posthuman. Sometimes the word "transhuman" is applied to persons intermediate between humans and posthumans. Assuming this, we might say that I can survive the changes to become a transhuman, and; as a transhuman, I could survive the changes to become a posthuman.

Another way to question the Aristotelian argument is to note that, in thinking about the application of technology for the purpose of redesigning our biology, we must be careful about genuflecting to what is "normal" or "natural." It is true that we are most familiar with gradualism: it is almost always the case that we see gradual changes in persons, but we must be aware that this may color our perception of personal identity. Imagine a species, *Homo lamarkian*, very closely related to humans. They live on an isolated island in the South Pacific. As with humans, gestation takes nine months, and when children are born they are indistinguishable (to the naked eye) from human babies. When they are two days old, something amazing (at least to us) happens: the newborns undergo massive amounts of change and then turn into beings that look exactly like adult humans overnight. The rapid physiological changes are quite remarkable as is the fact that during this metamorphosis the newborns have complete mastery of language and knowledge of their culture. (This knowledge of language and culture is somehow encoded in their DNA – Chomskyism with a vengeance!) The Lamarkians are an example of "punctuated growth" rather than the more familiar gradualism. Of course this is bizarre, but would it be wrong for this culture to assert that it is one and the same individual before and after the radical transformation? If yes, then can't we say the same thing for rapidly becoming a posthuman? Admittedly, at this point these are merely rhetorical questions waiting further exploration. But let me point out that the fact that we might find such examples bizarre does not show that they are incoherent. In fact, we are not entirely unaccustomed to punctuated growth in the animal kingdom: as you read this, caterpillars are morphing into butterflies. If it helps, we can imagine the Lamarkians going in cocoons during their metamorphosis. Perhaps too we can imagine the aforementioned neural surgery being performed in a (large) cocoon. The point here is not to be facetious, but to remind us that there may be possibilities for us as individuals that we have hitherto not had a chance to explore.

It may be remarked that there is a major difference between becoming posthuman and the natural punctuated growth of the Lamarkians and caterpillars. In the former case, punctuated growth is (alleged) to be realized through technology, whereas in the latter case the "inner principle" is a natural unfolding of a species' genetic code. The artificial nature of the former change means that the analogy does not hold. What are we to make of this objection? Notice that it reasons from what is "natural" to "what ought to be." I submit that we should be open to the possibility that "who we are," biologically speaking, and "what we want to become," biologically speaking, can be determined autonomously. The "inner principle" here is not a genetic program but our autonomous decisions. Determining our identity autonomously is already "natural" for us, because we cannot forget that even today part of our identity is determined autonomously in the non-biological realm: I can choose the sort of person I want to become by choosing my actions, educational opportunities, my friends, political associations, colleagues, and so on. For those who think we can preserve our personal identity while becoming posthuman, we must say that we may be able to autonomously determine our identity through the

exercise of technology on our biology. In fact this would be a higher expression of our autonomy than we can achieve today.

## Conclusion

My main theme here is cautionary: I argued that the technology for creating posthumans may be much more imminent than is often thought. Secondly, the connection between individual rights and becoming posthuman is much more complicated than it might first appear because it involves philosophical issues of personal identity. I have given some brief suggestions as to how an account of personal identity might be consistent with such rights, but I am under no illusion that the discussion is anywhere near complete. Rather, my more limited aim is to draw our attention to possible objections and some possible solutions. Further thought is required if we are to sustain our claim to having a right to radical cognitive enhancement, that is, to become posthuman. I am optimistic that the identity objection will not thwart our attempts to give a coherent account of a right to become posthuman. Given that the technology is already here for the first crude (and very dangerous) experiments to become posthumans, and the intricate nature of the moral and philosophical issues it raises, it is perhaps with some haste that we should reflect further on these matters.

## References

- Aristotle. 1962. *Ethics*. Translated by Martin Ostwald. Indianapolis: Bobbs-Merrill.
- Boncinelli, E., and A. Mallamaci (1995) "Homeobox genes in vertebrate gastrulation." *Current Opinion in Genetics and Development* 5: 619-27.
- Chan, W. S., et. al. 2001. "Transgenic Monkeys Produced by Retroviral Gene Transfer into Mature Oocytes." *Science* 291: 309-312.
- Dworkin, G. 1988. *The Theory and Practice of Autonomy*, Cambridge: Cambridge University Press.
- Edelman, G. M. 1987. *Neural Darwinism: The Theory of Neuronal Group Selection*. New York: Basic Books.
- , 1989. *The Remembered Present*. New York: Basic Books.
- Finkelstein, R. and E. Boncinelli. 1994. "From fly head to mammalian forebrain: The story of otd and Otx." *Trends in Genetic* 10: 310-15.
- Freeman, T.B., et al. 2000. "Transplanted fetal striatum in Huntington's disease: Phenotypic development and lack of pathology." *PNAS*, Vol. 97, No. 25: 13877-82.
- Freitas Jr., R. A. 1999. *Nanomedicine, Volume I: Basic Capabilities*. Georgetown, TX: Landes Bioscience.
- Holland, P. P. Ingham, and S. Krauss. 1992. "Development and Evolution. Mice and flies head to head." *Nature* 358, 627-28
- Hughes. 2004. *Citizen Cyborg: Why Democratic Societies Must Respond to the Redesigned Human of the Future*. Boulder: Westview.
- Kahn, D. M. and L. A. Krubitzer. 2002. "Massive cross-modal cortical plasticity and the emergence of a new cortical field in developmentally blind mammals." *Proceeding of the National Academy of Science*. 99 (17): 11429-34.
- Moravec, H. 1998. *Robot: mere machine to transcendent mind*. Oxford: Oxford University Press.

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Walker, M. 2002. "Prolegomena to Any Future Philosophy." *Journal of Evolution and Technology* 10, March 2002. (Available online at <http://www.jetpress.org/volume10/prolegomena.html>).

-----, 2004a. "Skepticism and Naturalism: Can Skepticism be Scientifically Tested?" *Theoria* LXX, 1: 62-97.

-----, 2004b. "Genetic Virtue." Unpublished manuscript.

Weeks, R. et al. 2000. "A positron emission tomographic study of auditory localization in the congenitally blind." *Journal of Neuroscience*, 20(7): 2664-72.