Nanoethics and Human Enhancement: A Critical Evaluation of Recent Arguments

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Human enhancement—our ability to use technology to enhance our bodies and minds, as opposed to its application for therapeutic purposes—is a critical issue facing nanotechnology. It will be involved in some of the near-term applications of nanotechnology, with such research labs as MIT's Institute for Soldier Technologies working on exoskeletons and other innovations that increase human strength and capabilities. It is also a core issue related to far-term predictions in nanotechnology, such as longevity, nanomedicine, artificial intelligence and other issues.

The implications of nanotechnology as related to human enhancement are perhaps some of the most personal and therefore passionate issues in the emerging field of nanoethics, forcing us to rethink what it means to be human or, essentially, our own identity. For some, nanotechnology holds the promise of making us superhuman; for others, it offers a darker path toward becoming Frankenstein's monster.

Without advocating any particular side of the debate, this essay will look at a growing chorus of calls for human enhancement, especially in the context of emerging technologies, to be embraced and unrestricted. We will critically examine recent "pro-enhancement" arguments —articulated in *More Than Human* (2005) by Ramez Naam,[1] as one of the most visible works on the subject today—and conclude that they ultimately need to be repaired, if they are to be convincing.

I

Before we proceed, we should lay out a few actual and possible scenarios in order to be clear on what we mean by "human enhancement." In addition to steroid use to become stronger and plastic surgery to become more attractive, people today also use drugs to boost creativity, attentiveness, perception, and more. In the future, nanotechnology might give us implants that

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[1] Ramez Naam, *More Than Human* (Broadway Books, New York: 2005). See also www.morethanhuman.org.

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enable us to see in the dark, or in currently non-visible regions such as the infrared. As artificial intelligence advances, nano-computers might be imbedded into our bodies in order to help process more information faster, even to the point where man and machine become indistinguishable.

These scenarios admittedly sound like science fiction, but with nanotechnology, we move much closer to turning them into reality. Atomically-precise manufacturing techniques continue to become more refined and will be able to build cellular-level sensors and other tools that can be integrated into our bodies. Indeed, designs have already been worked out for such innovations as a 'respirocyte'—an artificial red blood cell that holds a reservoir of oxygen.[2] A respirocyte would come in handy for, say, a heart attack victim to continue breathing for an extra hour until medical treatment is available, despite a lack of blood circulation to the lungs or anywhere else. But in an otherwise-healthy athlete, a respirocyte could boost performance by delivering extra oxygen to the muscles, as if the person were breathing from a pure oxygen tank.

What we do *not* mean by 'human enhancement' is the mere use of tools, such as a hammer or Microsoft Word, to aid human activities, or 'natural' improvements of diet and exercise—though, as we shall discuss later, agreeing on a definition may not be a simple matter. Further, we must distinguish the concept from therapeutic applications, such as using steroids to treat any number of medical conditions, which we take to be unobjectionable for the purposes of this essay.

Also, our discussion here can benefit from quickly noting some of the intuitions on both sides of the debate. The anti-enhancement camp may point to steroids in sports as an argument for regulating technology: that it corrupts the notion of fair competition. Also, some say, by condoning enhancement we are setting the wrong example for our children, encouraging risky behavior in bodies that are still developing. 'Human dignity' is also a recurring theme for this side, believing that such enhancements pervert the notion of what it means to be human (with all our flaws).

On the pro-enhancement side, it seems obvious that the desire for self-improvement is morally laudable. Attempts to improve ourselves through, for example, education, hard work, and so on are uncontroversially good; why should technology-based enhancements be viewed any differently? In addition to virtue-based defenses of technological enhancement, we might also appeal to individual autonomy to defend the practice: so long as rational, autonomous individuals freely choose to participate in these projects, intervention against them is morally problematic.

In *More Than Human*, it is interesting to see that the debate is framed as a conservative (anti-enhancement) versus liberal (pro-enhancement) issue.[3] This proposed dichotomy is undoubtedly influenced by the creation and work of the U.S. President's Council on Bioethics. Led by Leon Kass, M.D., PhD, the council released a report, *Beyond Therapy,* in 2004 that endorsed an anti-enhancement position; this report has become the prime target for both liberals and pro-enhancement groups. However, it would be a mistake to think that the issue necessarily follows political lines, since there may be good reason for a liberal to be anti-enhancement, as well as for a conservative to support it.

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[2] Robert A. Freitas Jr., "Exploratory Design in Medical Nanotechnology: A Mechanical Artificial Red Cell," *Artificial Cells, Blood Substitutes, and Immobil. Biotech.* 26 (1998): 411–430.

[3] Naam (2005), p. 3–5.

II

In his introductory chapter, Naam outlines the overarching theme that is supported by his research and analysis in subsequent chapters. He offers four distinct arguments in defending the pro-enhancement position: first, there are pragmatic reasons for embracing enhancement; second, regulation will not work anyway; third, respect for our autonomy licenses the practices; and, fourth, that the desire to enhance is inherently human and therefore must be respected.

1. In his first argument, Naam points out that "scientists cannot draw a clear line between healing and enhancing."[4] The implied conclusion here is that, if no principled distinction can be made between two concepts, it is irrational to afford them different moral status. So, since there are no restrictions on therapy, in that we have a right to medical aid, there also should be no restrictions on human enhancement, i.e. using the same medical devices or procedures to improve our already-healthy bodies. In other words, there is no significant or moral difference between therapy and enhancement.

There are numerous problems with such a claim; we will herein elucidate two. The first problem can be illustrated by the famous philosophical puzzle called "The Paradox of the Heap": given a heap of sand with *N* number of grains of sand, if we remove one grain of sand, we are still left with a heap of sand (that now only has *N*–1 grains of sand). If we remove one more grain, we are again left with a heap of sand (that now has *N*–2 grains). If we extend this line of reasoning and continue to remove grains of sand, we see that there is no clear point where we can definitely say that on side A, here is a heap of sand, but on the side B, this is less than a heap. In other words, there is no clear distinction between a heap of sand and a less-than-a-heap or even no sand at all. However, the wrong conclusion to draw here is that there is no *difference* between them; so likewise, it would be fallacious to conclude that there is no difference between therapy and enhancement. It may still be the case that there is no *moral* difference between the two, but we cannot arrive at it through the argument that there is no clear defining line.

But, second, there likely *are* principled distinctions that can be made between enhancement and therapy.[5] For example, Norm Daniels has argued for the use of "quasi-statistical concepts of 'normality' to argue that any intervention designed to restore or preserve a species-typical level of functioning for an individual should count as [therapy]"[6] and the rest as enhancement. Alternatively, Eric Juengst has proposed that therapies aim at pathologies that compromise health, whereas enhancements aim at improvements that are not health-related.[7]

Another pragmatic reason Naam gives is that "we cannot stop research into enhancing ourselves without also halting research focused on healing the sick and injured."[8] However, this claim seems to miss the point: anti-enhancement advocates can simply counter that it is not the research they want stopped or regulated, but rather the *use* of that research or its products for

[4] Naam (2005), p. 5.
[5] For more discussion of these ideas, see Fritz Allhoff, "Germ-Line Genetic Enhancement and Rawlsian Primary Goods," *Kennedy Institute of Ethics Journals* 15.1 (2005): 43–60.
[6] Norm Daniels, "Growth Hormone Therapy for Short Stature: Can We Support the Treatment/ Enhancement Distinction?", *Growth: Genetics & Hormones* 8.S1 1992): 46–8.
[7] Eric Juengst, "Can Enhancement Be Distinguished from Prevention in Genetic Medicine?", *Journal of Medicine and Philosophy* 22 (1997): 125–42.
[8] Naam (2005), p. 5.

enhancement. For instance, we may want to ban steroids from sports, but no one is calling for an outright ban on all steroids research, much of which serves healing purposes.

Naam also puts the burden of proof—that regulation of enhancement is needed—on the anti-enhancement side, instead of offering an argument that enhancement need not be regulated.[9] But it is unclear here why we should abandon the principle of erring on the side of caution, particularly where human health may be at stake as well as other societal impacts. Further, both sides have already identified a list of benefits or harms that might arise from unregulated human enhancement. The problem now is to evaluate these benefits and harms against each other (e.g., increased longevity versus overpopulation), also factoring in any relevant human rights. If neither side is able to convincingly show that benefits outweigh harms, or vice versa, then burden of proof seems to be a non-issue.

2. In his second argument, Naam compares a ban on enhancement to the U.S. "War on Drugs", citing its ineffectiveness as well as externalities such as artificially high prices and increased safety risks (e.g., users having to share needles because they cannot obtain new or clean ones) for those who will use drugs anyway.[10] If people are as avidly driven to enhancement as they are to drugs, then yes, this may be the case. But is that a good enough reason to not even try to contain a problem, whether it is drugs, prostitution, gambling, or whatever? While such laws may be paternalistic, they reflect the majority consensus that a significant number of people cannot act responsibly in these activities and need to be protected from themselves and from inevitably harming others. Even many liberals are not categorically opposed to these regulations and may see the rationale of 'greater good' behind similar regulation of enhancement.

Further, that we are unable to totally stop an activity does not seem to be reason at all against prohibiting that activity. If it were, then we would not have any laws against murder, speeding, 'illegal' immigration—in fact, it is unclear what laws we would have left. Laws exist precisely because some people inescapably have tendencies to the opposite of what is desired by society or government. Again, this is not to say that human enhancement should be prohibited, only that a stronger and more compelling argument is needed.

3. In his third argument, Naam ties human enhancement to the debate over human freedom: "Should individuals and families have the right to alter their own minds and bodies, or should that power be held by the state? In a democratic society, it's every man and woman who should determine such things, not the state...Governments are instituted to *secure* individual rights, not to restrict them."[11]

Besides politicizing a debate that need not be political, Naam's arguments are increasingly not anti-conservative but pro-libertarian. You would need to have already adopted the libertarian philosophy to accept this line of reasoning (as well as the preceding argument), since again, even liberals can see that the state has a broader role in creating a functioning, orderly society. This necessarily entails reasonable limits to whatever natural rights we have and also implies new responsibilities—for example, we shouldn't exercise our right to free speech by slandering or by yelling "Fire!" in a crowded theater.

[9] Naam (2005), p. 5.
[10] Naam (2005), p. 6.
[11] Naam (2005), p. 6–9.

A democratic society is not compelled to endorse *laissez-faire* political philosophy and the minimal state, as some political philosophers have suggested.[12] Nor would reasonable people necessarily want unrestricted freedom, e.g. no restrictions or background checks for gun ownership. Even in a democracy as liberal as ours the United States we understand the value of regulations as a way to *enhance* our freedom. For instance, our economic system is not truly a "free market"—though we advocate freedom in general, regulations exist not only to protect our rights, but also to create an orderly process that greases the economic wheel, accelerating both innovations and transactions. As a simpler example, by disciplining a dog to obey commands and not run around unchecked, we actually increase that pet's freedom by now being able to take it on more walks and perhaps without a leash (not to compare people with dogs or laws with behavioral conditioning).

4. Finally, Naam argues that people have been enhancing themselves from the start: "Far from being unnatural, the drive to alter and improve on ourselves is a fundamental part of who we humans are. As a species we've always looked for ways to be faster, stronger, and smarter and to live longer."[13] This seems to be an accurate observation, but it is an argumentative leap from this fact about the world, which is descriptive, to a moral conclusion about the world, which is normative. Or, as the philosophical saying goes, we cannot derive 'ought' from 'is', meaning just because something is a certain way doesn't mean it should be that way or must continue to be that way. For instance, would the fact that we have engaged in wars—or slavery, or intolerance—across the entire history of civilization imply that we should continue with those activities?

More seriously, this argument seems to turn on an overly-broad definition of 'human enhancement', such that it includes the use of tools, diet, exercise, and so on—or what we would intuitively call 'natural' improvement. An objection to Naam's first argument also applies here: just because we cannot clearly delineate between enhancement and therapy or tool-use does not mean there is no line between them. We understand that steroid use by baseball players is a case of human enhancement; we also understand that using a rock to crack open a clam is not. Still, the fact that we have not arrived at a clear definition of 'human enhancement' should not prevent us from using intuitive distinctions to meaningfully discuss the issue.

III

The point here is not that human enhancement *should* be restricted. It is simply that current arguments need to be more compelling and philosophically rigorous, if the pro-enhancement side is to be successful. There is admittedly a strong intuition driving the pro-enhancement movement, but it needs to be articulated more fully, resulting in an argument something like the following:

Who we are now seems to be a product of nature and nurture, most of which is beyond our control. So, if this genetic-environmental lottery is truly random, then why should we be constrained to its results? After all, we've never agreed to such a process in the first place. Why

[12] See, for example, Robert Nozick, *Anarchy, State, and Utopia* (New York: Basic Books 1974).
[13] Naam (2005), p. 9.

not enhance ourselves to be on par with the capabilities of others? And if that is morally permissible, then why not go a little—or a lot—beyond the capabilities of others?

As suggested in the above analysis, one of the first steps in discussing human enhancement is to arrive at a better definition of what it is, perhaps by adopting that used by Daniels or Juengst, though these are still tough issues. For instance, does it matter whether enhancements are worn outside our bodies as opposed to being implanted? Why should carrying around a Pocket PC or binoculars be acceptable, but having a computer or a 'bionic eye' implanted in our bodies be subject to possible regulation—what is the moral difference between the two?

Further, there are societal and ethical implications that also need to be considered, apart from those already mentioned. Before we too quickly dismiss the idea of 'human dignity' as romanticized and outdated, we need to give it full consideration and ask whether that concept would suffer if human enhancement were unrestricted. Is there an obligation to enhance our children, or will parents feel pressure to do so? Might there be an 'Enhancement Divide', similar to the Digital Divide, that significantly disadvantages those without? If some people can interact with the world in ways that are unimaginable to others (such as echolocation or seeing in the infrared), will that create a further 'Communication Divide' such that people no longer share the same basic experiences in order to communicate with each other?

In this essay, we have tried to detail some of the challenges that nanotechnology and nanoethics will confront as applications to human enhancement become technologically viable. This will not be in the distant future, but rather sooner than many of us might have expected. It seems to the authors that a balanced and reasonable perspective is more appropriate than either polarizing extreme, if we are to responsibly and productively advance nanotechnology and its applications, particularly in light of the challenges to the pro-enhancement position that we have described.

About the authors:

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