On Genetic Enhancement

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To Enhance or Not to Enhance?

Biotechnology has fundamentally altered our relationship to life. No longer are we spectators of biology—with different biotechnologies, we can correct, replace, replenish, repair, and regenerate with medical interventions that only half a century ago were the province of science fiction. A fundamental bioethical debate emerges from paradigmatic advancements in cellular, molecular, and genetic engineering concerning the contexts in and extents to which biotechnologies ought to be used. If we can edit and replace genes, which genes are appropriate to edit or replace? And when? There are obvious justifications for the use of biotechnological interventions in medical contexts—for instance, to repair defective or deficient genes responsible for fatal health conditions and to protect against deadly infections. However, how—or if—we should use biomedical interventions in non-medical contexts for elective or other purposes is less clear. Ought we enhance? Echoes of eugenic thought reverberate in the logical space. In this paper, I explore the ethics of enhancement through two contrasting positions to illuminate prescient moral concerns about the non-medical use of genetic technology and resist the claim that we have a moral obligation to enhance.

What is Enhancement?

Some clarifications in terms are needed. What does it mean to enhance? Michael Sandel (2004) argues that our knowledge of genetics, while promising for our ability to treat and prevent debilitating diseases, also puts us in a bioethical predicament:

> The predicament is that our newfound genetic knowledge may also enable us to manipulate our own nature—to enhance our muscles, memories, and moods; to choose the sex, height, and other genetic traits of our children to make ourselves "better than well." (Sandel 2004)

Sandel points to a visceral moral unease about this prospect, yet contends that typical liberal arguments from autonomy, fairness, and individual rights are not strong enough to quell the "moral vertigo" brought on by the genomic revolution and genetic engineering. Julian Savulescu (2009) understands the infinitive *to enhance* to mean to help people live a longer and/or better life than normal. In discussing the ethics of enhancement, he also focuses on biology, specifically genetic enhancement. More narrowly then, we can operationally define *enhancement* as a genetic intervention that increases or improves the quality of one's life.

If enhancement was a term in need of pinning down, then *quality of life* must be wrestled to the mat. The term has an immensely broad scope, mixes objective and subjective aspects, has been specified in different ways for different purposes, and generally lacks a universal definition. However, in creating an instrument to measure quality of life, the World Health Organization defined the concept:

> Quality of life is defined by the WHO as "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns"…It is a broad ranging concept incorporating in a complex way the persons' physical health, psychological state, level of independence, social relationships, personal beliefs and their relationships to salient features of the environment. (World Health Organization 1998, rev. 2012)

Quality of life is a multidimensional concept, incorporating one's subjective perception of their life from an embedded cultural, social, and environmental perspective that is influenced by health variables like disease, symptoms, conditions, or disability, but not a direct function of them. One's perception of their life situation can result from an admixture of knowledge, beliefs, dispositions, facts, memories, expectations, and a milieu of other variables that come together in judgement of how one imagines their relationship with themselves and the world to be. It is simultaneously causally rooted, cognitive, dispositional, and morally loaded. "Quality of life" therefore refers to a specific kind of self-perception about the character of one's overall life situation dependent on dispositional, health, environmental, and factors. Whether enhancement is ethical then hinges crucially on one's attitude about possible future self-perception of their life situation with enhancement weighed against their current self-perception of their future life situation without it. It is a *projection* and a weighing the actual against possible worlds. The situation gets more complex and higher order in the case of embryonic modification, when parents considering these possibilities for their unborn children are evaluating their projection of the character of their unborn child's experience and quality of life with enhancement versus without it.

One way of approaching the ethics of enhancement is to evaluate propositions about it against a concatenation of the above definitions. That is, the question of whether we ought to

enhance is about whether a genetic intervention improves a person's subjective perception of their life from their embedded cultural, social, and environmental perspective. Dilemmas can occur at the individual level when a person considers self-enhancement or at a higher level when a person considers enhancement for another. With these terms and preliminaries established, let us return to the original question—should we enhance? To respond, I'll examine contrasting arguments against perfection and for radical enhancement to sharpen the question and construct a context for my own views about the possibility and conditions of ethically responsible human enhancement given current states of knowledge about genetic interventions and philosophical concerns about projection and hypothesis of subjective experience.

Against Perfection

One of Michael Sandel's chief concerns about enhancement is that genetic intervention by parents during embryonic development denies a child's right to a self-determined future. This could also apply to an individual making a choice to circumvent a self-determined future in favor of a one partially determined by enhancement. Although we certainly do not choose our genetics, he argues, a moral impasse arises when we elect to "reach beyond health" by employing medical means for non-medical ends, even to improve quality of life. Considering our operating definition of quality of life, we encounter a projection problem in the ethics of enhancement that concerns the hypothetical improvement of future self-perception for oneself or another as grounds for genetic intervention in the present. Moral unease about this type of decision is stirred by the inherent uncertainty in predicting future self-perception generally with respect to action in the present. I might choose to do something now that I believe will condition my future happiness, but there are no guarantees. The moral unease is magnified in the case of parents enhancing unborn children.

Sandel contends that an argument from fairness, i.e. that non-therapeutic genetic enhancement is immoral because of the inequality it would produce, is weak in resisting the impulse to enhance because genetic inequality already exists in nature. Opposition to genetic enhancement then must find other footing. Sandel articulates that some worry enhancement may create two classes of human beings demarcated and segregated by their ability to access enhancement technologies—some will enjoy enhancement and other will be confined to their natural capacities. For Sandel, this raises the fundamental question of whether we should aspire to enhance at all. He also offers another variety of objection to enhancement—the arms race. The idea is that that unenhanced individuals will seek enhancement to catch up with enhanced ones. Still, Sandel presses, this objection does not address the attitudes and dispositions that drive our proclivity to enhance and therefore does not penetrate moral crux of the issue.

Is present perception of the possibility of improved quality of life enough to justify non-medical genetic intervention? Again, this is a battle between actual and possible worlds. Take the individual case. Say I believe that if I were taller, I would have an improved quality of life. This sentence is a dispositional statement about a counterfactual that has a peculiar logical status as concurrently an inductive inference and a hypothetical projection (Goodman 1955). It is a belief about a possible world, that is, a way the world might be (Stalnaker 1976). In this possible world, my weight would be more evenly distributed across my body, I would be able to see further in crowds, and perhaps, potential partners would perhaps find me more attractive. I might also be more likely to bang my head on door jambs, have poor posture, or be picked out of a crowd. I have no way of knowing whether this possible world is necessarily better than the actual one. Reasoning with some of the oldest discourse on possibility, one might contend that, despite conjectures about possible worlds and possible self-perceptions in them, the actual world is the best possible world (Leibniz

1714, 1709). Non-medical genetic manipulations then, regardless of their moral status, could be argued to be wholly unnecessary interventions.

Considering the possible world in which parents can choose the height of their child through genetic intervention, Sandel raises a broader ethical question to ground moral skepticism about enhancement: do we want to live in a society where parents feel compelled to spend a fortune to make perfectly healthy kids a few inches taller? Following this line, Sandel presents the case of MicroSort sex selection technology with which parents can select the sex of their second child through sperm cell sorting. The science is ingenious: spermatozoa with an X chromosome have higher DNA content, so these higher molecular weight cells are flow cytometrically sorted out from lower molecular weight cells for use in *in vitro* fertilization, permitting parents to effectively choose the sex of their baby. Sandel contends that the MicroSort case isolates many of the moral objections one might raise against enhancement generally, one of which is rooted in the undermining of our humanity. That argument goes that enhancement threatens our capacity for free action and success by our own efforts, slowly eroding our human agency by shifting admiration of achievement toward admiration of enhancement. However, Sandel's own concerns about enhancement and agency go in another direction:

> "I do not think the main problem with enhancement and genetic engineering is that they undermine effort and erode human agency. The deeper danger is that they represent a kind of hyperagency—a Promethean aspiration to remake nature, including human nature, to serve our purposes and satisfy our desires. The problem is not the drift to mechanism but the drive to mastery. And what the drive to mastery misses and may even destroy is an appreciation of the gifted character of human powers and achievements." (Sandel 2004)

Sandel is concerned with the morality of the *intent* behind human enhancement, and views enhancement beyond nature as infringing on the naturally endowed powers and abilities we possess —our natural gifts—and trading them for chosen, designed enhancements. His opposition to enhancement thus rests on an appeal to the questionable morality of letting rationality outrun nature, design dictate self-realization, and enhancement replace cultivation. Although "there is something appealing, even intoxicating," he says, "about a vision of human freedom unfettered by the given," there is a steep moral cliff from which to fall in exchanging work ethic, motivated self-determination, practice, training, and other character molding activity for the ideal pastures of enhancement. Euphemistically, enhancement trades the human journey for the destination through, in Sandel's view, a questionable species of rationality motivated by a desire for self-perceived and self-satisfying perfection.

Radical Enhancement

In stark contrast, Julian Savulescu (2009) argues a strong position on the morality of human enhancement that is better quoted in its entirety than glossed:

> I want to argue that, far from its being merely permissible, we have a moral obligation or moral reason to enhance ourselves and our children. Indeed, we have the same kind of obligation as we have to treat and prevent disease. Not only *can* we enhance, we *should* enhance. [sic.] (Savulescu 2009)

To advance this view, Savulescu acknowledges that we must consider the meaning and purpose of enhancement interventions, their social context, and the implications for other persons and

institutions enhancement practices will affect but does not see such considerations as prohibitive. Savulescu believes that biological modification will improve the opportunities for an individual to live a better life and advances a position here forward called *radical enhancement*.

The groundwork of radical enhancement includes a few assumptions and preliminaries to air out. The first is a distinction among types of enhancement. For Savulescu, enhancements include those for cognition (Ritalin®), mood (Prozac®, alcohol consumption), sexual performance (Viagra®), curative medical interventions, and regenerative medicine but his ethical focus is on "the radical improvement in quality of life through biological manipulation," that is, genetic enhancement. The second assumption is a belief in some version of genetic determinism suggested conjunctively by his (a) appeal to the power of genetics in experiments manipulating brain reward centers to induce monogamous behavior in prairie voles and eliminate laziness in monkeys and (b) an implicit commitment to behavioral genetics in highlighting that these experiments condition the desirable possibility of manipulating complex human behavior. In responding to the prospect of engineering better, happier people with gene therapeutic methods, Savulescu asserts that "there is no reason why such technology could not be used to alter non-disease genes in the future." He presents three arguments in support for morally obligatory human enhancement: (1) choosing not to enhance is wrong, (2) consistency and (3) no difference from treating disease. I'll examine each of these in turn.

The first argument contends that failure to enhance to sustain a more desirable state is morally wrong. Through a fictional example of parents that fail to administer a dietary supplement to their child that unlocks his superior intellectual ability, Savulescu equates dietary supplementation with biological manipulation and asserts that it is morally wrong not to enhance because it prevents the expression of superior capacities. This move is gratuitous, for there are worlds of difference between dietary supplementation and genetic manipulation. Genetic interventions are dangerous and risky, illustrated by the death of 19-year-old Jesse Ginsberg in a UPenn clinical trial of adenoviral-

delivered gene therapy for hereditary liver disease and the slow expansion of gene therapy clinical trials. (Sibbald 2001, Nature 2021) Moreover, the long-term outcomes of gene therapy are underdetermined. There has not been sufficient long-term data on the modality to make blanket conclusions about its safety, and undetermined when such data might be available. (Nature 2021)

Anticipating my objection, Savulescu's second argument leans on asserting consistency between interventions and objects to my counterargument of non-equivalence between biological and dietary manipulation. He asserts consistency between the modalities on grounds that both are "environmental manipulations" that alter biology. This argument has the logical form:

x alters z and y alters z, therefore x and y are equivalent

or formally:

$xRz \bullet yRz \rightarrow x = y$

The conditional asserts that two things that affect the same thing are equivalent, perhaps identical, to one another, but this is false (especially with the identity restriction). Consider a counterexample: exercise and illicit drug use induce euphoria through "environmental manipulation," however exercising and doing drugs are not the same. Abstracting medical context, there isn't sufficient reason to believe that because two actions change or alter something that those actions are of same class or kind. Heating makes copper contract and running an electrical current through it makes it conductive, but it doesn't follow that heating and running current are the same class or kind of action because they both affect the physical properties of copper. Consistently then, diet and genetic modification both affect biology, but they are different kinds and classes of interventions. Speaking from common sense, I believe one would be hard pressed to find someone who thinks there is no significant difference between dietary supplementation and gene therapy.

Savulescu's third argument contends that ethically accepting the treatment and prevention of disease entails accepting non-medical enhancement because health is instrumentally valuable to living a good life. He asserts we if we have the technology to alter all-purpose goods such as intelligence, memory, self-discipline, impulse control, optimism, and temperament at the biological level that we should because these capacities condition our ability to live better lives. Savulescu even endorses directed alteration of moral character in this context. However, his position hinges on the scientifically contestable dogma of behavioral genetics and projects a future of designer babies, elective upgrades, and technologically tuned morals—a brave new world with non-coercive eugenics as a necessary condition for its possibility. Such a world might indeed enable one to "pursue a preferred plan of life" and "insure for their descendants the best genetic endowment," or that society can "take steps at least to preserve the general level of natural abilities and to prevent the diffusion of serious defects" (Rawls 1971), however do the costs of potential inequities, segregation, and potentially serious long-term side effects justify its actualization?

Responsible Enhancement

How do we enhance responsibly? Health is a means to a good life, and we should use our intellect, ingenuity, and technology to treat and prevent disease. If we can detect that a developing embryo exhibits trisomy 21 and have the means to correct it, we should. The same goes for non-embryonic cases and gene therapy for diseases. These actions all aim to improve human life by improving health and alleviating suffering. We ought to use biotechnology to our advantage in the therapeutic context to improve life in this way. Genetic enhancement for non-medical purposes however is more complicated. Since it does not involve an obvious health-related need for genetic alteration, the drive to enhance rests on other motivations connected to a much broader scope than

the alleviation of suffering that has a causal, medical basis. What is the motivation to non-medically enhance? One possibility is a desire to be different than we are based on how we might feel after enhancement. Another is vanity. The impulse to non-medically enhance is *elective* and based on the projected improvement of one's or another's self-perception and distinct from wanting to be healthy or heal another. Non-medical enhancement is unnecessary from a medical perspective and difficult to justify let alone classify as morally obligatory. Responsible enhancement, in my view, is *rational* medical enhancement for the improvement of health conditions with a clear causal basis.

Scientifically, enhancement complicates research topography and might corrupt it significantly if non-medical enhancement is permitted to expand. Private companies pursuing non-medical enhancement with independent funding could siphon scientific talent away from basic disease and biomedical research funded by government grants. Will there be a clinical trial-like structure for approval of enhancement technologies? Will laboratories refocus to pursuing biological discoveries that can be exploited for enhancement rather than therapy? These are all prescient questions as enhancement technologies proliferate that ought to temper enthusiasm about elective enhancement and keep scientific focus on genetic interventions that can improve human health. On a practical note, it is morally obligatory to reduce the cost of genetic interventions. At present, genetic technologies are massively and prohibitively expensive. This would provide parents of fatally ill children with relief from heinously high financial burdens. Zolgensma® (onasemnogene abeparvovec-xioi) is a one-time gene therapy children under two years with spinal muscular atrophy (SMA) that costs $2.1 million for a single treatment. An alternative therapy for SMA, Spinraza® (nusinersen), is an oligosense nucleotide therapy that affects alternative splicing taken four times a year for life that costs $750,000 for the first year and $350,000 per year thereafter, for over $4 million in costs per decade. How can elective enhancement possibly be justified when medical interventions using the same basic technology are barely accessible to fatally ill people?

Genetic enhancement should be considered morally permissible and legally acceptable *in the medical context*, but it does not follow that we are not morally required to engage in non-elective genetic enhancement or that such enhancement is morally justified by extension. Enhancement for non-medical purposes fractures our human nature at the expense of specious idealism and at attraction to perfection. Enhancement is an efficient means to achieve and improve health, however going beyond health slides quickly into context with moral tensions concerning modification without consent, accidental social engineering, and eugenic habit formation. It at least invites healthy skepticism. Taking a view from above, the prospect of human enhancement by genetic engineering is both awe-inspiring and unsettling. Rationally, the biotechnological revolution presents us with a choice—whether to realize our destiny through grit and self-determination rooted in natural capacity or through choice, design, and intentional intervention. As we forge ahead in this brave new world, we must decide if enhancement is a virtuous path to liberation from nature, or the on ramp to a vicious circle between Promethean ideals and the prospect of actualizing possible worlds conditioned by advancing technology.

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