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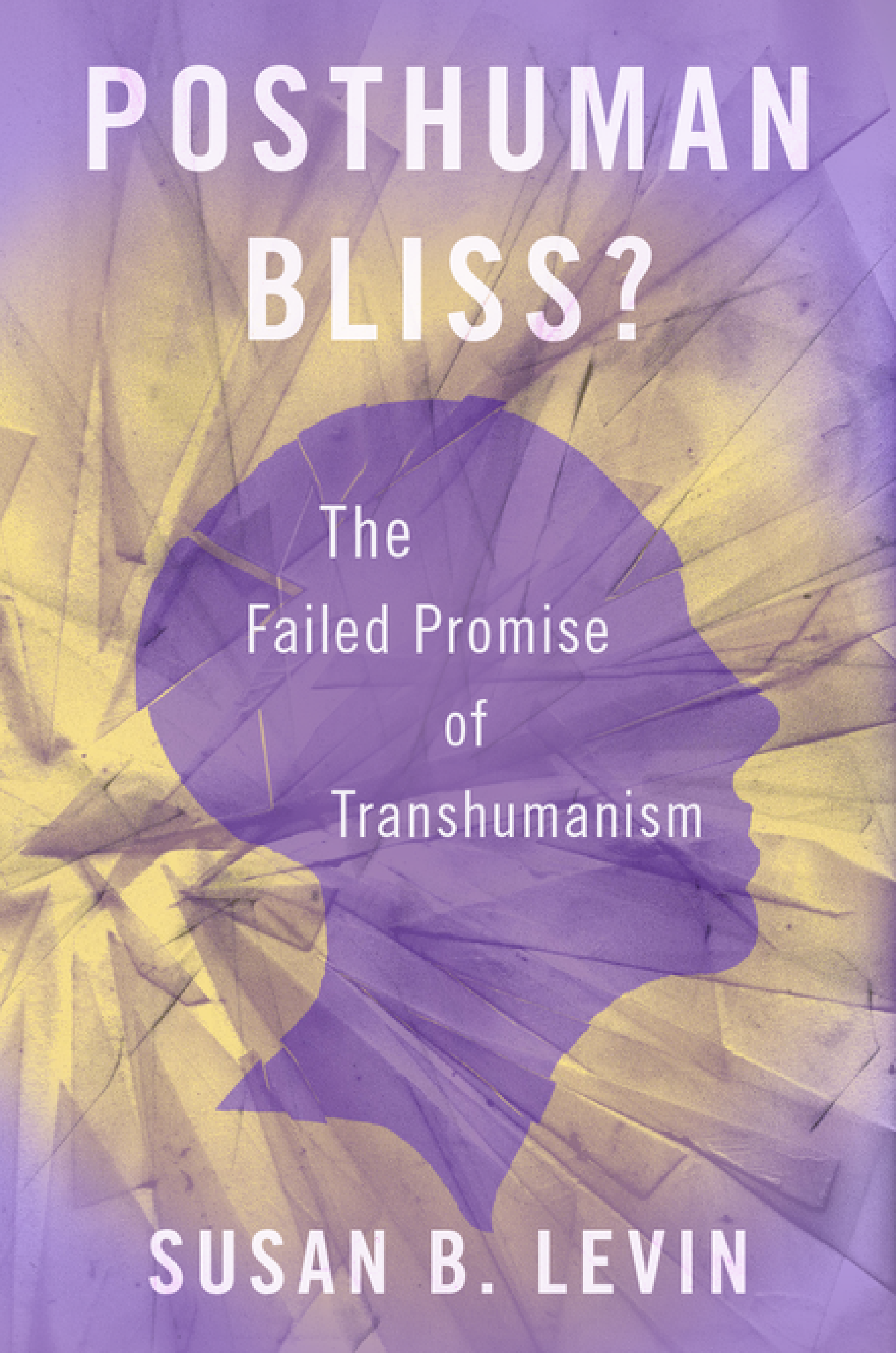
POSTHUMAN
BLISS?
The
Failed Promise
of
Transhumanism
SUSAN B. LEVIN

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Acknowledgments

In a post I wrote for Oxford University Press's blog in the fall of 2014, I remarked that, beyond enriching bioethical debate over the practice and profession of medicine, ancient Greek philosophy "offers a fresh orientation to pressing debates on other bioethical topics, prominent among them high-stakes discord over the technologically spurred project of radical human 'enhancement' " (i.e., transhumanism). In terms of my own research, this mention of the debate over radical enhancement was largely promissory. When I first encountered transhumanism during my bioethical research for the final chapter of *Plato's Rivalry with Medicine: A Struggle and Its Dissolution* (Oxford 2014), the topic gripped me mightily, and I had intimations of how I could bring Greek philosophy to bear on the controversy.

From 2014 onward, I immersed myself in the interdisciplinary debate over radical enhancement. This absorbing and invigorating endeavor represents exactly the sort of commitment that being at Smith College, my academic home of more than a quarter-century, not only allows but encourages. As I published articles and essays on the advocacy of radical enhancement, the contours of a book emerged in my thinking. I offer here the result, a fundamental critique of transhumanism on philosophical and scientific grounds.

My colleague Jill de Villiers read most chapters in draft form, and I am grateful for her feedback. I also appreciate the comments of another colleague, Jeff Ramsey, on drafts of two chapters and helpful conversations we had about Kant. I wish, as well, to thank You Jeen Ha, who was my student research assistant during the summer of 2018.

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Introduction

Optimally, would decisions be reached by reason alone? If you could spend a leisurely afternoon listening to Mozart or use that time to zip at lightning speed through half the contents of the Library of Congress, which activity would you choose? Would existence be better if we felt only pleasure, having excised the very capacity to experience anger, grief, and anything else deemed unpleasant? Are institutions and communities of a suitable kind required for our flourishing, or is freedom from constraints on individuals' discretion ultimately decisive? Is genetic information largely responsible for the sorts of people we become, with "environment" playing a far less powerful role? Are the key societal challenges we face rooted in human biology, to which, therefore, we should look for solutions? Such questions point us to contending values, positions, and yearnings within the current bioethical debate over human enhancement.[1]

If the controversy over human enhancement were a purely bioethical affair, those outside the field might simply shrug and say, "I'll leave them to it—this has nothing to do with me." But it does, for the above queries are not distinctively bioethical: underneath the discrete threads of bioethical controversy over enhancement are answers, often presupposed, to questions about who we are as human beings and what makes for a flourishing life.

The focus of this book is the controversy over radical enhancement, or transhumanism.[2] Its advocates press us to feature research aimed at the biotechnological heightening of select capacities so far beyond any human ceiling that the beings thus endowed could not simply be called "better humans": the term used to designate them—whether "posthuman," "godlike," or "divine"—should instead signal their existence on a higher ontological plane. Their own, highly contentious priorities and assumptions about what makes for a flourishing life drive transhumanists' insistence that we make this commitment.

Though the responses of transhumanists and their critics to the above queries diverge, for both, what we commit to going forward will reflect what we value most and the basis on which we do so (Levin 2014b, 4). The human stakes of how we respond are immense both because transhumanists urge humanity's own self-transcendence via science and technology and because their arguments state or suggest that bioenhancement may be morally required.[3]

In critiques of transhumanism thus far, outcomes—as distinct from core convictions of its advocates—have often been the focus of critical assessment.

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Challenging transhumanism based on possible results of the availability of radical-enhancement technologies, such as increased social inequality, is certainly important. But it has limited range, by which I mean that if consequences identified as undesirable could be alleviated or forestalled via regulation and subsidies, then moral objections to transhumanism would be met.

The paramount area of moral concern, right now, should not be how we respond if and when immensely high-tech interventions become available but instead whether we may—let alone must—commit massive resources to the targeted pursuit of radical enhancement at all. Opponents give transhumanists an unearned argumentative edge when they allow the focus to be on outcomes, with the associated back and forth over what regulations and subsidies, if any, should be put in place to forestall increased social inequality and permit all who are thus inclined to make good on what Nick Bostrom depicts as "the birthright of every creature" to a vastly augmented existence—"a right no less sacred for having been trampled upon since the beginning of time" (2019, 5).

Though prior critics have addressed transhumanists' fundamental claims about what we are and should become, discrete disputes, for example, contention over whether there exists a "human nature," have often taken center stage. Transhumanists' overarching commitments have received valuable consideration, but contesting transhumanism at its roots requires that one tackle advocates' overarching commitments in a more thoroughgoing and integrated way than has occurred thus far. In *Posthuman Bliss? The Failed Promise of Transhumanism*, I reveal transhumanists' notion of humanity's self-transformation into divinity via science and technology as pure, albeit seductive, fantasy. I do this by unmasking grave weaknesses in their views and assumptions about the mind and brain, ethics, liberal democracy, epistemology, and ontology. My arguments unite philosophical with scientific challenges to transhumanism based on current findings in fields including cognitive psychology, genetics, and neuroscience. By proceeding in this way, I strengthen an existing case for our needing to reject it.

Philosophically and, to a great extent, scientifically, I proceed in sharp contrast to transhumanists themselves. They deny all intrinsic merit to human values, priorities, and aims—indeed, to humanity itself—without making the requisite philosophical arguments, which could then be subjected to the light of day. Vintage philosophical inquiry is even eschewed (Bostrom 2014, 58–59, 256). Contra transhumanists, in taking up the gauntlet that their push for categorical enhancement and associated technologies throws down, we have never needed philosophy more.

Transhumanists may appear to be philosophically engaged when, at times, they assert continuity with august figures, including Plato, Aristotle, and Immanuel Kant, but these claims are decontextualized and self-serving. My extensive, prior research in Greek philosophy gives me a distinctive platform on which to critique transhumanism and propose an alternative. In addition, my background in the broader history of Western philosophy enables me to draw where relevant on other figures, above all, Kant.

Insofar as my arguments against transhumanism are philosophical, their conclusions stand apart from the technological feasibility of what advocates propose. It turns out, however, that "the factual premises upon which the entire . . . project is built are false" (Rosoff 2012, 174). On scientific grounds, we are justified in opposing transhumanists' presumption that pertinent developments, if properly resourced, *will* occur. They, of all people, should root their claims for what I term theoretical and practical "proof of concept" in extensive familiarity with cognitive psychology, neuroscience, molecular and evolutionary biology, and genetics. In reality, not only do transhumanists tend to neglect deep engagement with these sciences, but my examination of current findings shows that they often rely on questionable or outdated claims. At pertinent junctures, my arguments go into a good bit of scientific detail because that level of engagement is needed to counteract the visceral appeal of transhumanism, together with advocates' thin provision of supporting evidence.

Chapters 1 to 3 elucidate and critique transhumanists' views of the mind and brain, as illustrated by their advocacy of cognitive and moral bioenhancement. Chapter 1 shows that transhumanists are rational essentialists, of an extreme sort, whose conviction of boundless prospects for self-creation is folded into that essentialism.

Crucially, transhumanists conflate reason and cognition, defining the latter faculty and its upgrading informationally. Taking reason/cognition to operate in a self-contained, or "modular," way, they presume that the brain reflects this circumscription; as a result, their cherished capacity could be singled out from the rest for heightening. Not only is this construction of reason vastly constrictive, but research on psychostimulants, which transhumanists cite as practical proof of concept for more dramatic augmentation, undermines their view that our cognitive operations are segmented, self-contained, and upgradable as such.

A normative position is embedded in any proffered construction of human nature. By definition, rational essentialism treats nonrational faculties (i.e., those besides reason proper) as subordinate to reason, but this relative valuation does not itself settle the question of whether faculties other than reason also have necessary roles in a life well lived. Committed to extreme rational essentialism, transhumanists deem it irrational to support anything short of a maximal heightening of rational/cognitive ability. Purportedly, reason/cognition operates best when unchecked by nonrational/noncognitive activity. Thus, alongside their advocacy of cognitive bioenhancement, transhumanists propose to weaken and even eliminate the capacity for "negative" affect, including emotions such as anger. Once again, they evince a view of the mind as composed of faculties that can be discretely assessed and manipulated per their evaluations.

Chapter 2 extends the argument of Chapter 1 by directly contesting transhumanists' entire picture of the mind and brain. Across the board, they fail to appreciate the complexity of our mental operations. Centrally in this regard, transhumanists are on the losing side of a decades-long dispute about the nature of emotion: on the merits, "appraisal theory" has superseded "basic-emotion" and "dual-process" views, whose proponents, like transhumanists, view the mind as a set of compartments whose functionality is explained by dedicated areas or systems in the brain. Klaus Scherer's version of appraisal theory is especially promising, for it integrates well the insight that "cognition" is not a separately identifiable aspect of our mental operations; distinguishes clearly between wide and narrow senses of "cognition"; and accommodates the subtlety of human emotion. Further, it is compatible with mounting evidence of the brain's complexity.

Regarding the mind, what is problematic is not rational essentialism per se but transhumanists' version. Here, comparative discussion with Aristotle is instructive. Bostrom wrongly views his and Aristotle's versions as compatible (2008, 130), for only the latter incorporates a necessary role for nonrational faculties and intrapsychic harmony. By Aristotle's lights, insisting that maximal augmentation of reason is the sole "rational" course testifies to one's *ir*rationality. Philosophically speaking, I heartily agree. What's more, concerning the mind and brain, my investigation unearths a powerful alliance between Aristotle, writing in the fourth century BCE, and the present day. While transhumanists' lens is at odds with contemporary findings, Aristotle's view of the mind shares important commitments with Scherer's appraisal theory and is broadly compatible with mounting evidence of the brain's complexity. Thus, in the trio comprising Aristotle, transhumanism, and contemporary science, transhumanism is the outlier!

Though its typical focus is augmenting rationality/cognition, transhumanist discourse also addresses moral bioenhancement. One might hope that a richer picture of our nonrational faculties would emerge when this occurs. Regrettably, as I argue in Chapter 3, this is not the case. The most visible advocates thus far of moral bioenhancement are Ingmar Persson and Julian Savulescu, who trace the threat of "ultimate harm," or human extinction, to inadequate prosocial motivation. Since a species-wide upgrade is needed, on utilitarian grounds, our use of bioenhancers to augment their favored attitudes, altruism and "a sense of justice," could be compelled. As elsewhere, transhumanist faith in the manipulability of favored mental targets reflects a commitment to "neuroessentialism" and to the strength and precision of what genetic adjustments could deliver regarding complex phenotypic traits (Racine et al. 2005, 160–61; FitzGerald and

Wurzman 2010, 222–26; Rosoff 2012; Malmqvist 2014, 47; Jotterand 2016, 45; Hall 2017, 8–10).

Challenging transhumanists' views of the mind and brain is quite important, but a thorough assessment of transhumanism also requires that its guiding, often tacit, ethical commitments be made transparent so that they—and their sociopolitical implications—can be scrutinized. In Chapter 4, I argue that transhumanists' avowed commitment to personal autonomy in decisions about bioenhancement is undercut by evidence in their accounts of a utilitarian obligation to enhance, well beyond the moral domain of Persson and Savulescu, that could jeopardize liberal democracy.

At first, this may be surprising since routine claims of a bedrock commitment to autonomy, often combined with libertarian propensities, frame transhumanist advocacy of bioenhancement. When these assertions are taken at face value, transhumanists are critiqued for a lack of concern with broader welfare. In fact, they evince a driving concern with broader welfare, at the species level.

Though Persson and Savulescu's utilitarian rationale for bioenhancement is explicit, it is far from unique in transhumanist discourse. When arguing for their agenda, transhumanists give evidential import to parallels with existing measures taken to promote the health and welfare of the public. In so doing, they reflect a current, broader tendency to extend the scope of "public health" beyond familiar initiatives. They forge these ties, however, without flagging the backdrop as that of public health, let alone owning the utilitarian justification that anchors measures instituted on that basis. Since what transhumanists trumpet in decisions about bioenhancement is individual autonomy, we might not even register pockets of argumentative reliance on the sphere of public health as sounding a countervailing note. But we should, as they are signs of transhumanists' willingness to defend their proposals on utilitarian grounds.

As transhumanists' foremost concern is the capacities of future beings, they are necessarily invested in the content of procreative decisions. In their handling of this topic, we witness a key tension between transhumanists' usual proclamation that choosing bioenhancement is simply one legitimate expression of personal autonomy and the tacit, utilitarian undergirding of its valorization. More specifically, their commitments fit with an "ideal" form of utilitarianism, devoted to maximizing featured, "objective" goods. Further, while utilitarianism usually instructs us to give equal weight to current and future beings, transhumanism gives such precedence to the latter that it "assign[s] . . . moral responsibility to the present generation for the potential harms caused to all future generations" (Buchanan et al. 2000, 231).

Ethical stances always have sociopolitical implications, and every politics presupposes an ethical position (Nagel 1988, 171). But the link between ethics and politics is especially tight for utilitarianism, whose supporters have tended to think that the justification for utilitarian political governance is more powerful than that for such decision-making by individuals (Williams 1973, 136). Transhumanists' notion that bioenhancement could be morally required, conjoined with their utilitarian commitments, yields a strong concern that sociopolitical requirements would flow from the implementation of transhumanists' agenda so as to put liberal democracy at risk. This risk has generally been underappreciated by commentators across the spectrum of positions on bioenhancement.

The bulwark of transhumanists' defense against claims of common ground between their position and eugenic history is that prior eugenics was state managed, while transhumanism features freedom of choice. To preserve this line of defense, transhumanists must make a strong case that personal discretion would steer decisions relating to enhancement. That their rejection of substantive ties to earlier eugenics zeroes in on this point of contrast shows transhumanists' awareness of its pivotal role.

When transhumanists distance themselves from eugenic history, Nazi eugenics is typically at the fore, either directly or by implication. Reference to it does not settle the matter, however, for an investigation of links between transhumanism and Anglo-American eugenics, conducted in Chapter 5, yields important connections that span notions of human agency, views of our mental faculties, ethical commitments, and deleterious implications for democracy as we know it.

Since ethical imperatives are only as strong as their epistemological and ontological underpinnings, in Chapter 6, I identify and critique those that steer transhumanism. Addressing central weaknesses in advocates' handling of the mind, brain, ethics, and politics, prior chapters dealt, to some degree, with transhumanists' ontological and epistemological commitments. Here, I critique directly their equation of the real and knowable with information.

Both transhumanism and Anglo-American eugenics are "totalizing visions,"[4] meaning that scientific positions on what is and can be known are supposed to reflect the unfiltered findings of reason and are seen, on that basis, as the guideposts for ethical decision-making. Having previously addressed transhumanists' ethical commitments, I challenge the ontological and epistemological prongs of their totalizing lens. In crucial respects, what they take to be context-independent truths involving information that will be fully fleshed out with continued research by biologists, neuroscientists, and computer scientists are actually problematic holdovers from a particular historical and cultural setting, World War II and its aftermath: prior to that time, the informational vantage point that came to seem self-evidently true was nowhere to be found. The lens on human biology anchored in information theory, cybernetics, and Francis

Crick's Central Dogma, questioned from the start, increasingly recedes today in favor of "developmental systems theory."

Once we reject an informational vantage point on reality and knowing, the question becomes: Are we capable of arriving at any ontology and epistemology whose context-independent rightness we could confirm? We have good reason to conclude that the answer is "no," for not only does scientific realism "[commit] one to an unverifiable correspondence with the world" (Fine 1984, 86), but also—as Kant saw long ago—how humans approach anything at all stems from the way in which our minds work, indeed, must work for us to think, experience, and imagine anything at all. Evelyn Fox Keller brings the scientific and broader points together well:

> By what mandate is the world obliged to make sense to us? Is such an assumption even plausible? I would say no, and on a priori grounds. . . . The human mind does not encompass the world; rather, it is itself a part of that world, and no amount of self-reflection provides an escape from that limitation. . . . The mind—along with its capacity to make rational sense—is itself a biological phenomenon. . . . The need for understanding, as for explanation, is a human need, and one that can be satisfied only within the constraints that human inquirers bring with them. (2002, 295–97)

Transhumanists fail utterly to glean this unbreachable human scenario, citing Kant as a backdrop for rationally steered pursuit of humanity's self-transcendence. His *Critique of Pure Reason* does, indeed, bear on transhumanism. It does so, however, by showing as irrational advocates' insistence that human reason *will* spearhead a project requiring fundamentally more of it than reason, as a capacity of ours, could shoulder.

For transhumanists, humanity is gravely and irremediably flawed, but salvation is achievable if we would but dedicate ourselves to creating posthumanity. All together, Chapters 1 to 6 strongly support the view that transhumanists' vision is misguided, on philosophical and scientific grounds. If dramatic, salutary change involving the human occurs, it will stem from our dedicated efforts, individually and collectively, to narrow the gap between reflectively affirmed human ideals and their worldly manifestations. This view reflects a hopefulness for humanity that is absent from transhumanism. In this way, it is far more optimistic.

If we sign on to transhumanism, beyond endorsing fantastical claims about what will be, we are accepting that we should no longer see human goods and flourishing as having intrinsic worth. In the book's closing chapter, I propose that Aristotle's virtue ethics, adjusted to accommodate liberal commitments reflected in America's founding documents, is well worth consulting as we consider how best to move forward.

Virtue ethics is presented as a "third way—an alternative to the deontological and consequentialist approaches that dominated modern moral philosophy until very recently" (Farrelly and Solum 2008, 1). This characterization is misleading, for, strictly speaking, the three approaches are not competitors for the same role. Unlike utilitarianism and deontology, virtue ethics foregrounds "the importance of the agent's life as a whole, and, relatedly, the importance of moral education and development" (Annas 2006, 519). Virtue ethics is holistic, too, because it builds in the ethical value of commitments to other people; incorporates and integrates levels of human concern, individual up through civic; and defuses the thought that in any situation, we must choose between pursuing our own and others' good.

In my view, virtue ethics can help America frame a way forward amidst its struggles with illiberalism. Quite apart from the impossibility of our mapping ancient notions wholesale onto the present, the attempt would be detrimental because our vision of how to proceed must incorporate liberal commitments to justice and equality; hence, I sketch cornerstones of an approach that is rooted in Aristotle but adapted to America today. With the reinvigoration of liberal democracy in view, a potent way to mobilize people is to tap into what many already care substantially about but whose opportunities for cultivation and expression are constricted by our present milieu. On my account, virtue and core American ideals fit the bill, and the latter can be accommodated under the umbrella of virtue ethics.

There is no proxy for the thought and practical engagement involving human goods and flourishing that must be done in the present, but we have emerged from and belong to philosophical and political traditions that richly repay our consultation. My belief that we can shoulder this work reflects my view that human capacities promise a great deal more than transhumanists appreciate. Not only do their arguments fail, but transhumanism fails to do us justice.

1
Assessing Transhumanist Advocacy of Cognitive Bioenhancement

1. Introduction

According to Savulescu and Guy Kahane's Principle of Procreative Beneficence, parents are obliged "to create children with the best chance of the best life" (2009) or, per John Harris, to optimize "possible functioning" (2010, 53). Central to this pursuit, as advocates conceive it, is profound cognitive enhancement. If the Principle of Procreative Beneficence were implemented regarding cognitive enhancement, the result would be highly impoverishing.

To see this, we must lay out what cognitive bioenhancement would allegedly augment and, correspondingly, what transhumanists devalue about our mental life, even favoring its extirpation.[1] Though transhumanists critique their opponents' human essentialism while denying their own, they embrace a version of rational essentialism (Sections 2 and 3.1). Reason, they assert, is the heart of what counts about us, and, suitably heightened, it would both enable the emergence of posthumanity and anchor posthuman existence. Although transhumanists align themselves here with a grand Western tradition extending back to Presocratic philosophy, avowedly, their particular tie is to the Enlightenment, where our rational faculty was to be the Ariadne's thread allowing us to sidestep lairs and dead ends represented by religion, tradition, and nonrational faculties undergirding our reliance on them.

By definition, rational essentialism treats other faculties as in some way subordinate, but this relative valuation does not, of itself, preclude their also having necessary roles in a flourishing life. In the present work, the nonrational domain of interest is "affect," broadly construed to cover emotion, mood, and desire/motivation. As I show in Section 3.2, transhumanists' version of rational essentialism includes outright hostility to the nonrational in the form of "negative" affect, spanning desire, emotion (e.g., anger), and mood (e.g., sadness). Quite apart from the impoverishment of our mental life that such a picture embodies, this dismissal turns out to be problematic for transhumanists' own investment in cognitive enhancement.

Though transhumanists link themselves to a rich philosophical tradition when foregrounding reason as the linchpin of our humanity, when they directly

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consider how this treasured faculty would be augmented, "reason"/"rational" and "cognition"/"cognitive" are conflated (Section 4). Transhumanists, like cognitive neuroscientists, operate with an informational construction of the "cognitive" in "cognitive enhancement." This means that forms of rational engagement not reducible to informational manipulation—including the creativity required for fresh scientific discoveries and philosophical insights—are not included. Notwithstanding this conflation, because "cognitive enhancement" is standard rubric within the enhancement debate and scientific accounts, I use it without comment when presenting claims and findings from those milieux. In addition, I treat "reason"/"cognition" (or "rational"/"cognitive") as a unit in order to distinguish it from what transhumanists lodge under nonrational/noncognitive faculties. I differentiate reason and cognition expressly, however, when showing how transhumanists' conflation helps to render their picture of the mind untenable—a notable illustration being that, per cognitivist theories of emotion, considered in Chapter 2, emotion is nonrational yet importantly cognitive.

Section 5 considers reasons for transhumanists' conviction of the promise of cognitive enhancement, the first of which is their paramount investment and confidence in our rational capacity itself to spearhead the endeavor. In addition, transhumanists extrapolate from what they treat as an established finding that cognitive bioenhancement already occurs, viewing that as a clear harbinger of far more powerful technologies to come.

I close the chapter (Section 6) by showing why transhumanists' fixation on "cognition" and conviction of its direct, unadulterated augmentation are misguided with respect to aspects of capacity and function that they want—and need—to see upgraded. Sure that psychopharmacological agents successfully deliver cognitive enhancement, they take this as promissory evidence of more powerful technologies to come. *Pace* transhumanists, however, research findings involving cognitive tradeoffs, baseline-dependent effects, and creativity show that psychostimulants' delivery of cognitive upgrades is far from clear (Section 6.1). Such findings are in keeping with the existence of strong neuroscientific support for the complexity of our mental operations generally. Unsurprisingly, therefore, early research on transcranial magnetic stimulation and transcranial direct current stimulation suggests the potential for cognitive tradeoffs and baseline-dependent effects.

Neuroscientific findings for psychostimulants also challenge transhumanists' presumption that sound cognition operates apart from noncognitive factors, for improvements in cognitive functioning, such as they are, may be indirect, with the primary impact being on affect, specifically, motivation (Section 6.2). Finally, I cite neuroscientific evidence that positive affect, here, mood, can actually diminish cognitive effectiveness, while a negative mood augments it (Section 6.3). Such findings suggest that dampening, not to mention eliminating, our very capacity for negative affect would likely make our overall cognitive functioning less, not more, effective.

2. The (Unsuccessful) Essentialism of Enhancement Critics

Concepts of human nature are indispensable to both transhumanists and their opponents (Hauskeller 2009). Transhumanists, however, do not see the matter thus, insisting that only their critics are what we can call "capacity-," or "faculty-essentialists." Typically, if transhumanists directly concede that anything constitutes our nature, being as such nonnegotiable, it is an unquenchable drive to surpass the level of attainment that we have achieved at any given time. Among philosophers, this is a nontraditional way of construing what is crucial about us, and transhumanists apparently assume that operating thus will allow them to sidestep the charge of essentialism that they level at opponents—misleadingly termed "bioconservatives" since critiques come from the political left and right (Parens 2015, 52). As I will argue, however, transhumanists are essentialists, focusing—like so many philosophers in the Western tradition—on rationality: though transhumanists routinely accuse their critics of upholding the status quo, on this very important matter, they are traditionalists. Transhumanists and their opponents, then, do not differ on *whether* they embrace a human nature in a way that qualifies them as faculty-essentialists, but instead based on what that essence is and how we may or even must endeavor to augment it.[2]

Critics tend to be unabashed essentialists: there is something—whether it be called "Factor X" (Fukuyama 2002), "dignity" (President's Council on Bioethics 2003), or "giftedness" (Sandel 2007)—that is the core of being human. Further, seeking to alter defining human features or capacities, we would jeopardize those precious characteristics, at our peril. This is not to say that our level of actualization of what is essential is rightly frozen for all time, for these critics make clear that individuals and communities could often do more to narrow the gap between fitting ideals and their enactment.

When assessing transhumanists' express handling of essentialism, one must distinguish between their (1) deeming critics' defenses of our nature untenable, a position that the present section affirms, and (2) unsuccessful attempts to distance themselves from opponents by claiming that the latter alone are faculty-essentialists, to be addressed in Section 3. To illustrate how these defenses of human nature have thus far come up short, I consider the positions of Francis Fukuyama and the President's Council on Bioethics, whose conceptual vagueness hampers their efforts to show what is essential to us that should, as such, be retained.[3]

In his attempt to specify our essential feature, Fukuyama uses the term "Factor X" as a placeholder for what would fit the bill: "What the demand for equality of recognition implies is that when we strip all of a person's contingent and accidental characteristics away, there remains some essential human quality underneath that is worthy of a certain minimal level of respect—call it Factor X" (2002, 149). As "the human essence, the most basic meaning of what it is to be human," Factor X "etches a bright red line around the whole of the human race and requires equality of respect for all of those on the inside" (150). The sociopolitical outcome of denying this essence is potentially disastrous, for "we need to be the same in some one critical respect in order to have *equal* rights. . . . [If] the clear red line around the whole of humanity could no longer be drawn, the way would be paved for a return to a much more hierarchical ordering of society" (153, 155).

Fukuyama's indication of why Factor X needs defining is clearer than his unpacking of it, for he simply identifies a number of traits, claiming that what is distinctive of humans is the collection in its entirety: "Factor X cannot be reduced to the possession of moral choice, or reason, or language, or sociability, or sentience, or emotions, or consciousness, or any other quality that has been put forth. . . . It is all of these qualities coming together in a human whole that make up Factor X" (171). It may appear that Fukuyama has simply given up the attempt to define our nature in the vein of his initial framing of the quest (149–50). He continues, however, to reach for a unifying core, anchoring Factor X in "a genetic endowment . . . that distinguishes a human in essence from other types of creatures" (171).

According to Fukuyama, what "we want to protect from any future advances in biotechnology . . . [is] the full range of our complex, evolved natures. . . . We do not want to disrupt either the unity or the continuity of human nature, and thereby the human rights that are based on it" (172). Although the key formulations here—"we want to protect," "We do not want to disrupt"—are descriptive, their force is strongly normative. I am untroubled by the fact that Fukuyama's collection of traits is empirically unverifiable, for, as Michael Hauskeller observes, no conception of human nature could be confirmed (or refuted) in such a way (2016, 7). Genuine difficulties include the fact that Fukuyama's account of Factor X provides no direction concerning relative priorities among listed items or what would count as exemplariness. In addition, what Fukuyama ultimately wants to preserve is a certain phenotype. Consequently, rooting his favored nexus of traits in a particular "genetic endowment" (Fukuyama 2002, 171) is an incomplete strategy at best.[4] Further, if what need safeguarding are features that, phenotypically speaking, could themselves be interwoven more fruitfully than is often currently the case, then unflinching allegiance to a certain genetic profile may actually be counterproductive—assuming, *per impossibile*, that it could be enforced (Juengst 2009, 50).

What is more, Fukuyama may have opened the door to enhancements of the sort that Nicholas Agar calls "moderate" because they do not surpass the upper bounds of the human range (2010; 2014). Unless we are prepared to claim that the most exceptional human beings (e.g., Plato, Einstein) are themselves posthuman, enhancements "that shift[ed] someone outside the range of normality might not *always* undermine the basis for human dignity and human rights" (Kaebnick 2014, 172); that is to say, they need not jeopardize the role of Factor X to preserve "equality of recognition" (Fukuyama 2002, 149). Rather, enhancement "would seem to pose a problem only when it occurs often enough and dramatically enough to pull apart the statistical curves that describe normal ranges of human traits" (Kaebnick 2014, 172–73). In other words, "If human nature is a dispositional, selective population concept, then interventions, whether genetic or not, cannot alter human nature simply by moving some individuals within the range of traits already thought part of human nature" (Daniels 2009, 36). Fukuyama's "equality of recognition" might be impaired only at such time that some were denied opportunities to "moderately" enhance themselves that had previously been seized by fellow-citizens no more entitled in the abstract than they; at that point, to *preserve* equal recognition, society might need to commit to augmentation for the rest.

"Dignity" is the President's Council on Bioethics's counterpart to Factor X. One indication that the Council's framework is essentialist is its dependence on a number of salient Aristotelian ideas, mostly from the *Nicomachean Ethics*. Though Aristotle is mentioned expressly (2003, 196, 210 with 271n1), the Council's reliance on him is largely tacit. Parallels of note include a teleological orientation, with flourishing construed as the ultimate goal of everything we humans do (205, 215; *Nicomachean Ethics* I 7 [Aristotle 1894]). The Council also avows that the state of one's soul "implicates or points to something final and all-embracing" from a human standpoint (205; *Nicomachean Ethics* I 7, 13) and that repeated acts of a single type give rise to corresponding habits and character traits (236; *Nicomachean Ethics* II 1–2). In addition, flourishing for each of us is "a lifelong being-at-work exercising one's *human* powers *well*" (293; *Nicomachean Ethics* I 9). Further, "Happiness of the soul is inseparable from the pleasure that comes from perfecting our natures" and from developing "our capacity to satisfy the desires that by nature make us happiest" (270, 269; *Nicomachean Ethics* II 3, X 4–5). What's more, we flourish not as isolated individuals but only in communities (151, 192; *Politics* I 2 [Aristotle 1957b]), within which we should strive for human excellence, not that of god/the divine (149, 308; *Nicomachean Ethics* X 6–9 with Whiting 1986).

Though the parallel is far from perfect, for the President's Council on Bioethics, dignity is the closest functional counterpart to Aristotle's reason, the distinguishing feature of our nature and overall key to our flourishing (*Nicomachean Ethics* I 7, 13). The Council, chaired at the time by Leon Kass, is deeply concerned that biotechnological enhancement of "our . . . bodies, minds, and performance" would alter or jeopardize "the dignity of human activity" (2003, 105); it would, for instance, damage "the dignity of human sport" (143). More encompassingly, the Council channels Kant, specifically, his Kingdom of Ends formulation of the Categorical Imperative (1911, IV 433–35), when claiming that we "cannot ignore the great achievement of liberal society in its concern for the dignity of the individual person—for seeing individuals not simply as useful and expendable means to society's ends, but as ends in themselves" (266). Moreover, we cannot flourish absent "the dignity of our own embodiment," and, by affirming mortality, we commit ourselves to "a dignity beyond all disorder, decay, and death" (149, 200).

Though no clear picture of dignity emerges, the term is closely associated, even interchangeable, with "excellence," "worthiness," and "admirability," and tethered to traits, activities, and conduct deemed nature-befitting. Thus, augmented performances would jeopardize "the dignity or excellence of human activity" (123). More generally, every activity whose purpose is not the meeting of a human need "has a distinct character and excellence, and each retains a dignity unique to itself. . . . Even those activities necessary for life . . . can be done in a way that is dignified or undignified, human or dehumanizing. . . . What matters is that we produce the given result . . . in a human way as human beings" (153). For the Council, this means that embracing bioenhancement brings "the danger of violating or deforming the nature of human agency and the dignity of the naturally human way of activity" (292). Overall in its report, "dignity" operates as a sort of unexplained explainer, with diminutions of fuzziness about its meaning due largely to its association with other terms, centrally including those noted above.[5]

As Jonathan Glover observes, "In searching for essential characteristics, we seem to be looking, not for some fact, but for a definition" (2006, 84). I thus imagine Socrates posing, right about now, a "What is *F*-ness?" query. Socrates himself wrote nothing; by scholarly consensus, Plato's early dialogues are the place where we get the best sense of his mission and methodology. When articulating his renowned questions regarding values, for instance, courage, Socrates seeks an account of the essential feature that all things courageous share and that serves to distinguish courage from closely related values, such as justice (*Euthyphro* 5d, 6c–d, 12c–e, 15c–e [Plato 1995]; *Laches* 190c–191e [1903]).[6] The definitional assays of Socrates's interlocutors in Plato's early dialogues always fail. This is not tantamount, however, to the failure of Socrates's philosophical methodology: its use should leave no doubt, at least for readers, that uses of terms like "courageous" and "just" are not self-justifying, requiring instead an independent defense of the crux of each concept under whose explanatory umbrella all these uses fall.[7]

From a Socratic standpoint, the position of the President's Council amounts to something of the form, "All things dignified are excellent and nature-befitting," which does not serve to distinguish the subject from other sorts of things to which "excellent" and "nature-befitting" also apply. This situation harks back to the *Euthyphro*, where the dialogue's eponym defines the pious as "what all the deities love" (9e); this offering from Euthyphro does not differentiate piety from other values that are god-beloved, nor does it explain what it is about the pious that makes it lov*able* (10a–11b). Furthermore, as "dignity" appears to be synonymous (or virtually so) with "excellence" and "nature-befitting," any of the three could function as subject, with the other two as predicates. To offer a genuine defense of what is precious about us, we would have to depart from this circumscribed orbit.

Although reference to Socratic method helps to bring out what is lacking in such provisions of our essence, addressing that lack necessarily takes us beyond it. Plato himself flags this for us in the *Republic*. After a series of futile attempts to define justice (*dikaiosunē*) in the dialogue's initial book, he opens the second by having Glaucon ask whether Socrates wishes to produce only the appearance of having persuaded his auditors that a just life is superior to an unjust one, as opposed to actually convincing them (357a–b [Plato 2003]). To Socrates's affirmation that, of course, he wants the latter, Glaucon archly replies, "Well, then, you aren't accomplishing what you wish" (357b). Needful as it may be for clearing the ground of flawed and inconsistent beliefs, intuitions, and so on, that fail to survive rational scrutiny, once the task becomes defending conceptions of values and priorities that bear directly on our flourishing, Socratic method must give way to sustained philosophical inquiry and the fruits that only it can yield. Structurally, the *Republic* is built around Plato's investigation of individual and communal justice, expansively construed (Annas 1981, 13) in terms of overarching values, aspirations, and worthy endeavors. Plato's methodology here evinces his recognition that, to be genuinely convincing, one's philosophical defenses must focus on these, not definitional specifications.

Invocations of "Factor X," "dignity," and the like not only do not but cannot bear the explanatory heavy lifting required of them (see also Buchanan 2009a; Nielsen 2011, 28–30; Glannon 2015, 1255).[8] The spotlight is wrongly put directly on them as the hinge of what matters about us, as such terms are placeholders for whatever it is that is precious and must allegedly remain intact (Levin 2017a, 298). This stance is reinforced when one fully appreciates that, like justice in Plato's *Republic*, Factor X, dignity, and equivalents are normative notions: once we recognize this, it becomes clear that what is required is "a shifting of the justification problem to a higher level," on which "the reason why certain aspects of human nature are to be viewed as a normatively obliging substance is then in need of moral justification" (Bayertz 1994, 304).

Though I concur with transhumanists that critics' attempts to explain and defend "human nature" as requiring maintenance have thus far not succeeded, transhumanists overestimate the extent of their own divergence from their opponents regarding essentialism. First, transhumanists fail to do justice to opponents' more nuanced positions when they insist on a false binary between plowing ahead with the development and use of bioenhancement technologies and capitulation to the "natural lottery," with the latter position alleged to be critics' own. Harris, for instance, claims that human nature is a wholly inadequate basis for contesting bioenhancement: "If it were wrong to interfere with nature we could not, among many other things, practice medicine" (2009, 134). More generally, transhumanists allege that, per their critics, "humans are morally obliged to be inert, passive players in the game of life, to refrain from exerting any influence or control on the world around us" (Chan and Harris 2007, 2; see also Savulescu 2007a). Transhumanists are talking past their opponents here insofar as the latter do not dismiss all uses of biotechnology, wishing instead to circumscribe carefully what proper deployments are (cf. Hauskeller 2013, 76); for example, rejecting the view that the artificial is, as such, unnatural, the President's Council on Bioethics notes that "we eagerly embrace biotechnologies as aids for preventing or correcting bodily or mental ills and for restoring health and fitness" (2003, 290–91, 279). It is thus incorrect to claim that, for the President's Council, the natural qua "*that which is given by nature*" possesses "a positive value *per se*" (Nielsen 2011, 27).

My second, more important criticism involving transhumanists and essentialism will be the focus of the next section. Transhumanists' insistent rejection of essentialism with respect to human nature should not be taken at face value, for they are actually rational essentialists. Whether transhumanists and their opponents agree on what that essence comprises is irrelevant: what matters is that, contra their protestations, something plays that role in transhumanist thought (Hauskeller 2009, 16; 2013, 75; 2016, 80–87). Further, for transhumanists, like their critics, what is singled out in this fashion clearly has normative force, or "moral authority" (2009). Indeed, if they cherished nothing about us, transhumanists "would no longer be able to state their case for human enhancement" because "to decide whether a proposed . . . change of our qualities or abilities is, or is not, an enhancement, we need a [separate] standard by which to measure [and assess] this change" (16–17). The crucial difference between transhumanists and their critics regarding our essence is thus not whether we have one but rather how we may act and strive in relation to it, centrally including the question of whether we may—or even must (Bostrom 2003a; Harris 2010; Savulescu 2004; 2005; 2007b)—set out to radically augment what is singled out under that head.

3. Transhumanists' Rational Essentialism: An Avowed Enlightenment Legacy

"As . . . our ability to . . . select non-disease characteristics increases," the Principle of Procreative Beneficence "will require most reproducers to select the most advantaged child unless doing so is predicted to lead to a very significant loss of well-being to existing people" (Savulescu and Kahane 2009, 281); Harris's insistence that "possible functioning" replace the "normal" variety à la Norman Daniels (1985; 1994) points to a similar decisional requirement. Among abilities targeted for augmentation, transhumanists' paramount focus is rationality. As I show in Subsection 1, transhumanists are rational essentialists, with their aspiration to unbounded self-creation, whose origin is reason, folded into that essentialism.[9]

A comparative subordination of other mental faculties is built into rational essentialism. That said, multiple versions of this stance are possible, including Aristotle's, on which emotion and desire/motivation, harmonized with reason, are necessary to our flourishing. As we will begin to see in Subsection 2, transhumanists' view of the nonrational, namely, what is other than reason proper, is far less appreciative.

3.1 Transhumanists' Rational Essentialism

On Max More's summation, "Transhumanists over the last . . . quarter-century have practically always identified themselves as strong rationalists. A healthy legacy of the humanist roots of transhumanism is its commitment to scientific method [and] critical thinking. . . . A remarkably large number of transhumanists are preoccupied with understanding" (2013b, 6). Transhumanists' foundational occupation with rationality is signaled and reinforced by self-depictions of their thought as "trac[ing] its roots to [the] rational humanism" of the Enlightenment (Bostrom 2003b, 40; see also 2005a, 202; 2005b, 2–4; Pence 2012, 18; Bailey 2013, 338; More 2013b, 4, 10).[10] That said, transhumanists' vision is "more radical" than Enlightenment humanism, for it embraces "direct application of medicine and technology to overcome . . . our basic biological limits" (Bostrom 2003a, 494).

The way in which transhumanists target reason for vigorous enhancement evinces their allegiance to rational essentialism: we are to use our rationality to make further scientific and technological discoveries, whose fruits will feature posthuman rationality (i.e., rationality empowered to operate on a categorically higher level than does its human incarnation). Transhumanists link their own essentialism to advocacy of rational augmentation: "When we make decisions to improve our lives by biological and other manipulations, we express our rationality and express what is fundamentally important about our nature. And if those manipulations improve our capacity to make rational . . . judgements, they further improve what is fundamentally human. . . . Such improvements express the human [i.e., rational] spirit" (Savulescu 2005, 38; see also Stock 1993, 56–60; Savulescu et al. 2004, 667; de Grey 2013, 218; More 2013a, 450; 2013b, 6).

By Bostrom's lights, Aristotle's rational essentialism is compatible with his own transhumanism "since it would be perfectly possible for a posthuman to realize a telos of rationality as well as a human being could. In fact, if what is good for us is to develop and exercise our rational nature, this implies that it would be good for us to become posthumans with appropriately enhanced cognitive capacities" (2008, 130; Levin 2017a, 282).[11] One might assume that when Bostrom links transhumanists' focus on reason to Aristotle, he, like this ancient philosopher, construes "reason" in a way that is broad and rich. In fact, however, Bostrom, like other transhumanists, conflates "rationality" and "cognition" ("develop and exercise our *rational* nature . . . become posthumans with appropriately enhanced *cognitive* capacities"). As we will see in Section 4, this shift from reason to cognition when bioenhancement is directly considered is quite significant.

The radical outcome that transhumanists seek here is illustrated by the claim that once the sought-for heightening has occurred, "Today's greatest geniuses [will] seem like simpletons" (Stock 1993, 167). Transhumanists further dramatize the cognitive elevation they envisage for our successors by offering comparisons across ontological planes; for example, posthumans' capacity to think "will exceed human ability . . . by the same order of magnitude that human ability exceeds" that of chimps (Walker 2002); similarly, posthumans will "reach intellectual heights as far above any current human genius as humans are above other primates" (Bostrom 2003b, 5). The world may even see the emergence of "forms that transcend . . . human beings . . . by even more than we transcend the primitive worms and skeletons of the past" (Stock 1993, 52; see also Minsky 2013, 168; Moravec 2013, 181).

Transhumanists' self-conception as reason-focused is further evinced by their deployment of a rational-irrational divide when lauding their approach to flourishing. They take maximal rationality as the supreme rational preference simpliciter involving the psychic domain (cf. Agar 2014, 21–22, 78; Hauskeller 2013, 20, 28). It follows, by their lights, that opposing the concerted direction of our efforts toward skyrocketing rational capacity, via science and technology, is sufficient evidence of one's *ir*rationality (Harris and Holm 2002, 357, 366; Bostrom and Ord 2006; Savulescu 2013a, 54).

As noted above, when transhumanists directly concede that anything constitutes our nature, being as such nonnegotiable, it is an impetus to self-creation, understood in terms of an unquenchable drive to surpass the level of attainment that we have achieved at a given time. If transhumanists hope that this nontraditional way of framing what is crucial about us will permit them to avoid essentialism, they do so in vain. In my view, their emphasis on self-creation is properly interpreted through the lens of their rational essentialism rather than the reverse: not only does the impetus to self-creation originate in reason, but reason is what gives it content and direction throughout.[12]

Transhumanists' furthering of their vision anchored in reason translates into advocacy of cognitive enhancement, which is needed to propel (or at least accelerate) the scientific discoveries and technological innovations that will, in their view, lead to the emergence of posthumanity. Transhumanists' confidence that rationality/cognition, suitably augmented, can power the scientific-technological advances on which they rely is linked to their conviction that things go better for us when we control whatever we can, within and without (see further Parens 1995, 147–50; Hauskeller 2013, 11, 78; Roduit 2016, 59).

Above all, what would fuel headway toward posthumanity is the rational functioning that Savulescu associates with "creative and original invention" and that Harris ties to "science, innovation and knowledge production" (2013b, 69; 2011a, 110). Harris exults in the prospective existence of those who are "better able to . . . flourish, be curious and inventive, and create a better world"—adding that the features he lauds "can be seen as emblematic of the scientific endeavor, as characterized by relentless curiosity and the desire to find answers to questions that puzzle us. . . . In the long term, we may hope that those successors are the sort of creatures capable of finding other habitats elsewhere in the universe if self-conscious intelligent life of any sort is to continue" (2011b, 17–18).[13]

Creative thinking is nonlinear and unpredictable. Such engagement is also anticipatory, attuned to the need for locating and forestalling problems (Runco 2004, 658–59, 679); further, it must be context-appropriate, which requires marked flexibility in one's attunement to situational factors (658, 668). Unlike utopians who envision the full attainment of their ideal, transhumanists foresee no final state of consummate achievement but instead anticipate ceaseless augmentation (Bostrom 2003b, 52).[14] This means, presumably, that ongoing enhancement of creativity, discussed further in Section 6.1.3, will be needed to fuel the discoveries that prevent this elevation from grinding to a halt.

3.2 As We Augment Reason, We Should Eliminate Negative Affect

Consideration of any program of rational essentialism must include attention to how it handles faculties besides reason proper. Here, I address transhumanists' rejection of negative affect, where "negative" and its functional equivalents are synonymous with "unsalutary," or "deleterious." Although I reject the stark division of affects into positive and negative (considered further in Chapter 2, Section 4), I use that conceptual frame as a way to organize my presentation of transhumanists' views; when challenging their stance on philosophical, cognitive-psychological, and neuroscientific grounds, I make my departures clear. As this subsection illustrates, transhumanists embrace a strict rational essentialism that shortchanges the nonrational.

Though narrowly construed by Savulescu (2005), desire falls under what is standardly termed "motivation" in cognitive psychology and neuroscience. When setting the temptation to indulge a desire against reason's directive to refrain from its gratification, Savulescu (37) gives pride of place to Walter Mischel's studies of impulse control, performed with children attending Bing Nursery School at Stanford University during the late 1960s and early 1970s (Mischel et al. 1972; Mischel and Moore 1973; Mischel and Baker 1975; Zacharia 2015). In these studies, children had a choice involving their receipt of a desired item, most famously, marshmallows. Those who capitulated to the desire right away would receive one marshmallow, while children who lit on strategies to help them delay gratification would get two. Tracking children from both groups into adolescence and adulthood, Mischel contended that preschoolers who had deferred gratification developed into more self-disciplined people, performing better socially and academically (e.g., on the SAT) than those who had yielded immediately to their impulse (Mischel et al. 1988; 1989; Shoda et al. 1990; Casey et al. 2011).

Based on his findings, Mischel concluded that children's differing natural capacities for self-control, tied to intelligence, powerfully shaped these differential outcomes (Mischel et al. 1988; Rodriguez et al. 1989; Casey et al. 2011; Mischel et al. 2011). Mischel's determination is controversial for its relative inattention to environmental impacts, such as socioeconomic status and caregiver reliability, on children's behavioral control.[15] Despite this, Savulescu treats Mischel's construction as established fact, relying on it to support his claim that for the sake of improved self-control, parents are morally required to heighten the intelligence of children-to-be (2005, 37), to whatever extent is technically available at a given time; Savulescu continues to depend on Mischel's view almost a full decade later (2013a, 39; 2013b, 68; 2014a, 174–75).[16]

In their defense of cognitive enhancement as a route to augmented autonomy, Schaefer et al. (2014) juxtapose temptation against resistance in a way that is ostensibly more complex:

> Strictly speaking, desires are non-cognitive. However, reasoning capacities can be crucial in resolving potential conflicts. In the first place, some logical abilities will be needed to recognize that there is a conflict in need of resolution. An unwilling addict . . . must recognize the conflict between the lower-order desire to consume some substance and the higher-order desire to cease consumption of that substance (and comprehend the greater importance of the higher-order desire) in order to begin to overcome her condition. Further, attempting to discern appropriate strategies for bringing one's various desires into line will require critical analysis of a range of options. (Schaefer et al. 2014, 126)

Apart from the fact that success here does not seem particularly to be a matter of "logical abilities," this passage contains unargued assumptions and unclarities. Controversially, the relation of reason to desire is seen as not just tense but fundamentally adversarial in the sense that drawing toward an object of desire, as opposed to holding back, constitutes akratic failure. In addition, since desire, as such, is deemed noncognitive, it is not evident how the authors construe higher-order desires and the nature of their tie to reason. These desires are clearly viewed as superior noncognitive phenomena. But what makes them such, and on what basis, if any, can they coordinate with reason?[17]

In the above passage, Schaefer et al. take themselves to be presenting Harry Frankfurt's view of "freedom of the will" (1971, 17) to help make their point that, despite differences among notable accounts of autonomy, all put rational capacity front and center. In no small part, the unclarities in their presentation reflect the fact that what Schaefer et al. actually offer is not a paraphrase of Frankfurt's position but rather an oversimplified version thereof, with an overlay that reflects their own rational essentialism. As a result, and in keeping with Schaefer et al.'s favored methodology of "overlapping consensus" to support cognitive enhancement, "Frankfurt's" stance seems to mesh with their own position.[18]

According to Frankfurt, however, one can operate rationally at a high level without being rationally governed in the sense envisioned by Schaefer et al. (2014, 126), who omit his distinction of second-order volitions from second-order desires. To count as having second-order desires, one must merely "[want] . . . to have a certain desire" (Frankfurt 1971, 10); this matches Schaefer et al.'s formulation of the second-order variety as "desires to have a certain desire" (2014, 125). On a superior plane, however, is one with second-order *volitions*, who "wants a certain desire to be his will" (Frankfurt 1971, 10). This individual manifests autonomy, understood as self-governance per Schaefer et al. (2014, 127): the will of such a person is truly "his own. . . . [Far from being] a helpless or a passive bystander to the forces that move him . . . there is nothing in the way of freedom that he lacks" (Frankfurt 1971, 17). Frankfurt may appear to be a strong rational essentialist when stating that "it is only in virtue of his rational capacities that a person is capable of becoming critically aware of his own will and of forming volitions of the second order. The structure of a person's will presupposes, accordingly, that he is a rational being" (11–12). Frankfurt cannot be a rational essentialist in the vein of Schaefer et al., however, for his "wanton," who is indifferent to her will (i.e., lacks second-order volitions), may nonetheless "employ rational faculties of a high order" (11).

Schaefer et al.'s stringent rational essentialism is front and center when they later consider a wider range of challenges to rational dominance and, thus, autonomy. Regardless of the trigger, these threats "operate internally . . . by affecting individuals' . . . psychology . . . through non-rational . . . means" (2014, 127). Attempts at deception via direct appeals to nonrational aspects of us—including not only desire/motivation but also emotion and mood—"[aim] at creating false beliefs, thereby inhibiting individuals' ability to reason soundly" (127). Schaefer et al.'s account includes self-deception, too, for "a lack of self-awareness prevents people from attending properly to their own beliefs, desires, interests, and so on" (127). Because "all these internal effects relate directly to people's ability to reason and deliberate properly . . . [one] prevent[s] such inhibitions by . . . improving people's reasoning abilities" (127). Thus, *all* obstacles to rational governance, including desire but by no means limited thereto, are properly handled to the extent that reason operates unchecked by intrusions from nonrational faculties.

Transhumanists' hostility to nonrational faculties is even more pointed when they speak of negative emotions as simply deleterious and hostile to reason. For instance, David Pearce opens his "Abolitionist Project" by announcing that the elimination of suffering, both physical and psychological, has "overriding *moral* urgency" (2007, 1). He is supremely confident that we should and ultimately will have "Godlike powers over our emotions" (10). In that paradise of well-being, negative emotions (e.g., grief, loneliness), condemned as "subjectively unpleasant states of consciousness," will not exist (2, 10–11). Not only that, but allowing them room in one's existence will be morally impermissible (12, 14–15). In the meantime, "*Un*enhanced humans will . . . be prey to [mental suffering, including] petty disappointments and frustrations—sadness, anxiety, jealousy, existential angst . . . loneliness, rejection . . . grief, [and] anxiety" (2, 11; I return below to this intermixing of emotions and moods).

For Savulescu and Kahane as well, we would be better off if our very capacity for "negative affect" were eliminated: "Reproducers . . . have strong reasons to seek to prevent even an innate tendency to negative affect, or the severe impairment in social skills associated with Asperger's syndrome" (2009, 281). As with desire (Schaefer et al. 2014), so, too, with "negative" emotion: the nonrational is simply dismissed as *ir*rational, leaving the possibility of alliances with reason toward shared ends unthinkable. At the extreme, beyond its expression, our capacity for "negative" emotion would be removed, as in, genetically deleted. Savulescu and Kahane take for granted that phenomena like anger function in the individually and socially disruptive fashion of appetitive desires. They assert the merit of extirpating the very capacity for "negative" emotion, as though it were self-evident both what negative emotion encompassed and that it must be subdued to the vanishing point. Savulescu and Kahane fail to provide an account of what makes emotional responses negative versus positive, a necessary basis for which would be a defense of the view that such a bifurcation exists.

Transhumanists sometimes employ anger, which they link closely to aggression, as a poster child for the harm of negative emotion. This picture of anger is a conventional one, widely reflected among both laypeople and experts (Novaco 2010). Per Savulescu and Kahane, anger is, by its very nature, deleterious. They contend that "the world and the lives of the people in it might be better if *everyone* were funnier, more intelligent, more empathetic and *less aggressive*" (2009, 284; emphasis added). It is most implausible to claim that human beings are aggressive such that a reduction in that form of responsiveness is required of one and all; it is far more likely that they are using "aggressive" as a synonym for "angry"—though even this claim, said of "everyone," is highly suspect. Similarly, Savulescu fuses anger and aggressiveness: "Impulse control has . . . been linked to socio-economic control and avoiding conflict with the law. The problems of a hot temper can include life in prison. . . . Just having a sunny temperament [where the point of contrast could be anger and/or aggressiveness] can profoundly affect our lives" (2005, 37).

Anger and aggressiveness often combine in prison populations and various adult psychopathologies (Shniderman and Solberg 2015; Novaco 2010). Anger as such is routinely pathologized, in no small part due to its presence in dysregulated forms as a nonunivocal feature of the latter (Novaco 2010).[19] But this encompassing condemnation is unwarranted, conceptually and phenomenologically, based on evident contributions of anger to our living well (466–67, 485–86).

Transhumanists' lack of distinction between anger and aggressiveness reflects the pathologizing of anger that Raymond Novaco (2010) rightly warns against, for anger may fruitfully entwine with the "positive" emotion of empathy, particularly in our dealings with those closest to us. More broadly, mild to moderate anger, if contextually appropriate, may contribute to our flourishing. Further, unlike sheer aggressiveness, strong anger at systemic injustice or a heinous situation may be not merely warranted but morally required.

The same, reflexive presumption of harmfulness is evident in transhumanists' handling of negative mood. As we saw, Savulescu asserts that "just having a sunny temperament can profoundly affect our lives" (2005, 37). Transhumanists' comments on negative mood are often run together with those about negative emotion. Thus, Pearce's call for the wholesale extirpation of mental suffering covers not only emotions (e.g., grief, jealousy) but also moods such as sadness and anxiety (2007, 2, 11). Bostrom's push for the "elimination of unnecessary suffering" is of identical scope, for he champions whatever elevates well-being, subjectively construed (2003a, 493–94); per Bostrom, posthumans would "exercise control over their own desires, moods, and mental states [as well as] have an increased capacity for pleasure . . . and serenity" (2003b, 5). Similarly, Pearce speaks of "true wonderdrugs that [would] deliver sublime well-being on a sustainable basis" (2007, 5). Even better: posthuman minds, unlike ours, would be *designed* for happiness since "fundamentally, there is no reason why pleasure, excitement, profound well-being and simple joy at being alive could not become the natural, default state of mind for all who desire it" (Bostrom 2003b, 53).

Pearce exults at the prospect that our "whole civilization . . . [would] opt to become genetically hyperthymic—to adopt a . . . system driven entirely by adaptive gradients of well-being . . . shifting our hedonic set-point to a vastly higher level" (2007, 7). Thus, for posthumans, "Gradients of pleasure could play a role analogous to that which the scale ranging between pleasure and pain has for us. When thinking [of] the possibility of *posthumanly happy* beings, and their psychological properties, one must abstract from contingent features of the human psyche" such as the experience of and very capacity for suffering (Bostrom 2008, 120). A suffering-free existence would still allow scope for "all manner of desires" (Pearce 2007, 11); such a world "would be wonderful . . . and full-blown paradise-engineering even better" (13). Pearce's further claim that "other things being equal, happiness signals success" (14) makes clear that he—like other transhumanists—has bought wholesale into a deep-seated, distinctively Western view (see further Parrott 2014a, 273; Norem 2014, 261).

In sum, transhumanists present negative affect as harmful per se: not only undesired but undesir*able*. We should shun it as far as possible, and posthumans would lack the capacity for negative affect altogether.[20] Such a picture presumes that rational and nonrational faculties not only can but should be detached.

As Section 6 will show, rational and nonrational dimensions of us are far more entwined than transhumanists' picture of the mind—which anchors their advocacy of cognitive bioenhancement—generally allows. Before undertaking that endeavor, we must shine a spotlight on what, for transhumanists, cognitive enhancement actually entails.

4. The "Cognitive" in "Cognitive Enhancement": Its Meaning and Backdrop

Transhumanists' rejection of faculty-essentialism is belied by the presence of their own rational variety. As a result, the core dispute between transhumanists and their opponents regarding essentialism turns out to be over what our essence is, and the means and extent of permissible, even required, augmentation. The question then becomes: How does transhumanists' rational essentialism relate to what they push for under "cognitive enhancement"? Directly considering what "cognitive enhancement" would augment, we find that transhumanists' prizing of rationality is a mismatch with their handling of cognition, in two main ways: (1) "cognition" is defined in terms of information, and (2) cognitive functioning is presumed to operate, and hence be improvable, in a self-contained, or "modular," way. This section concentrates on (1), and Section 6 addresses (2). Beyond this, the informational crux of cognitive enhancement, shared by transhumanists and cognitive neuroscientists, reflects a general lens on knowing itself that threatens to become encompassing.

Talk of reason as our distinctive faculty is in one way all too familiar to those acquainted with the history of Western philosophy. But tying transhumanism to key historical figures, such as Plato, Aristotle, and Kant, beyond this notable yet broad similarity is unjustified. Transhumanists often use "reason"/"rational" synonymously with "cognition"/"cognitive." As we will see, however, compared with traditional philosophizing, their framing of what "*cognitive* enhancement" would augment as simply informational reflects a constriction of "reason." This circumscribed nature of cognitive enhancement, along with transhumanists' failure to appreciate that nonrational aspects of us—so-called negative ones included—often improve our rational functioning, puts cognitive enhancement at odds with the path toward and attainment of the posthuman rationality that they urge upon us.

That the rational functioning that cognitive enhancement would improve—and per transhumanists, already does—is regularly unpacked in terms of the acquisition, processing, and deployment of information is fully expected in the case of transhumanists primarily concerned with artificial intelligence, robotics, and information systems, such as Ray Kurzweil (2005; 2012) and Hans Moravec (1988). But it is also strongly evident when enhancement prospects via neuroscience and genetics are addressed.[21] Thus, Bostrom and Anders Sandberg construe cognition as "the processes an organism uses to organize information. This includes acquiring information (perception), selecting (attention), representing (understanding) and retaining (memory) information, and using it to guide behavior (reasoning and coordination of motor outputs). Interventions designed to improve cognitive function may be directed at any . . . of these core faculties" (2009, 312; see also Pearce 2007, 3–4; Persson and Savulescu 2008, 165, 171; Sandberg 2011, 71; Housden et al. 2011, 113; Bostrom and Roache 2011, 138; Sandberg and Savulescu 2011, 93). With cognitive improvement thus defined, Sandberg and Savulescu take it for granted that any forgetting or less-than-full attention decreases well-being (2011, 95).

It is not at all clear that enhanced cognition, defined in terms of the acquisition, processing, and deployment of information, would suffice to make us better at scientific *discovery* (cf. Koch 2010, 688–89). My point is not that informational operations and the attendant "knowledge bases" are inessential here, but rather that they are insufficient—all the more if one wishes to retain as a live option the possibility that key phenomena of interest cannot be adequately accounted for within a currently dominant explanatory frame.

As we saw, the driver of headway toward posthumanity is the rational functioning that Harris ties to "science, innovation and knowledge production" and Savulescu links with "creative and original invention" (2011a, 110; 2013b, 69). On its face, transhumanists' presumption that heightened informational ability would, of itself, augment the capacity for insight and creativity may be surprising. But a brief look at the historical backdrop for the conflation of knowledge with information, including the rise of an informational epistemology that threatens to become encompassing (discussed further in Chapter 6),[22] helps us to see why this conflation has occurred.

Our premium on knowledge qua information may be traced to scientific-technological landmarks, including the use of atomic bombs in 1945, the rise of computing, the discovery of DNA, the Human Genome Project, and the advent of functional-neuroimaging techniques (especially functional magnetic resonance imaging). The spur of computing, in particular, was strong, as it offered "both a metaphorical and a literal model for interpreting consciousness. . . . After the inception of the computer era, computational metaphors for explaining important aspects of brain-mind function were instrumental in paving the way for the field of cognitive neuroscience" (Kohls and Benedikter 2010, 61).[23] Further, M. B. Crawford observes that faith in mental modules, reflected in cognitive science, is rooted in logical positivism, which "conceived reason to be syntactical or rule-like. It is what computers do" (2010, 359). It is no exaggeration to say that a distinct epistemology has taken root around this notion: being scientifically adept requires an ability to master vast and increasing quantities of information; beyond this, knowing itself is increasingly equated with its acquisition, processing, and retrieval—not only in science but in broader society (Brin 1998; Solove 2004; Floridi 2014; Lanier 2014; Ford 2015; Lambert 2015; Schneier 2015).

Noting this historical backdrop positions us to consider a second way in which transhumanists handle creativity, which is needed for highly original discoveries: by effectively denying that headway toward posthumanity will require it. Thus, in "Letter from Utopia," Bostrom informs us that work toward posthumanity "will take your best science, your best technology, and your best politics. Yet each problem has a solution. My existence breaks no law of nature. All the needed materials are laid out in front of you. Your people must become master builders" (2019, 6). Not only do "the physical laws of our universe permit forms of organization that would qualify as a posthuman condition," but "there appears to be no fundamental obstacle to the development of technologies that would make it possible to build such forms of organization" (2007, 17). Evincing a similar confidence, Kurzweil asserts that "the human brain is a complex hierarchy of complex systems, but it does not represent a level of complexity beyond what we are already capable of handling" (2005, 145). Further, although his depiction of the Singularity as a "period during which the pace of technological change will be so rapid, its impact so deep, that human life will be irreversibly transformed" might be taken to suggest a pronounced epistemological divide, Kurzweil undercuts that impression by insisting that "our thinking today is powerful enough to have meaningful insights into the implications of the Singularity" (7, 487).

As we have seen, transhumanists' interchangeable use of "reason" and "cognition" notwithstanding, what would be enhanced under "cognition" represents but a subset of our rational operations. It is all the more important to stress this given the aforementioned, increasingly predominant informational epistemology. Transhumanists do not directly acknowledge this mismatch. What's more, their seizing on reason as our Ariadne's thread, including their self-linkage to the Enlightenment, suggests that they do not perceive it.

In the remainder of the chapter, having considered why transhumanists are confident that robust cognitive enhancement will be a live option, I investigate existing, so-called cognitive-enhancement technologies based on recent work in cognitive psychology and neuroscience, proceeding in light of what transhumanists themselves hope that cognitive bioenhancement will deliver. In addition to foregrounding central problems with their picture of cognition/rationality, my account casts scientific doubt on transhumanists' presumption that "negative" affect is, as such, deleterious.

5. Why Are Transhumanists So Confident That Cognitive Enhancement Is Upon Us?

The first reason for transhumanists' confidence in the viability of cognitive enhancement of the sort they envision is their deep investment in our rational capacity itself, including an ability to creatively adjust, even transform, our circumstances at a given juncture. A second ground of their confidence is that, with reference to practical feasibility, they are extrapolating from what they take as an established finding that cognitive bioenhancement already occurs.

Transhumanists' rational essentialism thus combines with their generally rosy view of what scientific and technological advances will put on the table in terms of direct, uncompromised cognitive augmentation. Evidence for the legitimacy of their optimism is taken to stem from the impact of existing technologies used for cognitive enhancement and the promise of what's to come that they represent. In making their case that cognitive bioenhancement already occurs, transhumanists regularly assume that psychostimulants used to address deficits in those diagnosed with attention deficit hyperactivity disorder (ADHD) are fruitfully employed, off label, by "unimpaired individuals seeking a cognitive boost" (Levin 2014b, 7; Bostrom and Sandberg 2009, 316–18; Sandberg 2011, 74, 79; Sandberg and Savulescu 2011, 104; Persson and Savulescu 2008, 164–65; Harris 2011b, 9; 2012, 3–4; Vita-More 2015).[24] Transhumanists are interested in psychostimulants mainly for the promise they represent in terms of technological prospects for "mak[ing] us . . . better at remembering and understanding things, more competent, more of everything we want to be" (Harris 2012, 2).

In terms of usage and research involving pharmacological agents of cognitive enhancement, the focus so far has been on mixed amphetamine salts (Adderall), prescribed mainly for ADHD; methylphenidate (Ritalin), chemically related to amphetamine and, like it, used mostly to treat ADHD; and modafinil (Provigil), prescribed for narcolepsy, sleep apnea, and sleep disruption due to shift work (de Jongh et al. 2008, 762–64; Buyx 2015, 1193).[25] Because psychopharmacology is "the science behind current and near-term brain enhancement" (Farah 2010a, 12), Section 6 mainly addresses "cognitive enhancement" via psychostimulants. As we will also see, however, the situation is not demonstrably better when one considers the prospect of cognitive augmentation through such means as brain stimulation technologies (deep brain stimulation [DBS], transcranial direct current stimulation [tDCS], transcranial magnetic stimulation [TMS]), neural prostheses (NPs), and brain–computer interfaces (BCIs), which have recently garnered interest (Farah 2010a, 12; Gordijn and Buyx 2010, 284–85; Luber and Lisanby 2014; Blank 2016, 250–51; Maslen 2016, 275). Beyond the fact that they have not yet been properly vetted for this purpose, the invasiveness of DBS, NPs, and BCIs (i.e., the requirement of surgical implantation) precludes their justified "nontherapeutic use" (Farah 2010a, 12; cf. Outram 2010, 200–201).[26]

6. Hoisting Transhumanists by Their Own (Mental) Petard

Should transhumanists be confident that cognitive enhancement would fuel the scientific and technological breakthroughs that may be required to enable the advent of posthumans, our ontologically superior successors? The answer is a resounding "no." But the prior and more immediately pressing question is, Do well-studied means upgrade cognition at all?

Psychostimulants have a widespread reputation as "universal enhancers" (President's Council on Bioethics 2003, 83). Far from supporting the viability of transhumanists' vision, however, these pharmacological agents are not a clearly promising way to augment cognition in their current, off-label usage (Farah et al. 2009; Schermer et al. 2009; Advokat 2010; Outram 2010; Lucke et al. 2011; Farah et al. 2014).[27]

Through the lens of research on these agents, let us explore several ways in which transhumanists' fixation on "cognition" and confidence in its unadulterated strengthening are counterproductive by their own aspirational lights, that is to say, in terms of the aspects of capacity and function that *they* want to see upgraded. Subsection 1 focuses on alleged cognitive upgrades via psychostimulants: as discussion of cognitive tradeoffs, baseline-dependent effects, and creativity will show, the existence of cognitive benefit is far from clear.

Subsections 2 and 3 address noncognitive factors. Finding that noncognitive aspects of us promote cognitive functioning would be quite significant since transhumanists' picture of "cognitive enhancement" presumes that cognition operates in a compartment of its very own: because, allegedly, cognition alone is responsible for the aspects of our mental functioning that engage transhumanists, cognitive-enhancement tools not only do but must target it exclusively. In Subsection 2, I suggest that pharmacological boosts, such as they are, may not be wholly or even mainly *cognitive*. Further, in Subsection 3, I cite evidence that a positive mood can diminish cognitive effectiveness, while a negative one can augment it. This should greatly concern transhumanists because it means that dampening, not to mention eliminating, the capacity for negative affect in tandem with cognitive bioenhancement would likely make cognitive functioning *less* effective overall than it would otherwise be.

Findings for psychostimulants, such as the occurrence of cognitive tradeoffs and the bearing of affect on cognitive functioning, are unsurprising given strong scientific support for the complexity of our mental operations generally, which Chapters 2 and 3 consider in depth. Although psychostimulants' lack of clear, demonstrated efficacy to date does not ensure the same outcome for other pharmacological agents, this complexity, illustrated by the factors noted above, should dampen excitement in that regard (Schermer et al. 2009, 77). On the same basis, it is not surprising that research thus far on the possible use of TMS and tDCS for cognitive enhancement already suggests the potential for cognitive tradeoffs and baseline-dependent effects.

6.1 Experimental Results Problematize the View That Cognitive Enhancement Actually Occurs

6.1.1 Cognitive Tradeoffs

To the extent that psychopharmacological agents offer cognitive boons of any kind, they fall strictly under an informational epistemology. What, more specifically, can be said about them? Citing tradeoffs involving the targeted areas of cognitive functioning, memory, and attention, Claire Advokat's review found "scarce evidence that . . . stimulant drugs truly are 'cognitive enhancers' " (2010, 1264).[28] To illustrate: A review of studies of methylphenidate shows that it can strengthen memory, above all, spatial working memory, even as it "disrupt[s] . . . attentional control" (Repantis et al. 2010, 204).[29] De Jongh et al.'s review of existing pharmacological agents suggests that such tradeoffs exist not only between working and long-term memory but, within each function, between flexible and stable performance (2008, 769–71).[30] Thus, "Enhancing the consolidation of [long-term memory] might disrupt the ability of new information to modify those memories, and increases of cognitive stability (which benefit working memory maintenance) come at the cost of a decreased capacity to flexibly alter behavior" (773). The impact of stimulants on attention is also tied to situational complexity: "Although performance on simple tasks that require sustained attention is enhanced, more demanding tasks, [which] require *selective* attention [or 'cognitive flexibility'], may be impaired by stimulant drugs" (Advokat 2010, 1260, 1262). One might therefore suspect that pharmacologically increasing speed and focus in subjects' performance of circumscribed tasks featuring memory and attention could occur at the expense of creativity (as we will soon see, this musing has significant experimental support).

What's more, boons to memory and attention, such as they are, may be absent if subjects are not sleep deprived (Zohny 2015; regarding modafinil specifically, see further de Jongh et al. 2008, 762–63). Per Repantis et al., single-dose studies of modafinil suggest cognitive enhancement where subjects are moderately sleep deprived, while studies of repeated administration show augmentation only of wakefulness (2010, 203–204). The latter finding, "together with a possible effect of overconfidence on cognitive performance, makes it questionable whether repeated doses . . . in long lasting sleep deprivation could be of help . . . for someone who wants to stay alert and preserve performance at a pre-sleep deprivation level" (204).

6.1.2 Baseline-Dependent Effects

It stands to reason that, when it comes to prospects for further scientific headway, transhumanists would like to see cognitive ability augmented in those who are already gifted by human standards. From that vantage point, they should find worrisome the existence of experimental evidence that stimulants strengthen task performance particularly in those with weaker cognitive baselines, not doing so or even lowering performance in their opposites.

In their review, de Jongh et al. observe that boons to working memory and attentiveness from modafinil are more significant for or even exclusive to subjects with lower cognitive baselines (2008, 763); according to Schermer et al., no study thus far has discovered "any positive effects of [modafinil] in subjects already performing at optimal levels" (2009, 77). Cognitive benefits for those with lower baselines have also been shown for methylphenidate (de Jongh et al. 2008, 764). In a study of amphetamine by Ilieva et al. (2013), in turn, cognitive improvement for subjects overall was slim; only those with a lower cognitive baseline showed improvement at all, doing so on Raven's Progressive Matrices, a widely used measure of general cognitive ability, word recall, and the discernment of embedded figures (Raven 2000; Ilieva et al. 2013, 502). On a standard definition of "neuroenhancement" as "the improvement of brain and associated mental functions beyond what is considered normal for the general population" (Glannon 2015, 1252), upgrading of this sort would not qualify.

Strikingly, not merely an absence of cognitive benefit from stimulants but also deterioration in performance has been found to occur in subjects with higher cognitive baselines (Schermer et al. 2009, 77–78; Advokat 2010, 1263; Zohny 2015, 260).[31] Getting a handle on why such disparities exist requires reference to genetic differences. Baseline working memory differs between Val/Val and Met/Met genotypes; the latter genotype stems from "variation at codon 158 of the *COMT* gene (captured as rs4680) [that] results in a valine (Val)-to-methionine (Met) substitution" (Landi et al. 2013, 14). The availability of dopamine is greater in Met/Met individuals, which correlates with stronger baseline working memory; in the study of Landi et al., which focused on reading skillfulness, Met/Met individuals fared best. Adderall and Ritalin produce their effects by inhibiting the reuptake of dopamine and norepinephrine, especially the former (de Jongh et al. 2008, 763–64; Farah 2010a, 13; Repantis et al. 2010, 188; Calipari and Ferris 2013; Buyx 2015, 1194; Glannon 2015, 1255). In a study of amphetamine, Mattay et al. found that although Val/Val subjects displayed improvement in working memory across load levels, Met/Met individuals showed reduced processing efficiency on high-difficulty tasks (2003, 6188). Consistent with recent reviews that document the lack of clear support for the enhancement function of stimulants, Ilieva et al. (2013)—who sought to avoid weaknesses in the design of prior studies of stimulants and enhancement in terms, for example, of statistical power (497–98, 504)—found no cognitive enhancement for subjects overall by any of the thirteen measures of cognitive ability that they employed. More specifically, however, it turned out that the performance of subjects with cognitive baselines below and above the median was strengthened or reduced, respectively, on several tasks, particularly Word Recall and Embedded Figures, a test of convergent thinking (502).

A likely explanation for the above findings is that "the relationship between dopamine activity and cognitive performance . . . follow[s] an inverted U-shaped curve, in which intermediate dopamine levels are optimal for cognitive performance, whereas low and high levels are detrimental" (Ilieva et al. 2013, 497). Applied to subjects with high cognitive baselines, the idea is that there is a built-in limitation on how far individuals' systems can be pushed with respect to cognitive effort and available dopamine before they are simply overtaxed, with attendant declines in individuals' cognitive performance (Mattay et al. 2003, 6190; on differential dosing apropos of this curve, see Arnsten and Li 2005, 1379). Per Mattay et al., "The combined effects on [dopamine] levels of [amphetamine] and high [working-memory] load push individuals with the *met/met* genotype beyond the critical threshold at which compensation can be made" (2003, 6190; see further de Jongh et al. 2008, 768–69).

Before turning to psychostimulants and creativity, from the standpoint of cognitive tradeoffs and baseline-dependent effects, let us briefly consider the alleged enhancement potential of nonpharmacological techniques. Most authors who enthuse about this terrain focus on TMS and tDCS, which are "noninvasive"—though Cabrera et al. prefer " 'minimally invasive' . . . to underscore . . . that they impose exogenous magnetic fields or electrical currents upon the brain, and can thus be considered at least somewhat invasive" (2014, 35). These techniques of brain stimulation, developed originally to permit structural analysis of brain areas, came to be used for the diagnosis and treatment of neurological conditions (McKinley et al. 2012, 134). Can noninvasive brain stimulation also enhance cognition absent a neurological problem? Although enhancement effects from its use have been reported on cognitive tasks including planning performance (Dockery et al. 2009), memory of word-pairs (Hamani et al. 2007), complex verbal associative thought (Cerruti and Schlaug 2008), and the acquisition of motor skill (Reis et al. 2009),[32] confidence in the cognitive-enhancement potential of TMS and tDCS is premature.[33]

The status of TMS and tDCS as "external intervention[s] may create the misplaced perception that [their] use is less problematic than more obviously internal enhancements, and thus lower the threshold for premature use" (Kadosh et al. 2012, R108). For example, not only can repeated TMS cause seizures in laboratory subjects, but "unknown complications [may exist] due to TMS induced fields" (R109; Dubljević 2015, 121n5, 122). Further, hearing can be impaired, "as TMS coils produce noise levels which may exceed 140 dB" (Dubljević 2015, 122); to put this in perspective, 140 dB(A) is the noise level on the deck of an aircraft carrier, and a level of 150 dB(A) can cause eardrum rupture (Rovig et al. 2004, 429; European Environment Agency and WHO Regional Office for Europe 2002, 32). Though TMS is the more familiar of the two techniques, due to its portability, ease of employment, and comparative safety, tDCS is thought to have greater promise as a tool for use outside of medical settings (Brunoni et al. 2012, 177; Kadosh 2013, 20). Veljko Dubljević, however, finds the pronounced enthusiasm for tDCS that researchers express to be unwarranted, for serious harm occurs "even with strict adherence to safety protocols" (2015, 117). Further, a great deal about the neural mechanisms through which these techniques produce their effects and the long-term impact of their use (i.e., that spanning months or years) remains unknown (McKinley 2012, 134; Cabrera et al. 2014, 43; Dubljević 2015, 122).

Might boons in performance on the cognitive task of focal interest occur at the expense of performance on others (McKinley et al. 2012, 134; Cabrera et al. 2014, 38; Dubljević 2015, 122)? If, as with psychostimulants, this is the case, strong limits would exist on the nature and complexity of cognitive operations that TMS and tDCS could help to improve (McKinley et al. 2012, 134). The illusion that no such cognitive tradeoffs exist is closely related to the fact that "potentially detrimental effects are not measured and hence not reported" (Dubljević 2015, 117). Even though studies to date have largely featured individual tasks, cognitive tradeoffs have already been documented (Kadosh et al. 2012, R109; Kadosh 2013, 27–28). To illustrate: Teresa Iuculano and Roi Cohen Kadosh (2013) studied whether tDCS may augment performance on one mathematical learning task while impairing it on another. They found that tDCS directed to the posterior parietal cortex improved mathematical learning rates while impeding "automaticity, the quick and effortless performance of [the learned] task," with tDCS to the dorsolateral prefrontal cortex showing the reverse effect (4482, 4485).

Cognitive tradeoffs are a concern even when tDCS is used with those of "average or impaired abilities" (Kadosh 2013, 28). Beyond this, "Highly-developed capacities in certain cognitive domains in some individuals are accompanied by reduced functioning in others" (28). This finding, notable from the standpoint of transhumanist aspirations for dramatically heightened cognitive functioning, meshes with the existence of baseline-dependent impacts on cognition that are already well established for pharmacological agents.

6.1.3 Creativity

Let us turn now to creativity, which ought to be and is quite important to transhumanists, both in terms of what further scientific discoveries leading to posthumanity would in all likelihood require and for posthuman existence itself. Where the aforementioned pharmaceuticals are employed off label for cognitive enhancement, users' goal is not creative innovation but rather the targeted acquisition and *re*production of information. Insofar as they prize creative ability, transhumanists have cause for worry that "far from stimulants' improving creativity and inspiration, expression of these traditionally precious features may worsen" (Levin 2014b, 7).

A parallel exists here to differential effects noted by Hazem Zohny (2015) and Advokat (2010) tied to subjects' baseline cognitive ability: while those with lower creative baselines receive some benefit, the creativity of those with higher baselines may be impaired, as Farah et al. documented for subjects' performance even on a test of convergent, verbal reasoning (2009, 546). The study of Farah et al. did not also cover divergent thinking, which creativity researchers test to reliably gauge individuals' creative potential (Runco 2004, 668; Runco et al. 2006, 269; Dietrich and Kanso 2010, 833; Runco and Acar 2012, 66, 72).[34] Even so, Farah et al. were troubled enough to conclude that, if stimulant use by the unimpaired became sufficiently widespread, the constrictive impact on humans' "cognitive style" stands to affect society in a way that is potentially "grave" (2009, 542).

The legitimacy of this concern is reinforced by Dione Healey and Julia Rucklidge's study of the relationship of creativity and symptoms of ADHD in children, in which, despite overlap between highly creative children without a diagnosis of ADHD and ADHD symptomology, "*None* . . . met full criteria for a diagnosis of ADHD" (2006, 435). It is well documented that "high levels of inattention in creative children" are essential to their creative functioning (433). Launching from this established finding, Healey and Rucklidge found that the cognitive impact of stimulants on children depended on the tested function. With respect to "Full Scale IQ, working memory, and executive functioning,[35] the creative group with ADHD symptoms performed significantly better than the ADHD group and very similarly to the creative group without ADHD symptoms" (433). When, however, it came to performative speed, creative children with symptoms of ADHD were surpassed by the group with ADHD (433); this signifies that "inattentive creative children process information slower and react slower to stimuli" (434). Given the premium placed by transhumanists on rapidity of processing as a reliable marker of intelligence and view of rapidity as an unmitigated boon (Bostrom 2007, 22–23; Kurzweil 2005; 2012), it is striking that, far from inhibiting children's creativity, slower processing- and reaction times look to be part and parcel of the creative endeavor itself.

Healey and Rucklidge's (2006) result calls to mind the general finding of Zohny that stimulants not only fail to facilitate the absorption of new information but can "actually impair performance on tasks that require adaptation, flexibility and planning" (2015, 259). Similarly, Advokat ties lowered adaptability and flexibility to a reduction in creativity (2010, 1263). She has good reason to do so, for it is well documented that these features, along with originality, are key thereto (Runco 2004, 658, 668). Recall Farah et al.'s (2009) finding that those with higher creative baselines performed worse even on a task of convergent thinking, which "is oriented toward deriving the single best (or correct) answer to a clearly defined question. It emphasizes speed, accuracy, logic, and the like and focuses on . . . accumulating information. . . . It leads to a single best answer and, thus, leaves no room for ambiguity" (Cropley 2006, 391). Divergent thinking—whose core feature is originality (Runco and Acar 2012, 66)—is, as noted, what creativity researchers test to reliably gauge individuals' creative potential.

Reviewing studies of creativity conducted via neuroimaging, electroencephalography, and event-related potentials, Arne Dietrich and Riam Kanso observe that "whereas a mental ability as extraordinary as creativity would appear to be associated with activation of the highest cognitive functions, creativity may also be associated with a state of hypofrontality" (2010, 838–39). Because manipulation of the prefrontal cortex would be involved in the augmentation not only of speedy and efficient informational processing but also of creativity, Dietrich and Kanso's finding casts further doubt on the prospect of our technologically augmenting all of this mental terrain.[36]

Valorizing as they do ramped-up processing capabilities, transhumanists rhapsodize about the prospect of one's being able to absorb, rapidly, the entire contents of the Library of Congress, Wikipedia, and the World Wide Web (Bostrom 2003a, 494; Kurzweil 2012, 156–59). What is lauded here is strictly informational; the matter of how, if at all, information could be translated into insight is ignored. The abysmal failure of Kurzweil's attempt to grasp free will via online sources, including a dictionary and Wikipedia (2012, 231–32, 240), is a harbinger of what would likely await us if top priority were given to our successors' upgrading, informationally construed.

If informational boosts in the form of augmented speed and efficiency on individual cognitive tasks were favored at the expense of creativity, many nontranshumanists would likely question whether we had chosen well. But, in light of their own broader aspirations, transhumanists, too, should be concerned about a future in which their dream of radically augmented processing speed, capacity, and reliability ruled the day. We are told that, compared with us, posthumans would have vastly more "creative mind[s]" (Bostrom and Sandberg 2009, 328; see also Walker 2002; Vita-More 2013a; Shapiro 2013, 283). A telling illustration is Bostrom's extravagant notion that posthuman creativity would be so profound that, by comparison with its fruits, Mozart's work would be the equivalent of "bad Muzak" today (2008, 112). If, far from promoting this exalted outcome, we were actually reducing, or even eliminating, the odds of there being further Mozarts, this counts as impoverishing by transhumanists' own lights.

But this worry about posthuman existence will be moot if, to get us there, transhumanists require minds that are both cognitively enhanced and capable of "creative and original invention" (Savulescu 2013b, 69). As previously observed, creative thinking is nonlinear and unpredictable. Indeed, to *be* creative, thought must be flexibly attuned to contextual factors (Runco 2004, 658, 668). The situational attunement of creative people extends beyond the present, for creative thought is anticipatory, keen at discerning and staving off problems (658–59, 679). Transhumanists' commitment to future agents of "cognitive enhancement," by extrapolation from allegedly existent ones, would reduce the caliber and likelihood of that creative functioning on which prominent figures count to bring us to posthumanity.

The second view of the future of creativity, on which reaching posthumanity will not require it, has the merit of being more consistent than the first with what transhumanists envision under "cognitive enhancement." It also presumes that we are in the thick of a recurring phase of scientific activity that Thomas Kuhn called "normal science," during which "progress seems both obvious and assured" (1962 [2012], 162). As he observes, to sustain this confidence, scientists operating within a given theoretical and experimental "paradigm" must "not see something *as* something else; instead, they simply see it" (85).

Though certainly productive, normal science does not exhaust what science *is* (151). Since no paradigm is all encompassing, "anomalies" always turn up (56–57, 82–83). Whether they foster "crisis" regarding a paradigm depends not only on what those incongruities are but on how scientists receive them (82–83, 93, 97). Although "ingenuity," or being "skilful enough," may suffice for headway within paradigms, appreciating "fundamental novelties" requires marked creativity (37–38, 52). Primed for the possibility that their theoretical or experimental expectations will not be met, when this happens, creative scientists do not decide straightaway that what confronts them are merely irrelevant findings or interim irregularities (56, 118); instead, even "a minor breakdown of the paradigm [may be] sufficient to induce in someone a new way of looking at the field" (86). Whatever, specifically, sets the stage, in keeping with the findings of creativity research, the transition to a new paradigm is nonlinear (85, 108, 119, 149). A fresh overarching vision may reach the consciousness of a creative scientist in "flashes of intuition" (122); more generally, "The transfer of allegiance from paradigm to paradigm is a conversion experience" (150). Such an experience "cannot be forced," meaning that, "like artists, creative scientists must . . . be able to live in a world out of joint" (150, 79).

I suggest that transhumanists' second lens on creativity reflects the typical attitude of scientists during periods of "normal science," where views of "what is" are not generally seen as *interpretations* whose tie to the "real" is mediated by favored theories, concepts, equipment, and experimental techniques (Kuhn [1962] 2012, 20, 37–42). Per transhumanists, we are finally on track to more fully unpack *the* correct scientific frame (including interdisciplinary synergies), with the result that what it matters to uncover *will* be unveiled.[37] And of course, with this unveiling will come an ability to funnel the known to desired ends. Unlike transhumanist avowals that creativity is requisite for headway toward posthumanity, notions of progress absent creativity mesh closely with an informational epistemology. That said, since pronounced creativity would almost certainly be required for this headway, and cognitive enhancement would likely weaken it, the upshot of both views of creativity and scientific progress is the same: improved informational capacity—the heart of cognitive enhancement—would not equip its possessors to reckon creatively with any need that should arise for deep shifts in their very "formulation of questions and answers" (Kuhn [1962] 2012, 139). On the contrary, it would reduce the likelihood that anyone could shoulder that kind of work.

6.2 Improvements May Be to Noncognitive Faculties, with Indirect Boons for Memory and Attention

Thus far we have assumed that the cognitive boosts—such as they are—that psychostimulants deliver stem from cognitive impacts of that use. As we will see, effects of these pharmacological agents, both unwanted and sought-for, are importantly noncognitive.

There is experimental support for the view that, in those taking stimulants for ADHD, "The empirically detectable side effects . . . go beyond the domain of cognitive abilities" (Kipke 2013, 155). Advokat's review of research on methylphenidate and amphetamine suggests that, in certain instances, stimulant use may augment impulsivity (2010, 1262)—precisely the lack of self-control that transhumanists would like to see removed from the psychic profiles of our successors. The use of methylphenidate by those with diagnosed ADHD "often . . . results in aggression, excitement, emotional lability, anxiety, depression, irritability—mental states that obviously belong to the domain of emotion" (Kipke 2013, 155). Since these side effects—mostly comprising mental features that transhumanists want to eliminate under the head of negative affect—"occur in ill patients, it seems likely that they will also occur in healthy persons" (155). Harmful emotional impacts on those with ADHD reflect the general fact that "cognitive and emotional processing are part of an interconnected system in the mind, which is regulated by interconnected cortical/limbic pathways in the brain" (de Jongh et al. 2008, 771). It is thus to be expected that "trying to enhance cognitive processing [in those without such a diagnosis] could impair emotional processing" (771) in their case as well.

The above argument addresses undesired noncognitive impacts of stimulants used for cognitive enhancement, leaving intact the notion, unquestioned by transhumanists, that those agents primarily augment cognitive functions, in particular, memory and attention. This view is problematized by Zohny, who argues that psychostimulants "appear to be acting, if at all, on non-cognitive brain states," specifically, mood and motivation (2015, 260). Stimulants are thus "second-order cognitive enhancers. For the sake of clarity, they would better be called vigilance or motivation enhancers" (Quednow 2010, 154). Even if future neuroscientific work showed convincingly that stimulants did augment cognitive ability, this would not impugn Zohny's conclusion about the irreducibly "integrated nature" of our cognitive and noncognitive operations, rejecting which would remain "neuroscientifically uninformed" (2015, 260–61). The dependency here is reciprocal: there simply are no exclusively emotional or cognitive areas (260–61). This fundamental idea, which runs strongly counter to the mental compartmentalization that transhumanists presume, will figure importantly in Chapter 2. In the meantime, as we shall see, transhumanists' rational essentialism, manifest in their rejection of the nonrational qua "negative" mood, runs counter to their expressed aim of augmenting cognition.

6.3 Moods and Cognitive Functioning

Contrary to transhumanists' lauding of positive affect and rejection of the negative variety, important research in cognitive psychology supports the view that being in a positive (happy) mood can impair performance on cognitive tasks of concern to them. Conversely, being in a negative (sad) mood can improve cognitive functioning on tasks that matter to transhumanists, including deficits for which they assume that cognitive improvement is the fix.

In what follows, I present several examples of how negative mood has been shown to augment cognitive functioning. First, Forgas et al. (2005) found that whether subjects were in a positive or negative mood affected the accuracy of their eyewitness memory: despite the fact that subjects in the former mood were *more confident* that their eyewitness accounts were correct, these individuals were more likely to interpolate material that had not been originally presented to them; Justin Storbeck and Gerald Clore (2005) documented the same mood-correlated impact on memory.[38] Forgas et al. maintain that "positive affect and the constructive, assimilative processing style it promoted . . . increased people's tendency to receive subsequent misinformation in an uncritical, accepting manner" (2005, 585). What such evidence shows is not that sadness is an unqualified boon but rather that while "happy moods employ thinking that blithely assumes that the world is consistent with one's preexisting conceptions of it, sad moods engage a style of thinking that is more carefully attentive to the specific details of the world as it actually is. Each style has its strengths and weaknesses, but there are certainly times when the sad style is superior" (Parrott 2014a, 279).

In addition, a negative mood augments our awareness of attempts made by others to deceive us (Forgas and East 2008; Forgas 2014, 15), making us less likely to take at face value information that others transmit, matching our opinions straightaway to their conveyances. The opposite has been found to occur in the case of those in a positive mood. Embracing either extreme can, of course, be harmful, for "rejecting valid information as false (excessive skepticism) is just as dangerous as accepting invalid information as true (excessive gullibility)" (Forgas 2014, 15–16). Lest one assume that the net result was harmful because it made those in a sad mood overly suspicious, it was not simply that sad subjects in Joseph Forgas and Rebekah East's study were less likely to take others' claims at face value: those subjects "were able to detect deception at a rate significantly better than did happy and neutral mood participants even when targets engaged in elaborate and motivated deception to deny responsibility" (2008, 1365). Apart from its theoretical interest, this finding is practically notable given the bearing of an ability to identify deception on one's navigation of ordinary life, not to mention on milieux such as law enforcement and the criminal justice system (1366).

A third sort of case involves stereotyping, where happy and sad moods correlate with greater and lesser reliance, respectively, on that mode of thought. For example, Bodenhausen et al. (1994) found that being in a happy mood made subjects more likely to rely on group stereotypes in an experimental scenario, "analogous to a criminal justice setting" (622), in which they were asked to assess whether individual fellow students were guilty of alleged offenses. These results are particularly significant since "the most damaging stereotypes are those that associate outgroup membership with tendencies toward engaging in undesirable, socially unacceptable, or criminal practices. The present research shows that feeling good tends to increase the extent to which such stereotypes are applied in making judgments of individual members of stigmatized outgroups" (628). Another stereotype relates to mathematics, in which area women have often been viewed as naturally inferior. One might imagine that doing mathematics in an optimistic mood would be conducive to women's performing in a way that belied this stereotype. What Sylvia Perry and Linda Skitka found, however, is that women heading into a math test with a high level of "defensive pessimism," combined with a pre-test introduction that put the stereotype front and center, were the ones who excelled (2009, 919).

Those in a good mood tend to "engage in global, category-level, relational processing, whereas [those in a sad one] engage in local, item level, stimulus-specific processing" (Clore and Huntsinger 2007, 395). This means, in practice, that while a happy mood correlates with dependence on readily available "cognitions and responses," a sad one "acts as a stop sign for dominant responses" (396). In keeping with this difference, R. Jeffrey Melton found that happy subjects did significantly worse on a syllogistic task, relying much more than controls on "unqualified, universal as opposed to qualified conclusions" and making greater use of the "atmosphere heuristic," namely, choosing conclusions for their "similarity in wording to the premises" (1995, 791, 790); Galen Bodenhausen (1993), too, found that happy subjects relied more on heuristic strategies. Thus, contra transhumanists (e.g., Schaefer et al. 2014, 126) who assume that cognitive enhancement will itself reliably augment logical reasoning, this test of syllogistic reasoning supports the view that mood, a nonrational faculty, is important as well. Findings such as Melton's are notable all the more when one recalls that, apart from cognitive augmentation, transhumanists are concerned with technological possibilities for doing away with suffering, sadness included.

As Schaefer et al. observe, cognitive ability contributes to autonomy (construed, etymologically, in terms of self-governance), and improved stepwise reasoning may certainly promote that end (2014, 126). But their claim that higher intelligence, and thereby greater autonomy, "is strongly correlated with resistance to conformity" (129) represents only part of the story. Schaefer et al. foreground greater-autonomy-through-cognitive-enhancement from the standpoint of outside impediments (i.e., of "externalism"), including deliberate attempts to deceive or manipulate us. Schaefer et al.'s contention depends on work from 1955 to 1960 (129; Pömsl and Friedrich 2017, 251).[39] Current research shows that, far from simply dragging us down, negative affect (in this case, mood) plays an essential role in our effective navigation of everyday life (Parrott 2014b). My point here is not that sad moods uniformly promote better cognitive and practical outcomes, let alone that sad moods are better than happy ones simpliciter. Rather, I wish to emphasize that on any reasonable view of flourishing, being inclined to zero in on contextual variables—as tends to occur with subjects in sad, unlike happy, moods—is a boon. Indeed, as we have seen, it can be a sign that one is resorting to independent thought versus embracing readily accessible opinions straightaway.

Findings such as the above challenge any presumption that negative mood is simply obstructive to worthwhile aims. Let us also recall here transhumanists' insistence that, unlike utopians who yearn for the full attainment of their ideal, they have in mind endless stores of desire/motivation fueling ceaseless augmentation. Enacting and rendering fruitful the quenchless drive toward the scientific and technological developments that transhumanists prize entails one's never being satisfied with any status quo. But evidence presented above suggests that acting on transhumanists' antipathy to negative affect might confound their project by fostering precisely that satisfaction.

Further, motivation is needed for our combating stereotypes and going the extra cognitive mile in daily life. All the more does the fruitfulness of perpetual dissatisfaction with any given state of scientific-technological achievement entail a desire to surpass it. It is therefore fitting to note that, beyond its salutary impact on cognition, negative mood can significantly augment motivation (Forgas 2014, 20). For example, in a study of "prosocial" interpersonal conduct, Hui Bing Tan and Forgas found that whether subjects were in a happy versus a sad mood affected their level of fairness, but not in the way that one might expect: in the dictator game, those in the latter mood were demonstrably fairer in their allocation of resources, whether publicly or in the lab (2010, 574). This is a descriptive result that happens to mesh with what the moral norm of fairness encourages.[40]

7. Conclusion

This critique of transhumanists' handling of cognitive enhancement, which reflects a thin view of reason itself and cordons it off from affect, sets the stage for my encompassing challenge to their picture of the mind in Chapter 2, where I argue that Aristotle's version of rational essentialism is philosophically preferable to transhumanists' extreme construction. What's more, it—unlike transhumanist essentialism—is compatible with the cognitivism regarding emotion (and by extension, mood and motivation) that predominates in cognitive psychology and is supported by neuroscience (Levy 2007, 295). Stunningly, though transhumanists are the ones who stake all on the rightness of their favored scientific views, they, not Aristotle, are the outliers. Far from being obsolete, traditional philosophizing—from the fourth century BCE, no less—aligns with key aspects of the scientific milieu on which transhumanists firmly but wrongly count as the engine of headway toward posthumanity.

2
Why We Should Reject Transhumanists' Entire Lens on the Mind and Brain

1. Introduction

A normative position is embedded in any proffered definition of human nature. Committed to extreme rational essentialism, transhumanists deem it irrational to support anything short of a maximal heightening of rational/cognitive ability. They also view our mental faculties in sharply segmented terms. Taking reason/cognition to operate in a self-contained, or "modular," way, transhumanists presume that the brain reflects this circumscription; as a result, their cherished capacity could be singled out from the rest for augmentation. Beyond contending that reason/cognition operates best when unchecked by nonrational/noncognitive activity, transhumanists target "negative" affect for deletion. Here, too, they evince a view of the mind as composed of discrete faculties that could be manipulated neurobiologically. Having challenged the above commitments in Chapter 1, I extend its line of argument by contesting transhumanists' entire picture of the mind and brain, which is on the verge of being outdated.

Transhumanists are on the losing side of a decades-long dispute about the nature of emotion. This debate is not over how we view a self-contained compartment of our mental functioning, as the phrase "emotion theory" might be taken to suggest. In terms of their reach and implications for our perspective on the human mind, the points of contention in current theorizing about emotion are global. This becomes clear once we observe that, within this debate, positions are demarcated by divergent answers to questions such as, What mental operations of ours are "cognitive"? Does emotion involve "cognition"? If so, how? How complex are our emotional experiences? Insofar as emotional experiences are susceptible to refinement, is the source of calibration within or without those experiences? Where emotion is concerned, how is the mind related to the brain, and how do the human mind and brain compare with those of nonhuman animals?

Like transhumanists, "basic-emotion" and "dual-process" theorists of emotion view the mind as a set of compartments whose functionality is explained by dedicated areas or systems in the brain (Section 2). Both theoretical approaches have been shown to reflect core misconceptions, and "appraisal theory," discussed

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in Section 3.1, is now the dominant lens on emotion. For appraisal theorists, emotions are not triggered by events themselves but by our interpretations of situations in light of our concerns. Klaus Scherer's version of appraisal theory is especially promising (Sections 3.2 and 4), as it integrates well the insight that "cognition" is not a separately identifiable aspect of our mental operations; includes a clear distinction between wide and narrow senses of "cognition"; and accommodates the subtlety of human emotion. Further, it is compatible with mounting evidence of the brain's complexity.

That conceptions of emotion are inseparable from theorists' views of cognition and reason means that philosophers and psychologists have long erred by attempting to explain and evaluate emotion apart from these. Committed as they are to a divide between reason/cognition and nonrational faculties, transhumanists fall squarely in the errant group. For not only does emotion involve "the entire person," with rational and emotional operations being "integrated," but there are not separate rational and emotional areas, or regions, within the brain (Scherer 2009, 3459; Zohny 2015, 261; Pessoa 2008; Duncan and Barrett 2007, 1187). Thus, claims of facultative and neurobiological discreteness, made by basic-emotion theorists, dual-process advocates, and transhumanists, are "neuroscientifically uninformed" (Zohny 2015, 261).

Having developed this scientific line of argument, I turn to Aristotle (Section 5), whose continued bearing on debates about the human mind and flourishing is clear not only from his role as the leading inspiration for contemporary virtue ethics but also from his bioethical invocation within the debate over bioenhancement. Though Aristotle's linkage to this debate is a fruitful development,[1] further exploration is needed to illuminate the distinctive bearing of his ideas.

Both transhumanists and Aristotle are rational essentialists. Though it involves a comparative subordination of faculties besides reason proper, by itself, a commitment to rational essentialism does not settle the question of whether nonrational faculties are also required for our flourishing. As noted in Chapter 1, Bostrom sees his and Aristotle's rational essentialism as compatible (2008, 130). This view is incorrect, for Aristotle's version, unlike transhumanists', incorporates a necessary role for nonrational faculties and intrapsychic harmony. It follows that, by Aristotle's lights, embracing transhumanists' commitment to maximal augmentation of rationality per se as the sole rational course would testify to one's irrationality.

Sections 6 and 7 defend a powerful alliance between Aristotle and the present day. While transhumanists' lens on the mind and brain is at odds with contemporary findings, Aristotle's view of the mind shares a number of important commitments with Scherer's appraisal theory and is broadly compatible with an emerging picture of the brain's complexity. It turns out that, in the trio comprising Aristotle, transhumanism, and contemporary science, transhumanism is the outlier.

2. Basic-Emotion and Dual-Process Approaches to Emotions and the Brain

Basic-emotion and dual-process theorizing fit within an "affect revolution" dating back to the 1980s (Haidt 2002, 852). At that juncture, theorists began seeking alternatives to the strong depreciation of affect, particularly emotion, in human morality under the head of "rationalism," during whose reign Lawrence Kohlberg's six-stage developmental account figured centrally (Helion and Pizarro 2015, 110–11; Haidt 2012, 6–9). Though it originated in the 1960s (Ellsworth and Scherer 2002, 572–73), appraisal theory, now the dominant lens on emotion, came to the fore in the 1980s as part of the aforementioned revolution. To pave the way for my focus on appraisal theory, I consider basic-emotion and dual-process theories as prominent lenses on emotion that appraisal theory has largely superseded.

2.1 Basic-Emotion Theory

For advocates of this approach, also known as natural-kind theory (Griffiths 1997; Izard 2007, 261), "basic emotions" are irreducible units of our mentality that "are assumed to be universally present in humans . . . selected for over the course of evolution, and biologically primitive, thereby constituting the fundamental elements of emotional life" (Barrett 2006, 30). Basic-emotion theorists strive to encompass all emotion under this head (Ekman 1992b).

Natural-kind theorists take emotion to be a realm apart in multiple senses. Informational self-containment, a key feature of modular systems (Fodor 1983, 119), is involved in the elicitation of emotional responses such that "rules governing the acquisition of information about what is emotionally significant are importantly different from those used to acquire information on other topics" (Griffiths 1997, 93). As a group, emotions share an array of features that distinguish them from cognitive activity, including "quick onset," "brief duration," and "automatic . . . unbidden occurrence" (Ekman 1992b, 175).

Here, "automatic" entails "noncognitive." Thus, basic-emotion theorists sharply differentiate "affect"/"emotion" from "cognition," as when R. B. Zajonc contends that "the affective qualities in impression formation are processed differently and perhaps separately from the cognitive content that 'carries' that impression" (1980, 167). Seeking a way "to distinguish affect from processing of information that does not have affective qualities" (152), Zajonc presents cognitive engagement as preceding affective responses:

> An affective reaction, such as liking, disliking, preference, evaluation, or the experience of pleasure or displeasure, is based on a prior cognitive process in which a variety of content discriminations are made and features are identified, examined for their value, and weighted for their contributions. Once this analytic task has been completed, a computation of the components can generate an overall affective judgment. . . . Objects must be cognized before they can be evaluated. (151)

Per Zajonc's review, the delineation of affect and cognition has "a psychological and a biological basis. . . . In contrast with cold cognitions, affective responses are effortless, inescapable, irrevocable, holistic, more difficult to verbalize, yet easy to communicate and to understand" (169). Humans' conveyance of emotion depends above all on "nonverbal channels," and "it is in the realm of [emotions'] nonverbal expression . . . that their basic nature is . . . revealed. The universality of [humans'] emotional expression strongly suggests our evolutionary continuity with other species" (157). While facial expressions are viewed as providing the most compelling evidence of universality (Ekman 1992a; 1992b, 172–73, 175–78), physiological responses, particularly heart rate and skin conductance, are also seen as "emotion-specific" and "universal" (1992a, 552).

As to the individuation of emotions, basic-emotion theorists support functional modularity (Zajonc 1980; Griffiths 1997). Those classed as fundamental are "separate, discrete, emotional states, such as fear, anger, and enjoyment . . . which differ not only in expression but . . . in other important aspects, such as . . . antecedent events, probable behavioural response, physiology, etc." (Ekman 1992b, 170). In a word, "Each basic emotion has distinct universal and unlearned regulatory and motivational characteristics" that "no other emotion serves" (Izard 2007, 264).

Inventories of basic emotions are generally short and often similar. Jaak Panksepp includes "seeking, rage, fear, lust, care, panic and play" (2007, 287). For Carroll Izard, the basic emotions are "interest, joy/happiness, sadness, anger, disgust, and fear" (2007, 261). Some propose extending the list; thus, having identified "anger, fear, sadness, enjoyment, disgust and surprise," Paul Ekman considers for addition "contempt, shame, guilt, and embarrassment" (1992b, 170).

Represented as "affect programs," basic emotions are treated as products of natural selection (Griffiths 1997, 12–14; Ekman 1992b, 170–71). From the standpoint of evolutionary psychology, which natural-kind theorists embrace, emotions "reflect the configuration of the past. . . . The operation of human psychological mechanisms is orchestrated by emotions that frame present circumstances in terms of the evolutionary past" (Tooby and Cosmides 1990, 419–20). So comfortably does basic-emotion theory fit under evolutionary psychology that John Tooby and Leda Cosmides, prominent evolutionary psychologists, cite it approvingly in just this way (417). Viewed in terms of natural selection, "The primary function of emotion is to mobilise the organism to deal quickly with important interpersonal encounters" (Ekman 1992b, 171). Anger, for example, has as its aim "to motivate individuals to avoid failure and pain by averting subordination under physically or socially caused harm and to gain superiority" (Stemmler 2010, 118).

Basic-emotion theorists do not merely assert strong phylogenetic continuity between us and nonhuman primates: they see fundamental emotions as products of "prototype emotional systems in all mammalian brains" (Panksepp 2007, 286). Basic emotions "derive from evolutionarily adapted neurobiological systems," being caused by dedicated patterns of brain activity, especially in subcortical regions (Izard 2007, 262, 264). This feature of basic-emotion theory is indispensable, for "if a single mechanism could subserve many different functions, or if a single function required the cooperation of a number of different mechanisms, then the characteristic [evolutionary-psychological] procedure of inferring mechanisms from functions would be undermined" (Woodward and Cowie 2004, 316). As this is precisely the view of the brain that neuroscience increasingly supports, basic-emotion theory is neuroscientifically untenable.

2.2 Dual-Process Theory

Dual-process advocates concentrate on the psychological and biological underpinnings of human morality. Notwithstanding this difference in focus, dual-process and basic-emotion theories share fundamental commitments regarding the mind and brain. The recognition by dual-process theorists that, on a broad definition of "cognitive," emotional/intuitive processes qualify as such represents an advance over basic-emotion theory. That said, they, too, view emotion/intuition and reason as operating on separate tracks. Further, embracing evolutionary psychology, dual-process theorists support both neurobiological circumscription and strong phylogenetic continuity, regarding emotion/intuition, between humans and nonhuman animals.

I concentrate here on the views of Joshua Greene and Jonathan Haidt, the core representatives of dual-process theory. Though their positions and points of emphasis differ in some respects, they are equally committed to the defining commitment of this approach: that there are two separate processes at work in moral judgment, the emotional/intuitive system being fast and automatic, the rational one deliberative and comparatively slow. Further, our emotional/intuitive system and processing should be understood as an adaptation, inherited from our primate ancestors, that remains intact (Greene et al. 2004, 389–90; Haidt 2012, 78–79, 83); rational input, in contrast, represents a separate, more recent evolutionary track and lens on moral judgment.

According to Greene, who concentrates on what he calls "moral-personal dilemmas," our emotional and rational systems are at odds, and only one can prevail. As his theory is "inspired by the trolley problem" (2016, 122), a well-known thought experiment in philosophical ethics, before exploring Greene's own theory, I briefly present this backdrop.

The trolley problem, debuted by Philippa Foot (1967), was elaborated by Judith Jarvis Thomson (1976; 1985) into a well-known juxtaposition of two scenarios. In Version 1, derived from Foot (1967, 2), without a change in course, a runaway trolley will strike and kill five people; alternatively, the trolley's conductor can shift it onto a different track, on which it will kill just one. Is it morally permissible for the conductor to make this shift? In Version 2, a spectator on a footbridge above the tracks realizes that the five deaths could be prevented if the trolley were brought to a stop by its collision with a hefty object placed directly before it. As it happens, a very large man is standing beside the spectator. Shoving him into the trolley's path will cause it to stop, killing him but saving the five. Is the spectator morally allowed to shove the man? When asked about these two dilemmas, most people deem the act proposed in Version 1 morally permissible while disallowing that featured in Version 2 (Mathews and Bok 2015, 1154).

Greene aspires to explain these divergent responses in psychological terms. Greene et al. (2001) address subjects' decision-making where they would be causes of harm either indirectly (as in Version 1 of the trolley problem) or directly (per Version 2). In their terminology, the dilemma in Version 1 is "moral-impersonal," while that in Version 2 is "moral-personal." To be classified as moral-personal, a quandary must satisfy three criteria: the act "(a) could reasonably be expected to lead to serious bodily harm (b) to a particular person or a member or members of a particular group of people (c) where this harm is not the result of deflecting an existing threat onto a different party" (Greene et al. 2001, 2107n9); Greene later condenses these three requirements into the simple sentence "ME HURT YOU" (Greene et al. 2004, 389).

Greene et al. (2001) hypothesize that "the thought of pushing someone to his death is . . . more emotionally salient than the thought of hitting a switch that will cause a trolley to produce similar consequences" and that, in this and similar cases, "it is this emotional response that accounts for people's tendency to treat these cases differently" (2106). Per their findings, "Some moral dilemmas (those relevantly similar to the footbridge dilemma) engage emotional processing to a greater extent than others (those relevantly similar to the trolley dilemma), and these differences in emotional engagement affect people's judgments" (2106).

In philosophical terms, responses of "no" to the question of whether shoving the large man off the footbridge to stop the trolley is "appropriate" manifest a deontological standpoint, which precludes using others strictly as means to one's chosen end (Greene et al. 2001; 2004). In contrast, "yes" responses—whereby reason overrides subjects' emotional aversion to being direct causes of physical harm (up to and including death)—reflect a utilitarian orientation, with the death of one rather than five presumed to maximize overall welfare (2001; 2004). Translated into psychological terms, "The central tension in ethics between deontology and consequentialism is a manifestation of the central tension in cognitive design between efficiency and flexibility. . . . The dual-process theory aims to characterize the moral-philosophical tendencies of distinct cognitive systems" (Greene 2016, 121–22).

In moral-personal dilemmas, subjects' common refusal to cause physical harm to others directly is said to stem from an automatic, emotional/affective system "inherited from our primate ancestors" (Greene et al. 2001, 2106; 2004, 398). Infrequently, subjects indicate a willingness to cause this harm to protect a larger number. According to Greene, this response is the outcome of a psychological conflict in which, via a separate process, reason overrides our deep-seated, emotional aversion to causing physical harm directly (2001, 2106; 2004, 398). The longer reaction times of subjects who deem it "appropriate" to cause such harm is taken to reflect the struggle of these two systems and their countervailing prompts (2001, 2106–2107). Results for impersonal-moral and nonmoral dilemmas did not exhibit this difference in response times for "appropriate" versus "inappropriate" (2107).

Greene anchors his explanation of subjects' differential responses to moral-personal and moral-impersonal dilemmas in evolutionary psychology (2003, 848–49; Greene et al. 2004, 389): on the one side, there are "the social-emotional responses that we've inherited from our primate ancestors (due, presumably, to some adaptive advantage they conferred)," which "undergird the absolute prohibitions that are central to deontology" (Greene et al. 2004, 398); contrasting with these is "the 'moral calculus' that defines utilitarianism [and] is made possible by more recently evolved structures in the frontal lobes that support abstract thinking and high-level cognitive control" (398).

Greene's "trolleyology" (2016, 125) hinges on reason and emotion's being tied strongly to separate areas of the brain; he likens this dual processing within the brain to the automatic and manual modes of a digital camera (120). Based on measures of brain activity via functional magnetic resonance imaging (fMRI) as subjects responded to queries involving moral-personal, moral-impersonal, and nonmoral dilemmas, Greene et al. claim that brain regions tied to emotion (e.g., the medial prefrontal cortex [mPFC]) were significantly more active when subjects handled dilemmas in the moral-personal class (2001, 2106–2107); in contrast, brain areas devoted to higher cognition, such as the dorsolateral prefrontal cortex (dlPFC), were much more active when the dilemmas facing subjects were moral-impersonal or nonmoral (2107; Drevets and Raichle 1998, 359). When, however, the moral-personal dilemmas put before subjects were challenging, beyond emotional regions, areas tied to "abstract reasoning and cognitive control" (e.g., the dlPFC) were enlisted in their resolution (Greene et al. 2004, 389). Thus, Greene et al. conclude, philosophical debate "surrounding utilitarian moral philosophy reflects an underlying tension between competing subsystems in the brain" (389).[2]

Greene takes his empirical findings to problematize deontology "as a school of normative moral thought" (2008, 36). The reason: "When we explore the psychological causes of characteristically deontological judgments," it turns out that "what deontological moral philosophy really is, what it is *essentially*, is an attempt to produce rational justifications for emotionally driven moral judgments" (39); that is to say, "What looks like moral rationalism is actually moral *rationalization*" (2016, 134). As Greene sees it, his findings warrant our embrace of consequentialism, which, unlike deontology, "is not intuition chasing. . . . Act consequentialism is WYSIWYG: What You See Is What You Get. It doesn't rely on mysterious automatic settings, and thus its soul has no secrets" (119, 138–39).[3]

For Haidt, moral intuitions are "the main cause of moral judgment" (2012, 54): "Aris[ing] . . . almost instantaneously," they are "the automatic output of an underlying, largely unconscious set of interlinked moral concepts" (xx; 2001, 825). Haidt, too, embraces evolutionary psychology, interpreting "moral" quite broadly so that it covers our continuity not merely with nonhuman primates but with mammals generally (2001, 818, 826).[4] Like Greene, Haidt contrasts our intuitive system with one devoted to reasoning: the former "is unintentional and runs automatically," while the latter, requiring "attentional resources," is "intentional and controllable" (818). The systems depend on "parallel-" and "serial processing," respectively (818); the intuitive system, unlike the rational, is universal among mammals (818).

Haidt construes "emotions" as a subcategory of "intuitions" (2012, 53, 56). For the most part, intuition presides over moral judgment, while reason steps in post hoc, to rationalize judgments reached based on visceral promptings—a state of affairs that Haidt takes to be supported by the phenomenon of "moral dumbfounding" (28–29, 54). Despite its strong deemphasis on reason, Haidt claims that his model is "more complex and comprehensive than most rationalist models," being "antirationalist . . . only in [the] sense . . . that moral reasoning is rarely the direct cause of moral judgment" (2001, 829, 815).

According to Haidt, we have "this weird mental architecture" due to our ancestors' adaptation to environmental demands (2012, 83). Far from being "a purely cerebral affair in which we weigh concerns about harm, rights, and justice," moral judgment is "a kind of rapid, automatic process more akin to the judgments animals make as they move through the world, feeling themselves drawn toward or away from various things" (72). Typically, moral judgments are made by "the elephant," which represents the intuitive system in Haidt's dual-process theory (72). From his evolutionary-psychological standpoint, "The rider (language-based reasoning) . . . evolved to serve the elephant" (54, 58).

As to emotional specificity, Haidt's six "universal moral 'taste receptors' [or 'taste buds']" are modules whose "original triggers are the set of objects for which the module was designed" (131, 144–45). Though contemporary culture affects interpretations and expressions of these modules, the modules themselves have long existed (145): they and their associated emotions arose to address "adaptive challenges" that our ancestors confronted (146–47).

Like the basic emotions discussed in Subsection 1, Haidt's modules are "innate and universal" (130). Each is an adaptive response to a particular ancestral challenge. For instance,

> The emotion of disgust evolved initially to optimize responses to the omnivore's dilemma. . . . But it's not just food that posed a threat: when early hominids came down from the trees and began living in larger groups on the ground, they greatly increased their risk of infection from each other. . . . The original adaptive challenge that drove the evolution of the Sanctity foundation [or module], therefore, was the need to avoid pathogens, parasites, and other threats that spread by physical touch or proximity. . . . If we had no sense of disgust . . . we would have no sense of the sacred. (172–74)

The module covering this terrain is termed "sanctity/degradation" (179). Separately,

> The care/harm foundation evolved in response to the adaptive challenge of caring for vulnerable children. . . . The Fairness/cheating foundation evolved in response to the adaptive challenge of reaping the rewards of cooperation without getting exploited. . . . The Loyalty/betrayal foundation evolved in response to the adaptive challenge of forming and maintaining coalitions. . . . The Authority/subversion foundation evolved in response to the adaptive challenge of forging relationships that will benefit us within social hierarchies. (178–79)

Later adding a "Liberty/oppression foundation," Haidt adjusts "the Fairness foundation to make it focus more strongly on proportionality" (215). Normatively speaking, Haidt takes his account to suggest that for the public arena, at any rate, utilitarianism is the right ethical frame (316).

Each mental module, or track, requires dedicated neural machinery, likened to "little switches in the brains of all animals. They are switched on by patterns that were important for survival in a particular ecological niche" (144). As to the identity of that machinery, while Greene favors dedicated areas of the brain, Haidt's "functional system" features "neurons, neurotransmitters, and hormones" (270).

3. The Superior Lens of Appraisal Theory

3.1 Introducing Appraisal Theory

Appraisal theorists reject core assumptions of basic-emotion theory: that (1) "a specific type of event triggers a specific affect programme corresponding to one of the basic emotions and producing characteristic expression patterns and physiological response configurations" (Scherer 2009, 3460); (2) "the affect programme is pre-programmed by evolution to deal with the eliciting event" (3460); and (3) "for each of these basic emotions affect programmes produce a prototypical reaction including a specific action tendency, physiological response pattern, motor expression and feeling state" (3461). More generally, appraisal theorists disavow the view of basic-emotion and dual-process advocates that emotion/intuition and reason operate on largely separate tracks, their operational discreteness fueled by dedicated regions or mechanisms within the brain.

The term "appraisal theory" encapsulates advocates' view that what is crucial to emotional experience is not events per se but our evaluation of them (Lazarus 1991, 353–54; Frijda and Zeelenberg 2001, 141; Kappas 2001, 157; Roseman and Smith 2001, 6–7; Scherer 1987, 14; 2009, 3461). Reflecting this emphasis on interpretation, emotion is viewed as a "proactive" process, in which "people evaluate events in terms of the perceived relevance for their current needs and goals, including considerations of their ability to cope with consequences and the compatibility of the underlying actions with social norms and self-ideals" (Ellsworth and Scherer 2002, 573, 580; Scherer 2002, 564).

Appraisal theorists support "emergentism," the idea that "the combination of appraisal elements in a recursive process is unfolding over time and that the ensuing reactions will form emergent emotions that are more than the sum of their constituents" (Scherer 2009, 3462; see further Parkinson 2001). Human emotions evince "[the] enormous variability and subtle distinctions" of which our minds are capable (Ellsworth and Scherer 2002, 573). The flexibility of an appraisal lens on emotion enables supporters to account for differences in emotional experience both across individuals and for one individual on separate occasions (Siemer et al. 2007, 598; Roseman and Smith 2001, 8; Ellsworth and

Scherer 2002, 574, 576). Translated into the terms of philosophical hermeneutics, an appraisal lens on emotion underscores the centrality of ongoing interpretation and reinterpretation to human existence.

Appraisals are "broadly speaking, *cognitive*, requiring some sort of interpretation of a situation in terms of its significance to the survival and/or well-being of me or mine. Emotional responses are evoked when the situation is cognitively appraised as one in which something is *at stake*" (Robinson 2010, 652).[5] Here, "cognition" refers to "information processing." A capacity for informational intake and processing is found in both humans and nonhuman animals. Not so beliefs and "epistemic justification," or "cognition" in the narrow sense of "reason/rationality" (Joyce 2014, 270–73; Woodward 2016, 97–98; Deigh 2010, 26–28).

Appraisal, basic-emotion, and dual-process theorists concur that the backdrop for all our mental capacities is, in some way, evolution. For appraisal theorists, however, it does not follow that human emotions are themselves adaptations (Machery and Mallon 2010, 23).[6] Correspondingly, while appraisal theorists acknowledge that "all mental events, including the psychological events we call by the names *anger*, *sadness*, and *fear* (plus a few others), are instantiated by brain states," they reject the notion that "these brain states are . . . implemented in . . . fixed, architecturally and chemically distinct circuits" (Barrett et al. 2007, 299).

3.2 Scherer's Appraisal Theory

According to Scherer, basic-emotion and dual-process theorists err in presuming that "emotion" and "cognition" operate discretely and thus can be separately addressed. As emotions "engage the entire person," the relationship of emotion and cognition should be debated "in the context of an emotion theory. . . . When emotion and cognition are considered in such a context their relationship proves much more complex" (Scherer 2009, 2459; Leventhal and Scherer 1987, 24). For Scherer, unlike basic-emotion and dual-process advocates, "*All* organismic subsystems are involved in emotion—in contrast to nonemotional states where each subsystem is focused on its particular function" (1993, 6). He thus rejects the view that the brain contains highly circumscribed "emotional" areas or mechanisms (7–8).

The components of Scherer's emotion process "can be schematized as questions individuals ask themselves about a particular stimulus, event, or situation" (Wranik and Scherer 2010, 246). As articulated by Howard Leventhal and Scherer, the five main categories in his appraisal process are these:

1. a novelty check;
2. a check for intrinsic pleasantness;
3. a check for relevance and/or conduciveness to meeting goals or plans;
4. a check for [an] ability to cope with the perceived event; and
5. a check for the compatibility of events (including actions) with self-concept and social norms, at least in the case of humans. (1987, 14)[7]

When elucidating the emotion process, Scherer speaks of "stimulus evaluation checks," rather than "appraisals," to avoid the misleading suggestion that emotion, a highly active process, is also a conscious one throughout (Leventhal and Scherer 1987, 13; Ellsworth and Scherer 2002, 582–83). Further, though "later checks seem to require the outcome of earlier ones," this applies only to "the initial evaluation of an event" (Leventhal and Scherer 1987, 14): because the evaluation process is highly recursive, closure in prior phases will often not be reached until a number of go-rounds have occurred (Scherer 2001, 93; Ellsworth and Scherer 2002, 577). Thus formulated, Scherer's model is able "to capture the complexity of emotion as a dynamic episode that involves a process of continuous change in all of its subsystems" (Grandjean and Scherer 2008, 341).

Evaluations under the first two categories, novelty and valence (or "intrinsic pleasantness"), "are likely to occur in an automatic, unconscious mode of processing, whereas later checks . . . require more extensive, effortful, and controlled processing" (Grandjean and Scherer 2008, 350). For Scherer, like other appraisal theorists, "automatic" is not interchangeable with "primitive," and "unconscious" does not mean "noncognitive" (Lazarus 1991, 152–55).[8]

The deployment of appraisal criteria in Scherer's sequence requires increasing phylogenetic and ontogenetic sophistication: "Most animals, including newborn humans" are capable of conducting the first two checks, and it may be that "these low-level processing mechanisms take precedence as part of our hardwired detection capacities and occur rapidly after a stimulus event occurs" (2009, 3463). In contrast, "More complex evaluation mechanisms are successively developed at more advanced levels of phylogenetic and ontogenetic development" (3463, 3465).

One sign of the greater sophistication of checks subsequent to novelty and valence is the larger number of subcriteria, or subqueries, associated with each. Subqueries under the third appraisal category, implications, include "*outcome probability* (How likely is it that the consequences will occur?)"; "*discrepancy from expectation* (How different is the situation from what I expected it to be?)"; "*conduciveness* (Is the event conducive or obstructive to reaching my goals?)"; and "*urgency* (How urgently do I need to react?)" (3464). Under the fourth criterion, individuals evaluate their coping potential, considering "*agent and* *intention* (Who was responsible and what was the reason?)"; "*control* (Can the event or its consequences be controlled by human agents?)"; "*power* (Do I have sufficient power to exert control if possible?)"; and "*adjustment* (If control is impossible, how well can I adjust to the consequences?)" (3465).

A further, pronounced jump in sophistication occurs with the fifth type of evaluation. Here, the focus is normative significance, "[an] overall assessment of the event with respect to compatibility with self-concept, values, social norms and moral rules" (3465). Standards are both internal and external, as individuals ask themselves, "Does the event or my behaviour correspond (i) to my self-concept or my values, is it just given my entitlement . . . and (ii) to social norms, values, beliefs about justice or moral principles?" (3465).

Most of Scherer's five criteria "can be processed at three hierarchically organized levels . . . of information processing" (Grandjean and Scherer 2008, 342; Scherer 2009, 3463): these are "(i) the sensory-motor level, on which the checking mechanisms are mostly genetically determined and the criteria consist of appropriate templates for pattern matching and similar mechanisms . . . ; (ii) the schematic level, based on social learning processes, occurring in a fairly automatic, unconscious fashion; and (iii) the conceptual level . . . requiring consciousness, involving propositional knowledge and underlying cultural meaning systems" (Scherer 2009, 3463). This trilevel structure allows Scherer's theory to "model a wide variety of different forms of emotion elicitation, ranging from extremely rapid, automatic, and unconscious processing to extensive, effortful, controlled, and conscious deliberation" (Grandjean and Scherer 2008, 342). As with movement across his five evaluative categories, this process is highly recursive: the three levels "continuously interact, producing top-down and bottom-up effects" (Scherer 2009, 3463).

Importantly, emotional processing on the sensory-motor level "is more complex than and supersedes simple, reflex-like reactions" (Leventhal and Scherer 1987, 7). Because sensory-motor processing includes "a set of innate expressive-motor programmes and cerebral activating systems which are stimulated automatically, i.e., without volitional effort, by a variety of external stimuli and by internal changes of state," it may be that emotion "occurs only when the sensory motor level by itself cannot take care of the problem and schematic or conceptual processing is required" (8, 17n1).

The second, schematic, plane

> integrates sensory-motor processes with image-like prototypes of emotional situations. Schemata are created in emotional encounters with the environment and are conceptualised as memories of emotional experiences: They are concrete representations in memory of specific perceptual, motor . . . and subjective feelings each of which were components of the reactions during specific

emotional episodes.[9] One or more schemata may form a "memory" of concrete instances that is prototypical of a class of episodes.[10] (10)

On the third, conceptual, level, "Processing activates propositionally organised memory structures which have been formed by comparisons over two or more emotional episodes. Conceptual processing is also volitional and can evoke emotions by accessing schemata. . . . A critical aspect of conceptual processing is that it nests emotional reactions within a longer term temporal context. . . . This temporal framework is typically part of a larger set of conceptual structures, such as that for the self system" (11).[11] Both this plane and the schematic one "incorporate learning into the emotional system and allow for more complex, cognitive-emotional interactions as the organism matures biologically and experientially" (8).

The appraisal process envisioned by Scherer is holistic. Such is "the interdependence of the state changes" that separation for purposes of analysis does not reflect operational discreteness (Scherer 1987, 8, 14). Further, the evaluations represented in "the sequence theory of emotional differentiation are not considered to be binary yes/no or present/absent comparators. Their operation and result is as differentiated and complex as the information processing of the respective organisms. In many cases this implies a continuous or graded appraisal on a scalar criterion and/or a multidimensional evaluation" (14).[12]

Basic-emotion theory posits "a small number of innate . . . emotions with clearly specified sets of response characteristics which are released in a unitary fashion" (42). For Scherer, in contrast, there is no definite answer to the question, How many emotions are there? Claims to provide such an answer move, illegitimately, from the presence of regularly occurring emotion-terms within and across languages to the conclusion that their referents pick out a natural kind, that is to say, "carve" emotional reality "at its joints" (Barrett 2006, 30; Griffiths 1997, 173). In other words, a given emotion term (e.g., "anger" or "fear") is not itself "an explanans" but, rather, "an explanandum" (Scherer 1987, 35).

Concerning the range of possible emotional experiences, Scherer's version of appraisal theory is unusually expansive (Roseman and Smith 2001, 13–14): there exist, in principle, as many emotions as there are distinct outcomes of appraisal processes (Scherer 1987, 42). That this is so hinges on the recursiveness of the appraisal process, which makes "the patterning of the component states . . . specific to the unique evaluation 'history' of the respective stimulus" (26).

Scherer acknowledges that there are "a certain number of very frequently occurring modal emotions" due to "constraints of social life" but rejects "the assumption of discrete emotion theory that the differentiated emotional states labeled in a highly similar fashion by most languages are produced by innate neural programs" (43). The presence of "modal emotions" reveals far less about emotion than basic-emotion theorists contend, for their existence does not answer the question of what emotions *are*: that answer must do justice to the "potentially infinite range of emotional experience" (Ellsworth and Scherer 2002, 574).

Emotions taken as fundamental by basic-emotion theorists are far from uniform. According to Scherer, anger—a fixture on their lists—"tends to be narrowly defined and poorly understood" (Wranik and Scherer 2010, 244). Not only are "concepts such as anger, hostility, aggression, and frustration . . . all used interchangeably" (244), but

> even when anger is explicitly defined, often implicit and untested assumptions are made, for example, (1) that anger is directed at another person with the intention to harm him or her, (2) that aggression and hostility are natural consequences (or sometimes precursors) of anger, and (3) that this emotion is associated with poor social integration, health, and well-being. . . . Anger does not emerge from specific situations or particular environmental or biological factors, but from the way that individuals subjectively evaluate situations or events. (244)

Because violence and aggression bear "high individual and social costs . . . the salient relationship between anger and aggression in both scientific and popular accounts is . . . not surprising. In large part, this relationship stems from biological and evolutionary approaches to anger, which argue that basic emotions are due to phylogenetically evolved, genetically encoded, and universal affect programs and that anger is inherently tied to the fight response in most animals" (249). Anger's widespread, lousy reputation has much to do with the focus of anger research on psychopathology, as "the most reliable effects of anger's influence on attention and information processing occur in anger-, hostility-, or aggression-prone individuals" (Wranik and Scherer 2010; Novaco 2010; Schultz et al. 2010, 312).

While basic-emotion theory permits "general predictions as to why anger could occur in response to stereotypical situations (e.g., threat) and what such anger expression may look like (e.g., frowning, scowling, physical aggression)," it cannot explain the distinctiveness of human anger, let alone address "individual differences in expression and behavior [or] why the same situation can lead to a large variety of different emotional feelings and reactions in different individuals on different occasions" (Wranik and Scherer 2010, 244). Scherer's framework is well suited to accommodate the highly nuanced character of human anger, which is typically nonaggressive (245; Ellsworth and Scherer 2002, 575).[13] Due to its complexity, we likely could not "detect many prototypical signs of anger expression outside a very controlled laboratory environment" (Wranik and Scherer 2010, 250).

Beyond handling the subtleties of externally directed anger, Scherer's perspective accommodates our direction of it toward ourselves, which can promote self-awareness and self-enrichment (260–61). Further, though Scherer's theory does not focus on psychopathology, "The concept of appraisal biases can help explain individual differences in anger experience," with that of "high trait anger individuals [tied to] an overactive or faulty evaluation system" (260).[14]

Because Scherer's account has phylogenetic range (1987, 47; Ellsworth and Scherer 2002, 583), while also giving significant scope to human uniqueness, it can withstand an objection from basic-emotion theorists that appraisal theory ignores links between humans and nonhuman animals. The stage is set for a measure of continuity because Scherer rejects the idea that emotions require a mental ability to form propositions, which view disallows babies and nonhuman animals from having them, and the notion that all evaluations involved in the emotion process are cognitive "in the sense of conscious, neocortical processes" (Scherer 1987, 46). Continuity between humans and nonhuman animals is limited, however, due to the

> increasing number of checks and the increased differentiation and complexity of the checks as one moves up the evolutionary ladder. . . . In humans, the most elaborate changes in the check process occur with the differentiation within each check. Development brings new goals and new possibilities for surprise [when expectations are unmet or satisfied in an unexpected way], new interests and values and new possibilities for obstruction, new coping resources and new possibilities to master or fail to master various obstructions. (Leventhal and Scherer 1987, 15–16)

Differences between us and nonhuman animals are not merely matters of degree. While nonhuman animals perform appraisals,

> at least in a rudimentary fashion . . . from its origin appraisal theory has recognized the important role of the social context of appraisal, particularly with respect to norms, values, and justice on the one hand and the self and its social identity on the other. . . . Appraisal on [Scherer's] "moral" dimension is a powerful factor in socialization and the maintenance of social order. A particularly important dimension in this respect is the evaluation of *deservedness* or *justice*. . . . Another eminently social aspect of the appraisal process is the evaluation of one's behavior with reference to the self-ideal, one's salient social identity or self-concept. (Ellsworth and Scherer 2002, 581)

Humans' ability to consciously monitor their emotion processes renders those processes accessible to "reflexion and . . . verbal description" (Scherer 1987, 35).

As a result, education, self-discipline, and metalevel questioning about values and priorities (Are these the ones that, on balance, it is best for me to espouse?) can prompt shifts in "the ease and relative frequency of use of different processing components and . . . in the degree to which different levels play the dominant role in emotional processing" (Leventhal and Scherer 1987, 21).

The view of basic-emotion and dual-process theorists that events themselves directly elicit corresponding emotions both wrongly frames our role in emotional experiences as passive and fails to address "individual and temporal variability in reaction to an event" (Roseman and Smith 2001, 4). Because emotions "are defined as complex, multicomponential, dynamic processes . . . the richness of emotion differentiation in humans is accounted for" (Grandjean and Scherer 2008, 341). In addition to covering differences among and within individuals, Scherer's version of appraisal theory can account for cross-cultural variance in emotional experiences (341).

Basic-emotion theorists object that appraisal theory focuses excessively on "cognition," taken to require conscious awareness (Ekman 1992b, 188–89). This objection does not apply to Scherer's version, which integrates the idea that facets of the appraisal process can be unconscious (Scherer 1993, 23–24; Kappas 2001, 158–59). When "cognition" is defined broadly as "information processing," "unconscious" does not equate to "noncognitive," as objectors wrongly presume.[15]

Emotion theorists have often conflated or blurred the distinction between broad and narrow meanings of "cognition" (see, e.g., Zajonc 1980; Cushman et al. 2010, 48, 61–62), fostering the misconception that theoretical and experimental results involving "cognition" all refer to the same capacity. A key strength of Scherer's appraisal model is its interweaving of "cognition" in both broad and narrow senses. According to Scherer, "The differentiation of emotion is dependent on the evaluation processes. . . . The complexity of the emotional reactions, and thus the emotional experience available to an organism, [is] bounded by the sophistication of the cognitive abilities available to the organism" (Ellsworth and Scherer 2002, 583). When "cognition" is broadly construed, the appraisal process is cognitive throughout (Wranik and Scherer 2010, 247). Evaluations are not, however, cognitive "if the term *cognitive* is taken to imply propositional representation or deliberation" (Ellsworth and Scherer 2002, 586), as occurs within the fifth appraisal category; on the third, conceptual level; and where these connect recursively with other criteria and planes. "Rational thought"—"the pinnacle of cognition"—is clearly distinguished from "information processing," or "cognition" broadly construed (Scherer 2002, 563, 565). Scherer's integration of this broad-narrow distinction in his model is crucial to its ability to capture both a measure of phylogenetic continuity and human uniqueness.

For transhumanists, cognitive bioenhancement is "an intervention that aims to . . . boost already healthily functioning information processing faculties, as opposed to more subjective facets of our psychologies, such as our emotions and dispositions" (Zohny 2015, 258). There has been a sea change in theorizing about information processing, with transhumanists' framing of cognitive enhancement reflecting the superseded assumption that "the proper objective of cognitive research was to study cold, affectless mentation. Affect [including emotion], if considered at all, was seen as a source of noise and disruption" (Forgas 2002, 597). As appraisal theory shows, efforts to forge "a clear-cut separation of our information processing faculties from the non-cognitive facets of our psychology are misguided" (Zohny 2015, 258). Transhumanists' conflation of "reason" and "cognition" haunts their view of the mind as a whole, for when "cognition" is defined as "information bearing," reason and emotion are equally cognitive. Transhumanists thus fail to appreciate what Scherer calls the changed "Zeitgeist . . . dominated by efforts to integrate rather than oppose cognition and emotion" (2002, 563).

What's more, if, regrouping, transhumanists sought to juxtapose the cognition they tether to reason against that wedded to emotion—defending the former as separable and superior—they would simply have affirmed, in different terms, their commitment to an errant frame: our mental faculties cannot be divided into discrete operational camps, objective/perspective-independent versus subjective/perspective-dependent, for we are fundamentally interpreters. This is a key insight of the Western philosophical tradition, starting with Kant, that contemporary appraisal theory in psychology is helping to give its due.

Though, unlike transhumanists and basic-emotion theorists, dual-process advocates recognize that emotion/intuition is "cognitive" in the sense of "information processing," they nonetheless view emotion/intuition and reason as involving largely separate processes; indeed, this conviction is what gives "dual-process theory" its name. Unlike basic-emotion theory, dual-process accounts, and transhumanism, Scherer's appraisal theory meshes with a more general tendency in recent philosophical and psychological discussions, taken together, to reject a traditional reason-emotion binary, at whose heart is tone-deafness to the richness of human emotion.[16] Further, his account fits with mounting evidence of the complexity of the human brain.

4. The Wider Resonance of Scherer's Theory

A salient insight of recent discussions is that many emotions are unique to human beings (Ben-Ze'ev 2010, 60); examples are humility, arrogance, and

Schadenfreude. Second, even staples on lists of basic emotions, including anger, that "appear to be common to humans and animals . . . are quite different in the two cases" (Ben-Ze'ev 2010, 60).[17] Reflecting this appreciation, recent accounts of human anger stress the need to distinguish among anger, hostility, aggression, rage, and irritation, and, within anger itself, between "state" and "trait" varieties (Novaco 2010; Spielberger and Reheiser 2010; Hess 2014, 55–56).

A third insight of recent literature is that the distinction between "positive" and "negative" emotions, whatever binary it stems from—"pleasurable-painful," "approach-withdrawal," or "benefit-harm"—is highly problematic. Emotions do not divide into positive and negative qua pleasurable and painful in a reliable or illuminating way (Solomon and Stone 2002, 425). For instance, anger, a "negative" emotion, is not rightly tethered to the latter prong of the binary "pleasurable-painful." For anger "can be very pleasurable, especially if it is righteous. Anger can be very painful, if it concerns an offense from a loved one. Anger can be very fulfilling on the one hand and nevertheless very painful at the same time, such as when one is winning a heated argument with a spouse or a friend" (Solomon and Stone 2002, 425). In addition, love, a "positive" emotion, "is among the most pleasant of emotions but it can also be the most painful" (425). As Robert Solomon and Lori Stone conclude, "It is an essential datum in the study of emotions, this phenomenon of 'mixed feelings,' but this does not just mean one emotion coupled with another" (425).

The assumption that "positive" and "negative" emotions can be parsed strictly in terms of "approach" and "withdrawal" motivations, respectively, is also untenable (Harmon-Jones et al. 2010). In the case of many emotions, there is no "simple behavioral measure" (Solomon and Stone 2002, 425). Love, for instance, "does not always lead to approach; indeed, when combined with shyness or insecurity love may be the explanation for avoidance" (425). On the flip side, "Hatred does not straightforwardly suggest either approach or avoidance, although it does strongly suggest confrontation and 'not letting the other out of one's sight' " (425). Further, how individuals behave when angry "depends heavily on the context, on the size and status of one's opponent, on the probable consequences, on the audience, on one's ideology and beliefs about anger and [the] offense and what (if anything) is to be done about it" (426). If anything, anger, routinely dubbed a negative emotion, is more properly linked to approach motivation (Carver and Harmon-Jones 2009; Lewis 2010). Similarly regarding fear, a negative emotion long tethered to withdrawal, "It is context that determines whether or not and in what way flight is possible. Fear can also cause paralysis . . . and fear can lead to aggression" (Solomon and Stone 2002, 426).

Finally, the binary "benefit-harm"—which underpins transhumanists' repudiation of negative affect—is increasingly rejected. As Ishtiyaque Haji observes, both "positive" and "negative" emotions are key to individuals' salutary acquisition of morality: "Fear and empathy are different (negative and positive) emotions that together play a necessary role in the capacity for anticipatory guilt and regret. . . . Guilt plays a vital, instrumental role in acquiring and internalizing moral norms. Moral norms, in turn, are crucial to ethical perception: one cannot have *ethical* perceptions if these perceptions are not, even in part, shaped or influenced by one's having moral norms that one brings to bear in perceiving the world" (2010, 141–42). The same applies to our being moral people once ontogeny is complete:

> What inspires fear for oneself are the events that inspire fear for others when they threaten others, and pity or compassion when others have been harmed. Thus, if you accept that pity or compassion comes with altruistic motivations, you must also accept that fear for others involves altruistic motivations. . . . Fear need not come with ill-adapted and rigid behavioural dispositions or with egoistic motivations. . . . The thesis of motivational modularity . . . [is] wrong at least in the case of human fear. . . . The relation of fear to action and motivation is complex. Insofar as emotions are perceptions of values, they can inform us about our practical reasons, such as the fearsome. (Tappolet 2010, 343)

The tethering of "negative" to "harmful," or "unsalutary," has been hardest to break for anger, which transhumanists link closely, and even conflate, with aggressiveness and criminality (Savulescu 2005; Savulescu and Kahane 2009).[18] Here, they manifest a wider tendency to pathologize anger as such—despite the fact that "anger experiences may have only a low correlation with overt aggression" (Novaco 2010; Tavris 1989; Berkowitz 2010, 268).

Though many, transhumanists included, deem anger the poster child for negative, qua destructive, emotion, this view is unjustified. As Raymond Novaco's extensive catalog makes clear, human anger has a wide functional range:

> It *energizes* behavior as a high arousal state, increasing the amplitude of responding and serving to override inhibition; it *focuses* attention on situational elements having threat significance; it *expresses* or communicates negative sentiment, to convey displeasure and to prompt conflict resolution; it *defends* the self by social distancing and fear suppression, and it also defends self-worth by externalizing attributions of blame for misfortune; it *potentiates* a sense of personal control or empowerment, among social groups as well as individuals; it *instigates* aggressive behavior due to its survival relevance, symbolic linkages, and learned connections; it *signals* information about personal state and situational significance, which is relevant to self-monitoring; and it *dramatizes* a social role enactment, in the sense of anger expression as dramaturgy played out in accord with social scripts or social rules. (2010, 466–67)

Further, no less than "positive" emotions, such as compassion and empathy, anger can "signal" to others what sort of person one is, reveal that to oneself, and help to enrich one's self-conception (Parrott 2014, 279; Tamir and Bigman 2014, 211; Litvak et al. 2010, 288).

Those who adopt a nuanced perspective on human anger account for its dysregulation under this broader umbrella rather than, like transhumanists, seeing anger per se as dysfunctional. As Novaco observes, "Given the functionality of anger, what demarcate anger dysregulation are the parameters of frequency, reactivity, intensity, duration, and mode of expression. . . . [Those with trait anger] are reluctant to surrender the anger-aggression system that they have found useful to engage, partly because they discount the costs of its engagement" (2010, 467–68). The above points regarding our emotional complexity are made by Scherer himself or fit comfortably under his theory.

As for the relation of emotion and reason, James Woodward defends an "integrative nondichotomy" position against a traditional "rationalist dichotomy," which "assumes a sharp dividing line between human 'cognitive' (rational, conceptual) capacities and capacities labeled 'emotional' or affective and valorizes the former at the expense of the latter" (2016, 87; see also Kennett and Gerrans 2016). The longstanding question of whether emotion is good or bad for decision-making, moral or otherwise, is premised on the misguided notion that it could occur without emotional processing (Woodward 2016, 89–90). Further, the complexity of emotional experiences in a rich human existence (e.g., our capacity for ambivalence) has much to do with the entwining of reason and emotion in those experiences (Helion and Pizarro 2015; Lindquist and Barrett 2008, 519, 525; Cunningham et al. 2004, 1725–26). Not only are human emotional experiences themselves complex, but they are likely "the most complex mental phenomena," for in this "mode" alone are "all (or almost all) the constitutive capacities of [our] other modes . . . also part of its own constitutive capacities" (Ben-Ze'ev 2010, 41, 60). Scherer's rejection of a reason-emotion binary, manifest, for example, in his handling of ambivalence (Moors et al. 2013, 123), is in sync with these observations; so, too, is his incorporation of manifold faculties, reason among them, in the emotion process itself.

Further, Scherer's appraisal theory fits much better with mounting evidence of the brain's complexity than do basic-emotion and dual-process theories, which, like transhumanism, treat our mental capacities as discretely lodged within the brain. A commitment to functional discreteness, the view that "brain areas are highly selective and exhibit considerable specialization," has "permeated brain science . . . often in an implicit fashion" (Anderson and Pessoa 2011, 2421; Pessoa 2008, 156). It turns out, however, that individual regions of the brain, large and small, are "pluripotent," meaning that "they can perform multiple roles and be involved in a variety of different processes" (Anderson 2010, 246; Klein 2011, 146). Further, many mental tasks involve numerous areas (Woodward and Cowie 2004, 325; Pessoa 2008, 154–55).[19]

A "simplistic understanding of how the brain works, with the limbic system functionally specializing in processing emotion and the cerebral cortex dedicated to cognitive capacities," is rapidly being supplanted (Zohny 2015, 261): "Even regions that were once thought to be purely affective in their specialization . . . appear to function more as connectivity hubs, integrating information from all over the brain rather than merely processing emotion. . . . Likewise, brain regions commonly viewed as purely cognitive areas . . . also appear to play more integrative roles rather than being specialized in cognition" (261).

Areas supposedly dedicated to " 'emotional' processing" include the ventromedial prefrontal cortex (vmPFC)/orbital frontal cortex, anterior cingulate cortex, insula, amygdala, and ventral striatum (Woodward 2016, 88). Contra evolutionary psychologists, these brain structures "have *not* been retained in relatively unmodified form from our nonhuman ancestors. Instead, they have continued to change under the distinctive selection pressures to which human beings have been exposed, and as a consequence are importantly different, both anatomically and functionally, from homologous structures in nonhuman primates" (89).[20]

The point here is not that regions deemed emotional are actually uninvolved in emotion but rather that they are incorrectly portrayed as "emotional areas." In what follows, I illustrate this idea via the amygdala, insula, and vmPFC.

Long viewed as the neuroanatomical locus of emotion, this status of the so-called limbic system is increasingly rejected. As each portion "is itself a complex area that is involved in numerous functions," the umbrella phrase "the limbic system" turns out to be a misnomer (Pessoa 2008, 148–49). Within this "system," the amygdala has, stereotypically, been given pride of place, particularly concerning fear, but its involvement in mental activity well surpasses this restrictive formulation (Crawford 2010, 358; Ochsner and Schacter 2002, 651; Pessoa 2008, 149). From this "broader and more flexible perspective," functions of the amygdala include, as well, "classically 'cognitive' processes" such as "attentional modulation" and "associative learning" (Pessoa and Adolphs 2010, 781; Klein 2011, 152; Pessoa 2008, 149).

Brain areas with numerous ties to others are identified as either "provincial" or "connector" hubs (van den Heuvel and Sporns 2013, 685; Pessoa 2008, 154–55); hubs of the latter type "link separate region clusters" (Pessoa 2008, 154). One such hub, the amygdala, belongs to "a 'core brain circuit' that is topologically central in terms of global brain connectivity and whose functions could include aggregation and distribution of information" (Pessoa and Adolphs 2010, 780). The amygdala "has a mostly modulatory role . . . [that] corresponds to broader and more abstract dimensions of information processing, including processing of salience, significance, ambiguity, [and] unpredictability" (780). All in all, the amygdala is no less poised to "integrate and distribute information" than are certain portions of the prefrontal cortex (PFC; Pessoa 2008, 151). Given the scope of its roles and connectivity, some reject the very "concept of *the 'amygdala'*" (Holland and Gallagher 1999, 72; emphasis added).

Traditionally depicted as "paralimbic," the insular cortex is expectedly active "in response to moral scenarios that evoke disgust, just because the insula seems to be especially sensitive to these sorts of stimuli" (Uddin et al. 2017, 300; Klein 2011, 151). Far from being devoted to their detection, however, the human insula "is involved in (it has been co-opted or reused for) a wide variety of other tasks, including empathetic identification, decisions regarding charitable donations, affective response to pain in self and in others, reactions to perceived unfairness in economic interactions, and assessments of risk" (Woodward 2016, 89). In their survey of its functions, Uddin et al. tie insular activity to "sensorimotor processing"—both "visceral information processing . . . [and] interoception, i.e., the sense of the physiologic condition of the body"—"socioemotional processing," and traditionally cognitive operations, including not only "attention and salience processing" but also speech (2017, 302–304).

Finally, portions of the PFC often dubbed emotional, central among them the vmPFC, turn out to be areas of "functional integration" between emotion and cognition (Pessoa 2008, 151). The view of many, including Greene, that the vmPFC is an "emotional region" owes much to Antonio Damasio, whose study of those with vmPFC damage from disease or injury led him to conclude that they can "know but not . . . feel" and that "reduced emotion and feeling" figures substantially in their highly impaired decision-making and relationships in "real life" (1994 [2005], 45, 49). More specifically, the "incapacities" of these patients are thought to include "choices that are highly imprudent, failure to learn from mistakes, problems in emotional regulation, and failure to conform to ordinary norms of social behavior" (Woodward 2016, 96).

As Damasio's own findings show, however, the vmPFC is unlikely to be an emotional area per se. That, beyond a marked dampening of feeling and emotion, those with vmPFC damage "are also profoundly impaired when it comes to planning and executing actions . . . suggests that the vmPFC is also essential to successful cognition and deliberation" (Klein 2011, 149). In "neurotypical" individuals, the mPFC more generally is implicated in "a wide variety of self-reflective cognitive functions, not just emotional ones" (150). What's more, "Insofar as the mPFC is associated with emotional processing, it can be associated with complex and subtle higher-order emotional processing: that is, [with] forming appraisals and beliefs about emotions, not just . . . feeling them" (150).

Turning to the contention that there are "cognitive areas," let us first observe that information-receipt, -processing, and -transmission happen brain-wide;

hence, while information-related activity in individual regions can be identified, no area is accurately singled out from the rest as an "information-processing region." Brain areas involved in "emotional processing . . . are doing 'cognitive' processing simply in virtue of doing information processing" (Woodward 2016, 114n9). Here, "cognitive" is "*defined* in such a way that it no longer contrasts with emotion and indeed so that pretty much anything the brain does is 'cognitive' " (114–15n9). Not only does Scherer's broad construction of "cognition" mesh with this insight, but he remarks on the folly of trying to determine what areas are emotional versus cognitive (Leventhal and Scherer 1987, 24).

When investigators claim that there are separate "emotional" and "cognitive" regions of the brain, "cognitive" often means "rational." Though they are not emotional areas per se, areas of the PFC, including the vmPFC, are involved in emotional experiences.[21] Despite this, theorists frequently treat the PFC as a cognitive region (Spocter et al. 2012, 2925; Pessoa 2008, 150). This view has become untenable (Barrett et al. 2007, 302–303; Pessoa 2008, 150–51): not the province of reason per se, the PFC "is critical to motivation, emotion, and higher cognitive functioning" (Perlstein et al. 2002, 1736). The upshot is that reason is not isolable in the brain.

Since, within the PFC, the dorsolateral region is routinely singled out as "a purely cognitive area" (Pessoa 2008, 150), I will illustrate the above insight with reference to it. The dlPFC has been tied particularly to "executive functions" such as working memory (Goldstein et al. 2007, 1034). Classifying the dlPFC as a cognitive (i.e., rational) region, Greene et al. take greater activity there when subjects resolve moral dilemmas on impersonal grounds to support dual-process theory (2004, 391).

There is mounting evidence that the dlPFC is not properly viewed as a "rational" area (Klein 2011, 150–51). Unlike "functional *localization*," which "relies on the logic of subtraction analysis," "functional *integration*" centrally involves "modulation and context-sensitive changes in effective connectivity" (Goldstein et al. 2007, 1035; Friston 1998, 799). Not a rational area per se, the dlPFC is instead a region of functional integration between reason and emotion. Perlstein et al., for example, found that activity in the dlPFC of subjects performing working-memory tasks involving pictures "was modulated by the intrinsic emotional valence of the [material] even when subjects were not requested explicitly to maintain valence information during the delay period" (2002, 1739–40). Their results "clearly highlight the role of affect in PFC functioning and suggest a conceptualization of the dlPFC and its involvement in [working memory] that takes into consideration motivational parameters" (1741). More generally, the findings of Perlstein et al. "point to a modulatory role in cognition of emotion or motivational factors and . . . suggest that the reciprocal relationship may map more onto defining emotional valance . . . than onto an emotion-cognition dichotomy"

(1740). Having manipulated both cognitive and emotional factors, Gray et al. also support the functional interweaving of emotion and higher cognition in the lateral PFC (2002, 4118). According to Jeremy Gray, "Emotional states and higher cognition are truly integrated. At some point of processing, functional specialization is lost, and emotion and cognition conjointly and equally contribute to the control of thought and behavior" (2004, 48).

Returning to Greene's moral dilemmas, if the dlPFC "plays an adjudicatory role, then dlPFC activation is only evidence for the dual track thesis if it reliably signals a conflict between emotion and cognition" (Klein 2011, 150). This is not the case: Activity in the dlPFC

> is seen when the conflict is between *entirely* emotional or *entirely* cognitive considerations. . . . So while dlPFC activation may indicate a conflict to be resolved, it does not indicate the *nature* of that conflict. . . . It is possible, for example, that the conflict in personal moral dilemmas is nothing more than a conflict between two distinct rules ("Don't put people in danger" versus "Save many even at the cost of a few") that are themselves the product of a unified system. (150–51)

It turns out that no brain area mentioned by Greene is "specific to either emotion or cognition [i.e., reason]" (Klein 2011, 152): not only is "every area of the brain . . . modulated by [one's] emotional state, but every area . . . can be affected by classically 'cognitive' processes" (152). In short, recent findings strongly support "a more nuanced view [of the brain] in which emotion and cognitive control are integrated, at times working in harmony" (Gray 2004, 46).

What's more, the notion of Greene and Haidt that two separate systems, emotional/intuitive and rational, are involved in moral judgment is undermined by evidence of "a single, unified network that is involved in prospective social cognition" (Klein 2011, 156; see further Bzdok et al. 2015). Contra natural-kind theorists, for whom every basic emotion has a distinctive "neural signature," on the present approach to networks, each has a range of roles united under an expansive functional head (van den Heuvel and Sporns 2013). The methodology that supports the existence of complex functional networks "takes activation across a *distinct* set of contexts, and presents a theory that provides the best explanation of that activation across all contexts" (Klein 2011, 154). This is more tenable than the method of "reverse inference," which "takes activation in a *single* experimental context, and uses it (illegitimately) as an indicator for the presence of a particular cognitive operation" (154).

I illustrate the idea of complex functional networks via humans' ability to redirect their vantage point "from the immediate present to alternative perspectives" (Buckner and Carroll 2007, 49). This capacity, termed "self-projection," has manifold functions and "underlies the flexibility of human cognition and behavior; it equips us with abilities to make social inferences and anticipate the beliefs and actions of others" (49). Studies that directly contrast future- and past-directed thought buttress the view that "multiple forms of self-projection depend on a shared brain network" (53). Specifically, this network "supports diverse forms of self-projection, which include thinking about the future (prospection), remembering the past, conceiving the viewpoint of others (theory of mind) and navigation" (49). Contra theorists' usual demarcation of past- from future-directed thought, on this network approach, both belong to a "class of function that enables flexible forms of self-projection" (55). Further, a reason-affect binary is inapplicable to one's consideration of these abilities, as prospection, for instance, "can involve conceptual content and affective states" (49).[22]

The above functions "share similar reliance on internal modes of cognition and on brain systems that enable perception of alternative vantage points" (55). Our ability to engage in perspective-taking is embedded in the temporality of human existence: "At its core, this network enables mental exploration of alternative perspectives based on our past experiences" (49). In a word, "We remember the past to envision the future" (55). On the level of the brain, the network involves systems in the frontal and medial areas of the temporal and parietal lobes that have wrongly been seen as devoted to planning and episodic memory (49).

Schacter et al. agree: that "the process of imagining or simulating future events depends on many of the same neural processes that are involved in episodic remembering . . . receives general support from findings of neural and cognitive overlap between thoughts of past and future events" (2007, 559–60). Moreover, "Future thinking . . . is just one of several forms of such ability. Thinking about the perspectives of others . . . also appears to use the core brain system, as do certain forms of navigation" (660).[23] This self-projection network, which "increasing evidence . . . supports" (Klein 2011, 155), is not believed to function identically across its operations. Rather, "Different self-projection tasks also differentially engage parts of the common network. . . . Differential activation across subtasks is not . . . evidence for multiple distinct processes: instead, it shows only that different kinds of self-projection require more or less engagement of core resources" (155).

Putting an investigative spotlight on individual areas of the brain encourages one to tether them to specific roles. Again, the point is not that individual areas cannot be linked at all with particular roles, but that interpretations of these ties have often been too narrow. Approaching specific regions from the standpoint of networks, broadly construed, permits one to reach more defensible conclusions about the functionality of those areas. Illustrating this point via the self-projection network, St. Jacques et al. found that "temporal self-projection into the personal past recruited greater ventral mPFC, whereas mental self-projection into another person's perspective recruited greater dorsal mPFC," and that "activity in ventral versus dorsal mPFC was sensitive to parametric modulation on each trial by the ability to relive the personal past or to understand another's perspective" (2011, 1281). This distinction in roles of the vmPFC and dlPFC based on the type of self-projection involved undermines Greene's designation of them as emotional and rational areas, respectively, by cutting across it (1283).

The brain's tremendous complexity also undercuts a frequent assumption by defenders of functional compartmentalization that findings for diseased or otherwise damaged brains (e.g., psychopathy, Phineas Gage) apply equally to neurotypical individuals, as when lesion studies are adduced to support the view that "characteristically deontological judgments are . . . driven by intuitive emotional responses that depend on the vmPFC, while characteristically consequentialist judgments are supported by controlled cognitive processes based in the dlPFC" (Cushman et al. 2010, 54).[24]

Those who would grasp how the brain normally functions should use findings for abnormal brains with great caution (Mathews and Bok 2015, 1159; Woodward and Cowie 2004, 326). A salient reason is that "in the event of a brain injury, other areas of the brain can take over a function previously supported by an injured area, thus compensating for the loss" (Mathews and Bok 2015, 1159). Humans' neural plasticity is extensive, as illustrated by the shifting of language function to the right hemisphere when tumors impair that functionality and by the fact that, following strokes, "Motor tasks or somatosensory stimulation recruit large brain areas extending outside the normal activation patterns" (Murphy and Corbett 2009; Thiel et al. 2006; Roiha et al. 2011, 339). Reorganization within particular areas also occurs (Kantak et al. 2012).

Scherer's appraisal theory, unlike basic-emotion and dual-process approaches, is not jeopardized by the extensive support that now exists for the great complexity of the human mind and brain. The notion of our mental and neurobiological compartmentalization that natural-kind and dual-process theorists espouse and that science increasingly gainsays is the same basic lens on the mind and brain that transhumanists embrace.[25] Far from being "rationally" grounded, then, transhumanists' conviction that discrete capacities could be targeted for augmentation or elimination, as the case may be, rests on a deeply problematic vision.

5. Aristotle's Lens on the Mind

The stance that contemporary science has defeated rationalism warrants refinement (Kennett and Gerrans 2016). As we will see, Aristotle's version of rational essentialism is philosophically superior to transhumanists' picture and meshes better with current scientific findings. Philosophically, his rational essentialism is preferable because it reserves a necessary place for nonrational faculties and psychic harmony. As Jonathan Jacobs observes, "The plausibility of the Aristotelian view rests, in part, on the complexity it acknowledges in the ways that states of character have multiple, interrelated aspects operating integratively" (2017, 134). Scientifically, not only is Aristotle a harbinger of appraisal theory,[26] but his lens on emotion shares important features with Scherer's approach. Beyond this, Aristotle's view of the mind is far more compatible than transhumanists' with increasing evidence of the brain's complexity. In this and the following section, respectively, I unpack Aristotle's ideas and explore their relationship to current science.

5.1 Grounding Aristotle's Approach to Nonrational Faculties

In *De Anima* (II 1–2), Aristotle (1956) distinguishes living from nonliving entities based on the former's possession of soul (*psuchē*; in discussing Aristotle's view, I use "soul" and "mind" interchangeably). Further, he divides living things into basic types due to the kind of soul each has. The psychic capacities (*dunameis*) that Aristotle identifies (II 2–3) are (1) a nutritive ability that enables growth and reproduction; (2) sense-perception; (3) desire; (4) locomotion; and (5) rationality. Because Aristotle is a monist, "psychic" should not be construed disjunctively with "physical," or "biological." He separates soul and body for analytic purposes, but in terms of beings' actual existence, "We can dismiss as unnecessary the question whether the soul and the body are one: it is as though we were to ask whether the wax and its shape are one" (*De Anima* [hereafter, *DA*] 412b6–7).[27]

Possession of (1) distinguishes plants from natural, inanimate entities (e.g., fire), while (2)–(4) differentiate nonhuman animals from plants. As *De Anima* (II 3) makes clear, psychic capacities are hierarchically arranged such that living things on higher tiers possess not merely their type's distinctive feature(s) but also any that belong to entities lower down. Thus, humans' distinctive capacity (*dunamis*; aka *ergon*, or function) is rationality (II 3; *Nicomachean Ethics* [hereafter, *EN*] I 7), but we also have abilities (1)–(4). This framework anchors Aristotle's handling of what we now call phylogenetic continuity, on the one side, and human uniqueness, on the other.

Early in the *Nicomachean Ethics*, Aristotle states that he will address the soul with human flourishing (*eudaimonia*) in view (1102a23–24). In keeping with this focus, the treatise attends substantially to the nonrational, specifically, emotion and desire. Though not intrinsically rational, emotion and desire (unlike the nutritive capacity of all living things) are amenable to rational governance such that, in a morally virtuous person, "Everything is in harmony with reason" (1102b28–31).[28]

For rational essentialists, reason can be dominant in ways that do or do not require harmony with what is other than it. The concept of harmony is inapplicable when rational governance involves the relentless, full subordination of the nonrational; this view is a fixture of transhumanist thought. Aristotle's picture of admirable conduct and motivation, in contrast, requires harmony between reason and the nonrational (*EN* 1119b15–16). While both Aristotle (III 8, 12) and transhumanists recognize that faculties besides reason are inadequate guides to action on their own, only Aristotle sees that other faculties can, nonetheless, be necessary to our flourishing.

5.2 Desire and Emotion United as *Pathē*

Pathē (singular, *pathos*) is Aristotle's collective term for what falls under the heads of emotion and desire, the latter being his counterpart to "motivation" in current scientific parlance (Ben-Ze'ev 2010, 47). Under *pathē*, Aristotle lodges appetitive desire, fear, anger, affection, longing, and pity, "and in general anything that is followed by pleasure or pain" (*EN* 1105b21–23). Together with capacities and characteristics, *pathē* comprise what exists in the soul (1105b20).

Aristotle, like transhumanists, aggregates what is other than reason proper under a single head. *Pace* transhumanists, this move does not commit one to a sharp devaluing of the nonrational that squeezes out the very notion of psychic balance. For Aristotle, deeming an aspect of us nonrational does not itself signify that the item thus labeled has nothing potentially fruitful to do with reason itself. In the case of *pathē*, "nonrational" picks out what is not intrinsically rational yet able to coordinate and collaborate with reason. Though not rational in their own right, *pathē* "belong to humans no less than reason does" (1111b1).[29]

5.3 Aristotle's Doctrine of the Mean and Idea of Psychic Balance

Aristotle's Doctrine of the Mean offers valuable guidance on how to differentiate among aspects and expressions of the human psyche in degree and kind. From start to finish (I 6, 13, II 1–3, X 9), Aristotle's concern in the *Nicomachean Ethics* is not the sheer subordination, let alone extirpation, of our capabilities besides reason proper but attaining balance among them—crucially including harmony of aims.

Aristotle's view of *pathē* in relation to reason is elaborated through the Doctrine of the Mean, according to which "we can experience fear, confidence, desire, anger, pity, and generally any kind of pleasure and pain either too much or too little, and in either case not properly. But to experience all this at the right time, toward the right objects, toward the right people, for the right reason, and in the right manner—that is the mean and the best course, the one that is a mark of virtue" (1106b18–23). Crucially, the mean comprising virtue "involves both *pathē* and actions" (b24–25).

Because the moral mean is categorically different from the cut-and-dried arithmetical variety, ascertaining what conduct expresses that mean cannot be routinized but instead often requires fine-grained contextualization (II 6; see also I 6, II 2–3, 5, 9). Features of particular situations both influence whether one responds and help to calibrate one's engagement under the pertinent head (e.g., anger, fear); where engagement is called for, the issue is not simply what responses are morally permissible but what ones may be morally required.

For transhumanists, the preeminent rational preference involving the psychic domain just is for greater rational capacity. From Aristotle's standpoint, in contrast, this preference is not rational because, if acted upon, it would throw off a delicate and important balance among multiple facets of who we are. According to Bostrom, Aristotle's rational essentialism "is plainly not a promising objection to [his transhumanist vision] since it would be perfectly possible for a posthuman to realize a telos of rationality as well as a human being could. In fact, if what is good for us is to develop and exercise our rational nature, this implies that it would be good for us to become posthumans with appropriately enhanced cognitive capacities" (2008, 130). Bostrom's confidence is misplaced because, for Aristotle, augmented rational ability is not a goal in its own right. Instead, our rational ability is meaningful and salutary only when actualized and instantiated in light of a rich, articulated notion of flourishing that is the ultimate telos, or "that for the sake of which" (*hou heneka*), of everything we humans do. Contra transhumanists, our rational capacity is untethered and potentially dangerous absent such a conception. Far from offering one, transhumanists treat its omission as a methodological strength (Savulescu and Kahane 2011; Schaefer et al. 2014).

Further, rather than speaking of "rationality" simpliciter, as is transhumanists' wont, Aristotle identifies and interrelates contemplative, or theoretical, and practical varieties. Why might this matter? Transhumanist Savulescu ties "rationality" to "our capacity to make normative judgements" (2005, 38), but our exploration of Aristotle suggests that what transhumanists envision under cognitive bioenhancement would minimize and perhaps eliminate our ability to make those judgments. Moral expertise requires exemplary attainment in both types of reason: not only is there "no practical rationality [i.e., *phronēsis*] . . . without the virtues of character," but both are entwined with virtuous agents' contemplative grasp of human flourishing and of specific, exemplary characteristics, such as courage and self-control (MacIntyre 1988, 136; Sorabji 1980, 205, 207; *EN* 1151a16–17).[30]

Such overlap as exists between portrayals of reason by Aristotle and transhumanists is quite generic, with differences being decisive. To illustrate: adeptness in stepwise reasoning is important for both (*EN* VI 7; Schaefer et al. 2014), but only Aristotle gleans that this facility is not worthwhile in a vacuum but instead proves its mettle in applications that call for marked contextual attunement. Further, reason, whether theoretical or practical, is insufficient to produce activity; for this, desire—a nonrational faculty—is always required (*DA* 433a22–24; *EN* 1139a35–36, b3–5). Aristotle disavows Socrates's view that knowing virtues by definition suffices for virtue itself (*EN* VI 13, VII 2). While Aristotle would agree that self-control, for instance, "depends on reasoning abilities and therefore cognitive capacity" (Pömsl and Friedrich 2017, 249), having the virtue of self-control (*sōphrosunē*)—along with every other excellence, intellectual or moral—depends also on one's *desiring* (i.e., being motivated) to act as virtue requires.

Aristotle's Doctrine of the Mean is a powerful, enduring illustration of the view that balance, or harmony, exists only in relationships where all salient dimensions are suitably aligned. In contrast, transhumanists would sever reason from other aspects of our mental functioning, lest they taint the superior factor, and have us extirpate at minimum the capacity for "negative" affect. Aristotle's handling of anger illustrates what an embrace of transhumanism stands to jeopardize in this regard.

5.4 Strong Emotional Responses Can Be Morally Required

For Aristotle, "our condition in relation to anger" is not "bad" simply because the anger is strong (*EN* 1105b26–27). Rather, we err "if our anger is either too violent or not violent enough. . . . A man does not receive praise for being frightened or angry, nor blame for being angry pure and simple, but for being angry in a certain way" (1105b27–1106a1). To be clear: getting angry is not an accomplishment (1106a2–3; 1109a26–27); further, the trait of proneness to anger (*orgilotēs*) is a vice (IV 5). But expressing anger "to the right person, to the right extent, at the right time, for the right reason, and in the right way is no longer something easy. . . . It is for this reason that good conduct is rare, praiseworthy, and noble" (1109a28–30).[31]

Furthermore, "In some cases we must (*dei*) be angry" (1111a30–31). "Not being driven by emotion" (1125b34–35) thus does not mean avoiding strong emotional responses simply because, for instance, those not well poised to judge might condemn them as excessive. Quite the opposite, as not just excess but "deficiency . . . receives blame. For those who do not show anger at things that ought to arouse anger are regarded as fools; so, too, if they do not show anger in the right way, at the right time, or toward the right person" (1126a3–6). On J. O. Urmson's useful elucidation of Aristotle's view, one

> whose character is such that he feels only mild annoyance at a trivial slight and is enraged by torture has a character that is in a mean between one that exhibits rage on trivial as well as important occasions and one that can coolly contemplate the greatest outrages. . . . To diverge from the mean in the direction of deficiency is as much not to experience and exhibit emotions at all when one should, or not about matters about which one should, or not toward people toward whom one should as it is to exhibit the emotions to the wrong degree. (1980, 161)

Aristotle's distinction between the experience and expression of anger, on the one side, and the characteristic of proneness to anger, on the other—whose counterpart today is the delineation of state- from trait anger—is also key. Three distinct dispositions can result from how anger is habitually expressed during moral development: gentleness, short-temperedness, and apathy (*EN* IV 5). The first of these is the virtue, while the other two constitute extremes of excess and deficiency, respectively. One may be surprised to learn that, regarding the *pathos* of anger, one who is excellently disposed has the virtue of gentleness. One with this virtue not only does but should become angry when that response is context-befitting: "A man is praised for being angry under the right circumstances and with the right people, and also in the right manner, at the right time, and for the right length of time. He is properly called 'gentle' since 'gentleness' is used as a term of praise. For being gentle means to be unruffled and not to be driven by emotion, but to be angry only under such circumstances and for as long a time as reason may bid" (*EN* 1125b31–1126a1). This account applies irrespective of the intensity of anger that is suitably calibrated to a given situation.

As anger arises particularly concerning what we deem to matter most (*Rhetoric* II 2 [Aristotle 1959]), when and how we get angry says a lot about what we value and prioritize; thus, both anger and its absence can be revelatory. Bracketing here the practicability of what transhumanists propose, reference to Aristotle helps us to see that going full steam ahead with cognitive bioenhancement, in tandem with extirpating "negative" emotion, would eliminate from the psychic repertoire of our successors the very capacity for powerful, justified anger at injustices, for whose experience the mere awareness that injustice exists is insufficient (*EN* 1135b28–29). Further, we stand to jeopardize the possibility of deep friendship, where the parties "become better people as they are active together and correct one another," for strong anger can be not only permitted but downright called for by the nature of that tie (*EN* 1172a11–12, cf. 1159b6–7).

5.5 The Import of Desire, Pleasure, and Pain

Aristotle foregrounds the necessity of desire, or motivation, in all human endeavors. He also stresses the essential, complex entwining of pleasure and pain in moral education, and their role in assessments of agents' character and actions' moral worth. As such, his account of the mind brings out how misguided we would be to set our sights on doing away with the so-called negative prong of the "pleasurable-painful" binary, as transhumanists such as Pearce and Bostrom would have us do.

As noted, on Aristotle's account of flourishing, reason cannot produce activity absent desire. This is a crucial point that advocates of maximal cognitive bioenhancement fail to register. In the broadest sense, desire, and thus the capacity for pleasure and pain, is a faculty of all animals, insofar as they possess at least one sensory modality (*DA* II 3). Both humans and nonhuman animals have this faculty of desire, defined as a reflexive preference for pleasurable over painful sensations. That said, for Aristotle, because of our rationality, the nature and complexity of human desire fundamentally surpasses that of animals (Lear 1988).

The same applies to pleasure and pain. By no means a hedonist, Aristotle foregrounds the import of pleasure and pain well beyond a focus on them as direct indicators that something is appetitively desirable or the opposite: "Pleasure and pain are a consequence of every emotion and of every action. . . . [Thus] virtue has to do with pleasures and pains" (*EN* 1104b14–16). Further, pleasure is not merely an experiential consequent, for Aristotle identifies "the noble, the useful, and the pleasant" as the motivators of decision and choice (b31). Thus, far from condemning pleasure, Aristotle stresses that our moral assessment of its presence in any situation properly depends on "whether we feel joy and pain in the right or the wrong way" (1105a7). Not only that, "An activity is increased by the pleasure proper to it. . . . Each activity determines its own proper pleasure. The pleasure proper to a morally good activity is good, and that proper to a bad activity is bad" (*EN* 1175a30–31, b26–28); the same applies to desire (b28–29, 1139a29–31). Through observations such as these, Aristotle points to the complexity and import of our nonrational capacities for desire, pleasure, and pain.[32]

From the standpoint of human flourishing—the only kind we are poised to assess—the capacity for pleasure is not detachable from an ability to experience pain. Aristotle gleans a contrast-dependency that transhumanists ignore in their rush to eliminate our very capacity to experience the latter.

5.6 *Phusis 1* Carefully Distinguished from *Phusis 2*

Finally, from Aristotle's standpoint, transhumanists conflate two senses of "nature" (*phusis*). Concerning rational essentialism, this is where their divergence from Aristotle involving the human comes to a head.

Aristotle differentiates between *Phusis 1* (potentiality)—"nature" qua a capacity not yet developed or defectively so—and *Phusis 2* (actuality): "nature" in the sense of a well-developed ability that is actively deployed (*EN* I 7, II 1–2, VI 8, 11–13, X 6; *DA* II 5).[33] When they denigrate the human per se, transhumanists ignore this crucial distinction. For them, a *Phusis 1*-notion of the nonrational often appears to exhaust that dimension of us. This view of the nonrational is coupled with a vague *Phusis 2*-lens on rationality that comprises a heightening of that capacity, in principle limitless, apart from any substantive notion of worthwhile aims.

As Aristotle observes, "The end that appears [good] to a particular person . . . is not simply given to him by nature but is to some extent due to himself" (*EN* 1114b16–17; see also II 1, 5). For Aristotle, the pinnacle of rational attainment is the actively virtuous existence in which flourishing consists. Said existence represents the culmination of a protracted development from *Phusis 1* to *Phusis 2*, where we have cultivated our human capacity for virtue into "virtue in the full sense" (1144b14, cf. b16–21). On Aristotle's broader formulation of the point in the *Physics*, *Phusis 2* "is the end or that for the sake of which (*telos kai hou heneka*)"—the end being "what is best (*beltiston*)" (194a28, 195a24 [Aristotle 1988]).[34]

Over and above the sustained cultivation of virtuous characteristics, "virtue in the full sense" requires our enactment of those features: otherwise, one who possessed virtuous characteristics (*hexeis*) could be said to flourish even if he was "inactive all his life" (*EN* 1095b33). Aristotle rejects this view: "Just as the crown at the Olympic Games is not awarded to the most beautiful and the strongest but to the participants in the contests . . . so the good and noble things in life are won by those who act rightly" (1099a3–7).

By Aristotle's lights, transhumanists' claim about the nonrational as disruptive applies only to cases where self-discipline is lacking. Schaefer and Kahane (2009) presume that humans just *are* akratic, whereas, for Aristotle, what they reject simply reflects *Phusis 1*: human potential un- or deficiently realized. This view ignores a salient distinction, drawn by Aristotle, between morally strong (enkratic) and morally weak (akratic) persons: it is to the latter alone that "we must attribute . . . a condition similar to that of men who are asleep, mad, or drunk" (*EN* 1147a17–18). Interestingly, G. Owen Schaefer and Savulescu concede indirectly that cognitive bioenhancement alone may not handle *akrasia*—a Greek term usually translated "weakness of will," but better rendered as "an absence of self-mastery"—when, having singled out the moral "useful[ness]" of "logical competence," they grant that "akrasia reduction was not included in our present framework, because it does not easily fit with our focus on judgments" (2019, 76, 76n5).

On Aristotle's account, surpassing moral strength is self-control proper (i.e., the virtue of *sōphrosunē*), whose possessors do not merely perform the right action but want to do so and enjoy acting thus. From his vantage point, transhumanists too readily jump from lamenting *Phusis 1*-type deficiencies in us to concluding that the best human attainment is necessarily inadequate in a categorical way. Because transhumanists fail to demarcate *Phusis 1* from *Phusis 2*, they presume identified flaws to reflect the human simpliciter, and this, in turn, renders the idea of a coming-to-fruition from within the human itself a nonstarter.

What's more, Aristotle's *Phusis 1-Phusis 2* composite requires ties to others of the sort that transhumanism cannot obviously accommodate and may preclude. For Aristotle, flourishing—indeed, the very possibility of our reaching *Phusis 2*—necessitates our rational and nonrational cultivation in a rich communal setting (*Politics* I 2 [1957b]; *EN* VIII–IX, X 9). Interpersonally, friendship (*philia*) is essential, for "a man of high moral standards will need people to whom he can do good" (*EN* 1169b8–13).

In antiquity, transhumanists' view fits best with that of the Stoics, who are extreme rational essentialists and condemn emotional experiences, such as grief and anger, because they reflect the false judgment that things not under our control bear unavoidably on our flourishing (Diogenes Laertius 7.1.110–14; Cicero, *Tusculan Disputations* 3.9–10; Epictetus, *Encheiridion* 1, 5, 19). Here, they diverge from Aristotle, for whom the evaluations involved in emotion are far from being systematically false (Nussbaum 1995, 53–78). Using the term, unlike Aristotle, in a condemnatory way, Stoics distinguish *pathē*, construed as "passions," from *eupatheiai*, or "good emotions" (Diogenes Laertius 7.1.116–19). The status of the latter as emotions is, however, debatable. For *eupatheiai* would not be directed toward individuals but rather to humans in aggregate or toward others based on their roles in relation to us (e.g., filial respect, owed by children to their parents due to the latter's function as such; Epictetus, *Encheiridion* 30). Because these experiences are tepid and generic, what makes them *emotional* ones is elusive at best. Aristotelian flourishing, in contrast, encompasses a wide range of emotional experiences, strong (e.g., angry) ones included.

6. The Alignment of Aristotle's Theory with Contemporary Science

Not only is Aristotle's rational essentialism philosophically superior to transhumanists' version, but his view of the human soul fits with the overall thrust of contemporary theorizing about the mind and brain. What's more, Aristotle's handling of emotion, desire, and psychic balance has something to offer the present.

To see why I make this point expressly at the launch of a discussion focused on contemporary science, we must adopt an interdisciplinary perspective—which notion is itself a historical construction. *We* might say that Aristotle's handling of the soul has a normative, versus a descriptive, focus. But this would be an oversimplification. In Aristotle's time, firm disciplinary boundaries (e.g., between philosophy and biology) did not yet exist: from our standpoint, his theory of the soul is descriptive and normative at once.

There is more common ground between us and Aristotle here than meets the eye. Though contemporary psychological theories may be presented as entirely descriptive, they are not. As humans are fundamentally interpreters, there is no such thing as a "purely descriptive" explanation of what operating as a human being involves. In purporting to illuminate this, theorists evince normative assumptions, for instance, that because subcortical areas of the brain are older, humans' mental operations involving them are more "primitive." Contemporary theorists often fail to recognize that their purportedly value-neutral accounts build in normative assessments (Ben-Ze'ev 2010, 48). This dimension is not always tacit, for psychological theories are sometimes taken to have the normative implication that we should embrace a particular ethical lens (Greene 2016; Haidt 2012). In what follows, as I note points of consonance between Aristotle and the present, I also mention, nonexhaustively, where further reflection on his approach to the mind could help to enrich current discussions.

Aristotle's handling of emotion shares important features with Scherer's version of appraisal theory. Aristotle and Scherer agree that one cannot do justice to the question, What is emotion? in isolation from addressing what we term "cognition." In addition, Aristotle accommodates the idea that our rational and nonrational faculties are broadly "cognitive," meaning "bearers of information," while also addressing humans' distinctiveness by virtue of our rationality. Further, both Aristotle and Scherer appreciate the potential richness of human emotion, along with the error of casting reason and emotion in agonistic roles. These insights reflect their holistic view of the human mind: while Aristotle and Scherer distinguish among our faculties for the purposes of analysis, they reject the notion that these faculties operate discretely and focus on how they blend.

There are also points of consonance between Aristotle and contemporary thought in a broader sense. A number of theorists maintain that, due to our rationality, humans can experience and cultivate desire (in current parlance, motivation) and emotion in unique and transformative ways. Aristotle's appreciation of this is rich and distinctive. He sets humans apart from nonhuman animals through our capacity for thought (*to dianoētikon te kai nous*; *DA* 414b18); as he puts the point in the *Nicomachean Ethics*, our unique function (*ergon*) is psychic activity in accord with *logos*, or reason (1198a7–8).[35] Aristotle's handling of desire/motivation reflects his hierarchy of types of souls. While desire prompts animal locomotion across the board, humans "distinguish themselves from other animals by their ability to think and by the fact that in addition to the appetites they have more sophisticated desires," or "higher-order" ones, including those for virtue and understanding (Lear 1988, 141–42). Although desire qua appetite (*epithumia*) is shared with nonhuman animals, higher-order desire (*orexis*) "cuts across" all faculties of the human soul (142n110).[36] Only those who conflate *epithumia* and *orexis* will presume that desire per se "must disrupt or distort a process of rational thought" (188).

Concerning *orexis*, Aristotle foregrounds the entwining of our rational and nonrational operations by framing "reflection as an expression of desire rather than as an activity carried out in complete detachment from desire" (Lear 1988, 151). Decisive here is that humans alone can "become consciously aware of their beliefs and desires . . . consider them and . . . decide what to do on the basis of that consideration. A human agent need not merely be caused to act by his desires: by his reflecting on his desires and deciding which to satisfy and how, the desires become reasons for him. In acting for these reasons, an agent manifests his freedom and humanity" (149–50). Thus, Aristotle anticipates the current recognition that metalevel functioning involving nonrational faculties is unique to us. Beyond this, exploration of Aristotelian *orexis* could help to enrich contemporary discussions of desire/motivation as a distinctively human faculty.

In Chapter 1, we witnessed transhumanists' conflation of "reason" and "cognition," seeing how it damaged their advocacy of cognitive bioenhancement. Here, we encounter a further problem stemming from this conflation, according to which emotion (and affect more generally), being nonrational, is perforce noncognitive: on the broad definition of "cognitive" that governs most appraisal theories, emotion is nonrational yet cognitive (Deigh 2010). Not only does Aristotle's theory of the mind accommodate this view, but Christine Tappolet channels Aristotle when observing that because emotion is "a-rational, it would be a mistake to infer that it necessarily leads to irrationality. Quite the contrary, it often makes it possible for the agent to focus on what is important" (2010, 336).

Aristotle's handling of emotion via the Doctrine of the Mean puts context, including proportionality, front and center. When emphasizing context-dependent emotional responsiveness, Scherer gestures toward proportionality (see, e.g., Ellsworth and Scherer 2002, 580–81); he also introduces the idea more directly when analyzing anger, anxiety disorders, and depression in terms of his appraisal framework. Litvak et al., in turn, anchor their appraisal perspective expressly in Aristotle's handling of anger via the mean and proportionality (2010, 304–305). As current theorists continue working to elucidate this terrain, Aristotle's nuanced treatment of context and emotional calibration in the *Nicomachean Ethics* is worth further study.

Strikingly, Aristotle anticipates contemporary challenges to the "positive-negative" binary (qua "beneficial-harmful") regarding emotion, especially anger, distinguishing between what is now called "trait anger," which he rejects (*EN* IV 5), and "state anger," which can be morally required. He would certainly concur with theorists today who note that those high in trait anger are strongly predisposed to interpret what transpires through the filter of that trait, with deleterious results for themselves and others (Schultz et al. 2010, 314–15). As for state anger, Aristotle offers the striking insight that gentleness is the most directly pertinent virtue of individuals who reliably express it in context-befitting ways.

Further, Scherer and Novaco echo Aristotle when stressing that disparate character traits and inclinations, including rage, aggression, and irritation, are wrongly lodged under "anger." While Aristotle's handling of the soul concentrates on what is "according to nature" (*kata phusin*), versus against it (*para phusin*), his theory of the soul enables him to account for certain forms of psychopathology, including those tied to "anger dysregulation" (Novaco 2010). The same applies to Scherer, who also calls Aristotle to mind when stressing individuals' responsibility for their anger (Wranik and Scherer 2010, 260).

What's more, theorists today channel Aristotle when maintaining that emotions' context-befitting experience and expression "signal" what kind of person one is (Parrott 2014, 279); for example, "Experiencing anger or compassion in the face of injustice informs people about their moral nature" (Tamir and Bigman 2014, 211). Lastly, there is an affinity between Aristotle's theory of the mind and the current view that emotions "are both necessary to the proper functioning of theoretical and practical rationality, and essential to moral action. In brief, emotions . . . allow us to think and act more appropriately" in both prudential and ethical terms (Tappolet 2010, 326).

When comparing Aristotle with the present regarding the brain, I distinguish between what he said or could have known, on the one side, and what orientation his theorizing about the soul can be argued to support, on the other. Scientists did not become familiar with the nervous system in detail until the eighteenth century, and it was only as the nineteenth drew to a close that the neuron was acknowledged as "the basic functional unit of the nervous system" (Bear et al. 2016, 7, 13). For Aristotle, the heart is the organ through which our sensory and intellectual capacities are instantiated (*Parts of Animals* II 10 [1868]; *Generation of Animals* II 6 [1965b]). From Hippocratic medicine, he inherits the notion that bodily excellence involves a mean between the extremes of excess and deficiency, a notable example being temperature (*Parts of Animals* II 7). The role of the brain, the body's coldest organ, is to foster the work of the heart by keeping it from overheating (II 7).

This is not the whole story, however, for we can separately assess the compatibility of Aristotle's account of the soul with current theorizing about the brain. Aristotle's soul is responsible for life, meaning that all living things possess it (*DA* II 1). The body represents potentiality, which is actualized by the presence of soul (II 1). As the "form" of the body, the soul is responsible for its structure and organization, and originates all bodily movement (*Physics* II 3, 7; *DA* II 4). Lacking magnitude, souls are not divisible into parts (*DA* I 3, 5). Apart from plants, living things possess multiple capacities depending on the type of soul they have. As a result, "A single definition can be given of soul only in the same sense as one can be given of figure. . . . The particulars subsumed under the common name in both cases . . . constitute a series. . . . Hence we must ask . . . what is the soul of plant, man, beast?" (*DA* 414b20–33). Psychic abilities are possessed hierarchically such that we have "calculation [and] all the other powers . . . while the converse does not hold" (415a8–10); our sole possession of this faculty has vast implications for how we instantiate those capacities that we "share" with nonhuman animals.

Aristotle's soul, the immaterial source of our capacities, actualizes bodily potential. Therefore, while he bases thought in the heart, Aristotle does not view the heart as *the cause* of thought (*DA* III 4). Bodies and bodily organs have purposes that ensouled members of species are well suited to enact (*Parts of Animals* I 5; *Generation of Animals* II 6). As to why this matching exists, Aristotle offers no story of origins, for he believes that species are eternal (Rorty 1978, 345).

Further, Aristotle's notion of correspondence between structure and operation is not materially or mechanistically rooted. His own handling of anger illustrates this. A physiologist, who concentrates on anger's bodily representation, would define anger as "a boiling of the blood or warm substance surrounding the heart" (*DA* 403a31–b1). Meanwhile, Aristotle addresses it as a psychological capability of ours, under the head of *pathē*: though they cannot occur absent the body (I 1), *pathē* are irreducible to it. Of his four explanatory factors (*aitiai*)—material, formal, efficient/moving, and final, or telic (*Physics* II 3)—only the material and moving factors appear, in stripped down versions to boot, in "mechanistic biology," which "has its roots in the natural philosophy that emerged from the work and ideas of Galileo Galilei, René Descartes, Pierre Gassendi, Robert Boyle, Isaac Newton and others during the Scientific Revolution" (Nicholson 2012, 153).

For Aristotle, the body depends on the soul because matter and form correlate, respectively, with potentiality and actuality, and in living things, form is soul and matter body (*Physics* III 1–3; *Metaphysics* IX 8 [1957a]; *DA* II 1–2). His idea of the soul as immaterial and lacking magnitude, yet responsible for the organism's being what and as it is, opposes views that localize particular capacities in specific organs (or, in our terms, areas of the brain or dedicated networks). In sum, Aristotle's theory of the mind is more compatible than are transhumanism, basic-emotion, and dual-process theories with growing appreciation of the brain's complexity and of the idea that physically centered accounts do not capture mental phenomena directly.

7. Casebeer's "Neo-Aristotelian" Position

In this section, I distinguish my perspective on Aristotle from William Casebeer's use of him within his "naturalizing" of ethics via evolutionary psychology, which explains current human psychology as a set of functional adaptations to ancestral environments. It is reasonable to maintain that scientific findings should "impact . . . moral philosophy" (Casebeer and Churchland 2003, 189). Casebeer, however, makes the far stronger claim that evolutionary psychology, boosted by neuroscience, permits us to identify the "appropriate norm-producing moral theory," which he dubs neo-Aristotelian (Casebeer and Churchland 2003, 172–74, 190n3; Casebeer 2003a, 67–68). Because he sees a propensity to virtue ethics as neurobiologically embedded, Casebeer endorses "a scientifically burnished neo-Aristotelian morality: a virtue theory for the twenty-first century," exulting that his "evolutionary ethic . . . resemble[s] a scientifically burnished Aristotelian virtue theory of which Darwin himself may have approved" (2003a, 67, 69).

I concur that, as an ethical lens, virtue theory is preferable to deontology and utilitarianism but disagree that science can direct us to a conclusion of this sort. For present purposes, my concern is to show that Casebeer's so-called neo-Aristotelian position is deeply un-Aristotelian. While using the term "naturalized" of Aristotle's virtue ethics is not inappropriate (cf. Jacobs 2017, 126–27), his view of nature (*phusis*), in which that ethics is rooted, differs markedly from Casebeer's.

Casebeer cites approvingly Frans de Waal's assertion that "morality is as firmly grounded in neurobiology as anything else we do or are" (de Waal 1997, 217; Casebeer 2003c, 102); thus, "naturalizing ethics" means "showing how our ability to grasp norms, reason about them, and act on them is a brain-based ability that can be explored using scientific methods" (Casebeer and Churchland 2003, 170). In terms of moral/social behavior, the distinction between humans and other "social animals" (e.g., wolves, ravens, baboons) is largely one of degree (173). Further, Casebeer denies that we are the sole "robust moral agents," aka "robust moral reasoners" (2003c, 92, 97). Expectedly, he features continuity between humans and other social animals regarding the brain, which is "organized in essentially the same way in all mammals" (Casebeer and Churchland 2003, 175).

Casebeer's account orbits the concept of function, which "bridge[s] the chasm between fitness and normativity" (2003a, 67): "Moral facts are functional facts" or "reducible to functional facts and . . . we can treat functions just as evolutionary biologists do by using a modern-history conception of *proper* functioning" (2003c, 53; 2003a, 67). On this view, "To say that something is maximally moral is to say that it is maximally functional" (2003a, 67). Having construed functions thus, Casebeer equates norms simpliciter with moral norms: "Moral cognition comprises any cognitive act that is related to helping us ascertain and act on what we should do" (2003b, 842). This means that moral cognition is "on a par with everyday forms of reasoning. For example, the question 'Who should I dance with?' is not radically different from the question 'Shall I tell a lie?' . . . At bottom it is only a matter of convention that we call certain judgments about what will be most functional for us 'moral judgments' while others are purportedly *merely* judgments of prudence" (Casebeer and Churchland 2003, 189). Here, Casebeer departs from the familiar view that "norms" are a wide category including the moral variety, as well as those concerning "etiquette, road regulations, rules of games and sports, and the norms of institutions generally" (Joyce 2014, 263n1).

The linchpin of Casebeer's evolutionary account, the concept of "function" is also the crux of the tie he forges with Aristotle: once "moral claims" are "reduced to functional claims technically construed," Casebeer can identify this function-based view as "shar[ing] roots with an Aristotelian view of the world" (2003c, 4).[37]

If we decontextualized Casebeer's claim that "moral facts are functional facts" (53) and applied it solely to human beings, Aristotle would agree. But Casebeer's conclusion that his own handling of function meshes with "the wisdom to be found in Aristotle" (71) does not follow and is, in any case, incorrect. For Aristotle, as we have seen, reason is humans' distinctive capacity, or function, its role as such guiding his approach to our nonrational faculties. Further, we flourish by cultivating the capacity for virtue borne by our rationality into "virtue in the full sense" (*EN* 1144b14). Here, Aristotle differs from Casebeer in two key ways. First, rationality, and thus virtue, divides us fundamentally from nonhuman animals. Second, by Aristotle's lights, Casebeer's encompassing tenet that living creatures fulfill their functions via accommodative, or adaptive, interactions with their environments (2003c, 55–56) does not do justice to the transmutative impetus and impacts that humans' actualization of our distinctive capacity entails.

In *The Order of Things*, Michel Foucault helps to contextualize a fundamental difference involving function between Aristotelian biology, which was highly influential up to the seventeenth century, and the modern variety. In opposition to the former, the latter

> was constituted . . . as an analysis of the relations between organs and functions. . . . It is upon the projected surface of biology that man appears as a being possessing *functions*—receiving stimuli (physiological ones, but also social, interhuman, and cultural ones), reacting to them, adapting himself, evolving, submitting to the demands of an environment, coming to terms with the modifications it imposes, seeking to erase imbalances, acting in accordance with regularities, having, in short, conditions of existence and the possibility of finding average *norms* of adjustment which permit him to perform his functions. (1970, 350, 357)

Foucault's observations help to explain why, having defined function in modern-biological terms and tethered existing well to adaptive behavioral patterns, Casebeer is led to conflate moral norms with norms simpliciter.[38] At the same time, Foucault's remarks also make clear just how off target Casebeer's handling of Aristotle is. Though Casebeer purports to channel Aristotle, his quasi-mechanistic notion of function, and thus his "evolutionary ethics" (2003a), is drawn from modern biology.

Further differences attend their divergence regarding function. Casebeer presents optimal functioning as a modus operandi built around the mastery of pertinent skills (2003c, 47). His framing of virtues as skills, together with his equation of "norms" and "moral norms," explains Casebeer's otherwise bizarre claim that a young child who dependably follows established practice in brushing his teeth has "the relevant virtue of character" (44). For Aristotle, in contrast, virtues are not skills but rather *hexeis*, highly cultivated states of character (*EN* II 5–6).

In terms of activity that realizes ends (*telē*), Casebeer's skill-based perspective calls to mind, not Aristotle's vantage point on human beings (or living things generally), but rather his handling of artifact production. Aristotle would find congenial Richard Lewontin's insight that a strong commitment to the modern concept of function befits artifact production, not biology (2000b, 81). Indeed, Aristotle himself is at pains to demarcate the expertise involved in virtue from the technical facility required for artifact production (*EN* II 4). The processes involved differ markedly, too: artifact production comprises activities (e.g., cobblery) that have definite, achievable aims, with the function the object will serve directing the highly circumscribed, linear process of its creation. In contrast, so long as we exist, the project of living virtuously, the sole human enterprise that ultimately matters, continues (I 10).[39]

8. Conclusion

Transhumanists dream that science and technology will deliver our successors from the plight that is human existence into the paradise of posthumanity. Regarding the mind, their guiding lens is an extreme rational essentialism that is philosophically inferior to Aristotle's version. Practically speaking, the viability of transhumanists' dream depends on a compartmentalization of the mind and brain that scientific findings increasingly supersede. As a result, their confidence that we could manipulate humans' mental capacities as they wish is quite unjustified. Strikingly, the very evidence that undercuts transhumanism anchors a transhistorical alliance between Aristotle's theory of the mind and contemporary science.

Thus far, in discussing transhumanists' handling of affect, we have focused on the "negative" variety. But their treatment of the nonrational sphere as a whole with rough conceptual instruments becomes glaringly problematic once we appreciate that emotions involve persons holistically (Scherer 2009, 3459) and that rational and nonrational faculties harmonize in human flourishing—the sole domain of living well that we humans are equipped, nonfantastically, to consider.

Transhumanists fail to defend a negative-positive bifurcation in the realm of affect. This omission is significant since any critique of so-called negative affect necessarily relies, even if tacitly, on a negative-positive contrast. Though transhumanists sometimes presume the existence of such a contrast, the sole template they offer for the nonrational presents it as deleterious. If transhumanists suppose that our capacity for, say, empathy and sympathy is or necessarily involves the nonrational, they have not spelled this position out, let alone used these "positive" emotions to anchor an approving take on a subcategory of affective phenomena; nor do they defend a favorable lens on an affective subgroup that one could apply to said phenomena. If the nonrational is not being condemned outright, this needs to be made absolutely clear, and the nature of positive affect explicated.

One might hope that a richer picture of the nonrational would emerge when moral, rather than cognitive, bioenhancement is the focus. Regrettably, this is not the case. While this area of focus is far less common, transhumanist advocacy of moral bioenhancement reflects the same flawed picture of the human mind as compartmental and of our biological constitution as highly amenable to manipulation. Transhumanists' neuroessentialism is on prominent display, as is their misguided faith in the power and precision of what genetic adjustments could deliver with respect to complex phenotypic traits, such as empathy and altruism.

3

Evaluating the Debate Thus Far over Moral Bioenhancement

1. Setting the Stage

1.1 Transhumanist Concern with Moral Bioenhancement

In 2008, moral enhancement emerged as an area of focus within the broader debate over human bioenhancement. Since that time, Savulescu and Ingmar Persson have repeatedly insisted on the imperative to develop effective means of moral bioenhancement. Why? "The future . . . looks darker than ever" (2019, 12–13), as humanity faces the real possibility of extinction, or "ultimate harm." Preventing it must be humanity's governing priority, and our chances of doing so hinge on moral bioenhancement.

Externally, humanity's continued existence is jeopardized most by weapons of mass destruction and environmental factors (e.g., climate change).[1] Persson and Savulescu trace these threats to a species-wide psychological flaw: inadequate prosocial motivation (cf. Jotterand and Levin 2019, 64, 65).[2]

Before we investigate moral bioenhancement, two preliminary clarifications are needed. In keeping with the book's focus on transhumanism, this chapter concentrates on Persson and Savulescu as its foremost supporters from that standpoint. Savulescu is squarely ensconced in the transhumanist camp. That, apart from his collaboration with Savulescu, it is less clear whether the same is true of Persson is irrelevant to assessing their joint advocacy of moral bioenhancement: insofar as their coauthored publications display salient transhumanist commitments, they are reasonably viewed as transhumanist defenses of moral bioenhancement.

Second, transhumanists generally focus on the technological elevation of capacities, above all, cognitive ability, such that their possessors would qualify as posthuman. I must therefore explain my classification of Persson and Savulescu's advocacy of moral bioenhancement as transhumanist, although their guiding aim, humanity's survival, falls outside that mainstream (Jotterand and Levin 2019, 68). In what follows, therefore, I note nine transhumanist ideas that are manifest in Persson and Savulescu's defenses of moral bioenhancement. The first six are substantive in nature, while the remaining three are methodological. This

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shared terrain supports our lodging their handling of moral bioenhancement under a transhumanist umbrella.

Manifest throughout their advocacy of moral bioenhancement is the familiar transhumanist notion that, launching from where Darwinian evolution has brought us, we not only can but must use science and technology to direct our development henceforth. The second point is closely related: Persson and Savulescu's dedication to moral bioenhancement reflects transhumanists' ultimate lack of confidence in social and political solutions to central human challenges (Green 2007, 170; Barben 2012, 394; de Melo-Martín and Salles 2015, 228–29; Hall 2017, xii). For Persson and Savulescu, human prosociality cannot be suitably augmented via "traditional moral education and reflection" or, for that matter, by any measures that existing liberal democracies take (2019, 8; 2012, 8). With a view to avoiding ultimate harm, pursuing moral *bio*enhancement is thus our most "urgent" priority (2008).

Third, transhumanists view means of achieving their goals as morally neutral: what matters is the expected impact on well-being (Harris 2010; Bostrom 2003a; Savulescu 2005; Savulescu and Kahane 2011). Persson and Savulescu share the view that "*whatever* means" promote the chosen outcome as quickly and reliably as possible—in their case preventing ultimate harm—are the ones that we should choose (2013, 130). A fourth, related tie is that they embrace transhumanists' rejection of the treatment-enhancement distinction as "conceptually incoherent and practically unhelpful" (Levin 2014b, 3).

Fifth, Persson and Savulescu's notion of what would be augmented or eliminated, and how, reflects a trademark transhumanist failure to appreciate the complexity of the human mind and brain. Sixth, and relatedly, they evince transhumanists' pessimism about humanity, centrally including a lack of concern with *human* flourishing. Persson and Savulescu's framing of the point is indistinguishable from standard transhumanist formulations (see, e.g., Bostrom 2005a): though their immediate focus is our moral bioenhancement to avoid ultimate harm, like transhumanists generally, they support humanity's "evolution" into posthumanity (Persson and Savulescu 2010, 668).

Methodologically, their advocacy of moral bioenhancement displays a prominent feature of transhumanist argumentation: the existence of a wide gap between the dramatic nature of authors' programmatic demands and their modest defenses of those demands. Second, Persson and Savulescu downplay or omit strong evidence against their claims, insisting that we avidly pursue moral bioenhancement so long as its feasibility has not been conclusively refuted. This reflects transhumanists' general strategy of placing the burden of proof squarely on opponents to demonstrate that what transhumanists propose is impossible—an argumentative standard that it is not reasonable to expect any theoretical position of even moderate complexity to meet. Third, Persson and Savulescu's defense of moral bioenhancement reflects transhumanists' neuroessentialism and misconception that genes strongly shape complex phenotypic traits.

1.2 What We Should Fear Most, and Why

Though Persson and Savulescu consistently insist that forestalling ultimate harm must be our overriding priority, there is a difference in the relative weight given to external sources of that harm. Initially, weapons of mass destruction are featured (2008), while in their major work on moral bioenhancement, *Unfit for the Future*, the greatest challenge is "the problem of climate change and environmental destruction" (2012, 1). Environmental ruination, broadly construed, is said to be fueled by rampant consumption stemming from routine failures of self-control. In *Unfit for the Future*, not only do environmental loci represent the graver threat to humanity's endurance, but increasing competition for scarce natural resources (e.g., oil, water) could trigger recourse to weapons of mass destruction (101, 105).

Garrett Hardin's "tragedy of the commons" forms the backbone of Persson and Savulescu's diagnosis of our prosocial failings regarding the environment (2012, 66–85). According to Hardin, based on immediate self-interest, when individuals are in a position to add members to their herds, doing so always makes sense (1968, 1244). But if every herdsman operates thus, overgrazing will eventually occur, with resulting harms to one and all (1244); the same problem arises "in a reverse way" with pollution (1245). On Persson and Savulescu's interpretation, Hardin's tragedy of the commons represents the environmental challenge that concerns them "on a smaller scale" (2012, 68).

Although they present Hardin's analysis as uncontroversial, this is far from being the case. As Herschel Elliott observes, what is destructive in how we operate well surpasses Hardin's modern-industrial focus—which Persson and Savulescu share—for "tragedy is logically dependent only on the assumption that there is steady growth in the use of land or resources within any finite ecosystem," not on a particular notion of what propels that growth (1997, 520–21). Elliott accepts that "excessive consumption of the wealthy industrialized nations" is a contributing factor (521). But it is only one such factor, for "rich nations' contribution to pollution may soon be overwhelmed by the steady small increments in the standard of living of such huge populations as those of India and China" (521). From Elliott's broader vantage point, those who "follow the rarely questioned principles of humanitarian ethics" on a worldwide scale are also an important propellant of its spread (522).[3]

In addition, Persson and Savulescu's biotechnological focus is at odds with Hardin's perspective since, "by morality, [he] meant temperance. . . . 'Social arrangements,' rather than scientific solutions, would provide the correct response to an overburdened commons" (Hardin 1968, 1247; Ghosh 2007, 857). Contra Persson and Savulescu's obsessive focus on moral *bio*enhancement, Hardin maintains that "no technical solution can rescue us" from environmental threats and that we must find the courage to admit this (1968, 1248, 1243). Further, while Persson and Savulescu would compel the unwilling to receive bioenhancement, Hardin supports only "coercion" that is "mutually agreed upon by the majority of the people affected" (1247).

Moreover, Persson and Savulescu presume the scalability of Hardin's small-scale tragedy of the commons to the species level via a mysterious "motivational bootstrapping" (2018, 188). But Hardin himself cautioned that "the commons, if justifiable at all, is justifiable only under conditions of low-population density" (1968, 1248). I will not consider further this problem of scale, which others have fruitfully addressed (Raus et al. 2014; de Melo-Martín and Salles 2015; Schlag 2019), though I later address a related problem with Persson and Savulescu's handling of *akrasia*.

While they are not wrong to claim that external sources of jeopardy exist and that certain of our current attitudes have destructive impacts, their advocacy of moral enhancement is fundamentally flawed. Having explored the moral attitudes, or emotions (2008, 169–70), that Persson and Savulescu suppose to require biotechnological improvement (Section 2), I show that their argument for the practical feasibility of moral bioenhancement fails (Section 3). Further, though Persson and Savulescu claim to root their defense of moral enhancement in an evolutionary milieu, they display little awareness of how the pertinent concepts are actually handled in evolutionary biology. Their detachment from this milieu, which will concern us in Section 4, anchors the failure of their argument for the theoretical feasibility of moral bioenhancement.

Although Sections 3 and 4 concentrate on Persson and Savulescu's transhumanist defense of moral bioenhancement, my arguments and conclusions there apply to nontranshumanist defenses, too. Advocates of moral bioenhancement tend to embrace it as a "solution to our difficult moral situation. . . . The presentation of arguments and counterarguments on this topic has almost become routine and the deadlock continues. One of the reasons for the impasse has to do with the presence of unexamined assumptions . . . that are crucial to the intelligibility of the debate itself" (de Melo-Martín and Salles 2015, 232). Key reasons for this "deadlock" are failed proofs of concept for the theoretical and practical feasibility of moral bioenhancement. The expression "proof of concept," as I employ it, is an extrapolation from its familiar role of signifying the evidential burden that those who urge support of particular technological projects (e.g., in the medical realm) are expected to meet (Jo et al. 2014; Bradley et al. 2013; Maia and Claro 2013; Audeh et al. 2010; Byrn et al. 2010; Tutt et al. 2010).

Though Persson and Savulescu count most heavily on there being evolutionary-psychological kernels of their favored attitudes and biotechnological means to augment them, my refutations of their proofs of concept cover any advocacy of moral bioenhancement that includes similar claims and assumptions (Douglas 2008, 233; DeGrazia 2014, 361–62; Rakić 2014, 246; Hughes 2012, 5–6).[4]

Far from conceding that their proofs of concept fail, Persson and Savulescu continue to support moral bioenhancement, defined in terms of augmenting prosocial attitudes. From 2012 on, however, they suggest an alternate psychological track to preventing ultimate harm, centered on erasing antisociality (Section 5). Though typically presented as two interpretive lenses on the same endeavor, as we will see, they represent different visions of our moral alteration.

Persson and Savulescu adopt a utilitarian lens on avoiding ultimate harm, according to which well-being alone has intrinsic merit, with benefit frequently provided *by* the minimization or prevention of harm (Beauchamp 2019; Williams 1973, 95). The paramount harm to be forestalled here is our extinction (Persson and Savulescu 2012, 100–101). Toward that end, should effective means of moral bioenhancement become available, they could be imposed without our knowledge or even against our will (2019, 14; 2008, 174). Though their prosocial and antisocial focuses both involve a sacrifice of psychic complexity and freedom, Persson and Savulescu's eliminative agenda, in particular, reflects a willingness to forgo, for the sake of survival, what makes human existence *worth* conducting (Section 6).

2. What, Specifically, Should Moral Bioenhancement Be Directed To?

According to Persson and Savulescu, our moral attitudes emerged as adaptations to an environment, "life in small, close-knit communities," that no longer exists, and the "mismatch" between it and our current milieu is "a serious matter" (2012, 134; 2013, 124). Because the moral features that need augmenting are biologically rooted, we are unprepared, at a biological level, to address the moral challenges that stem from this disconnect; on the flip side, however, since we already possess them in kernel form, *bio*technology could improve them.

What are these moral features? Persson and Savulescu identify two prosocial attitudes, "altruism and a sense of justice," as the "core" of morality proper (2012, 108). "Altruism" is variously defined in philosophical, psychological, economic, and biological discussions (Clavien and Chapuisat 2013, 126). On Persson and Savulescu's formulation, "To want or be concerned that things go well for beings for their own sake is to have an attitude of *altruism*, *sympathy* or *benevolence* towards them. . . . This attitude is universally considered to be an element of morality" (2019, 8). The focus of the second moral attitude, "*a sense of justice or fairness* . . . is not just that things go as well as possible for as many as possible, but that how well things go for different beings be as much as possible in line with justice. . . . The view that justice requires receiving what you deserve and have a right to has a tight hold on our minds" (8–9). Moral bioenhancement would comprise "boosting the strength of these two attitudes" (8).

That the targets of moral bioenhancement are moral *attitudes* puts the focus squarely on psychological states. Persson and Savulescu foreground this point:

> For something to count as moral enhancement, it must enhance your moral *motivation*, your disposition to (*decide* and) *try* to do what you think you ought morally to do, rather than your capacity to *implement or put into effect* such tryings, to succeed if you try. Moreover, it must enhance your disposition to try to do *for its own sake* what you think you ought morally to do, and not because you are in some way *rewarded* if you try to do this, or *punished* if you do not. The presence of effective sanctions is liable to cause people more often to try to do what they think they ought to do, and to refrain from trying to do what they think they ought not to do, but such actions in conformity with moral norms do not make people morally better. (2019, 7–8 [italics in original]; see also 2012, 39n25)

As the *why* behind one's acts is key, Persson and Savulescu set a high bar for what would count as our moral betterment—one with which, broadly speaking, Aristotle would concur.

Where does humanity stand with respect to their favored attitudes? Both belong to our biological endowment: we "have altruistic dispositions, that is, concern about the well-being of others for its own sake" (Persson and Savulescu 2010, 661); a nugget of just/fair motivation is also biologically embedded (662; 2012, 35).[5] It is crucial that these kernels have an "evolutionary origin," for "there can be no . . . spreading [of them] if these attitudes are lacking all together" (2012, 109, 108).

While our evolutionary legacy includes these moral nuggets, in their existing form, they leave us ill-suited "to cope with the moral problems generated by . . . advanced scientific technology, over-population, and the globalization of the modern world" (Persson and Savulescu 2012, 12). Our altruism "tends to be *partial*," or "limited" in range (2019, 8): we are predisposed to benefit close associates, both relatives and non-kin. In the small groups of the Pleistocene epoch, maintaining a clear division between in- and out-group members was key to maximizing survival and reproduction. Now, however, this restricted frame of reference is deleterious to our prospects for avoiding ultimate harm.

As for justice/fairness, our evolutionary legacy includes "a *conception of responsibility as causally-based*" (Persson and Savulescu 2012, 22), meaning that we consider ourselves accountable only for harms that our actions clearly bring about. This perspective was helpful within small, ancestral groups: cooperators reaped the boons, while those who misbehaved were readily identified and held to account. But this restricted view of accountability is deleterious now, when the world's population is over seven and a half billion (United States Census Bureau 2019); most people are anonymous to one another; and our own acts seem to have, at most, a minuscule environmental impact.

Since kernels of altruism and a sense of justice/fairness already exist within us, their wholesale implantation is not required; rather, we must strengthen these "core moral dispositions," that is to say, extend their range (Persson and Savulescu 2008, 171; 2019, 8–10). To Persson and Savulescu, their biological embedment means that this extension could occur via neurobiological and genetic manipulation (2008, 168; 2011, 443; 2012, 107; 2019, 8).

I challenge this picture in two phases, both of which have counterparts in my critique of transhumanist advocacy of cognitive bioenhancement. First, I address the question, Is there strong evidence that upgrades of our altruism and sense of justice are practically feasible? As I argue via discussion of oxytocin, serotonin, and genetics, all salient for Persson and Savulescu, in Section 3, the answer is "no." Their likely rejoinder, that in time, suitable means will be discovered, presumes their showing theoretical proof of concept: that humans are neurobiologically and genetically constituted such that they could be manipulated in the ways that they envision. In Section 4, I argue that this presumption is fundamentally flawed. Together, these sections gainsay Persson and Savulescu's insistence that moral bioenhancement is our best, or even only, hope of staving off ultimate harm.

3. Practical Proof of Concept for Moral Bioenhancement?

Persson and Savulescu fear that if there exists "too much pessimism about the possibility of moral bioenhancement," it could be "prematurely dropped" from consideration as a promising research project (2012, 124). To forestall this scenario, practical proof of concept for the endeavor is required. Thus, they promise to show "how moral behaviour can be influenced by biomedical means in order to demonstrate that moral bioenhancement is not just a theoretical possibility, but has been practised" (11). This formulation fails to distinguish clearly between two claims. That humans' moral behavior has already been manipulated experimentally shows only that conduct involving morality can be biotechnologically affected in one or another fashion (see also de Melo-Martín 2018, 24–25). The second, stronger claim is that sufficient promise has been shown that biotechnology could upgrade our moral attitudes, here, altruism and a sense of justice, *in the ways that Persson and Savulescu envision* so as to warrant dedicated pursuit of its development. Although they operate as though the second claim follows directly from (or is somehow equivalent to) the first, this is not the case. As practical proof of concept for moral bioenhancement requires the stronger claim, I concentrate on it.

3.1 Oxytocin

Oxytocin, found solely in mammals, is "a peptide of nine amino acids. . . . Produced in the hypothalamus and released into . . . the brain and the bloodstream," it operates as both a neurotransmitter and a hormone (Bales et al. 2013, 180; De Dreu et al. 2010, 1408). Oxytocin has been described as the cuddle hormone (Beery 2015, 174), love hormone (174; Smearman et al. 2015, 309), and prosocial hormone (Savulescu and Sandberg 2008, 36). For Persson and Savulescu, oxytocin "has been shown to promote trust" and thus evinces the biological feasibility of strengthening altruism (2008, 172; 2012, 118–19).

Since the early years of the new millennium, scientists have avidly studied the impact of oxytocin (abbreviated as OT and OXT) on prosociality in human beings (Bartz et al. 2011, 301; Nave et al. 2015, 773). Presumed successes in boosting prosociality in nonhuman animals by the exogenous addition of oxytocin spurred this research (Nave et al. 2015, 773). Most impactful here was a finding from the early 1990s that oxytocin fosters pair-bonding in prairie voles, a socially monogamous species (Smith et al. 2017, 620).

This finding predisposed researchers who first considered humans to optimism about its prosocial impacts in our case (Kosfeld et al. 2005, 673). From its earliest phase (see, notably, Kosfeld et al. 2005; Zak et al. 2005), research on oxytocin in humans has typically centered on the "trust game." On Berg et al.'s account of this economic game, "Subjects in room A [the investors] decide how much of their $10 show-up fee to send to an anonymous counterpart in room B [the trustees]. Subjects were informed that each dollar sent would triple by the time it reached Room B. Subjects in room B then decide how much of the tripled money to keep and how much to send back to their respective counterparts" (1995, 123). Kosfeld et al.'s study (2005), in particular, was hailed as early support for the view that the exogenous addition of oxytocin heightens interpersonal prosociality (Smith et al. 2017, 621),[6] and Persson and Savulescu cite it to support the feasibility of strengthening altruism through biotechnology (2012, 118–19).

Subsequent studies and reviews gainsay the rosy view that oxytocin promotes prosociality, pure and simple. Rather than warranting the conclusion that we should not rely on oxytocin alone (Persson and Savulescu 2012, 120), this growing picture suggests that we should not do so at all.

Having sifted through alleged findings of greater prosociality, Bartz et al. conclude that "almost half of the studies/outcomes reported in the prosociality domain found no significant main effect of oxytocin. . . . Moreover, situational or individual difference factors moderated 60% of the outcomes reported" (2011, 304). Further, a number of studies found "antisocial . . . effects, such as increasing feelings of envy, mistrust . . . [and] out-group derogation" (304). Since the review of Bartz et al. in 2011, the amount of research on oxytocin and antisocial behavior has increased (Smith et al. 2017). Per Smith et al.'s literature review, more recent work (e.g., Ne'eman et al. 2016) "highlights our growing understanding of the importance of oxytocin in mediating a range of antisocial behaviors" (2017, 621); in sum, their review and pilot data underscore "the potential for oxytocin to promote both prosocial and antisocial behaviors" (625). What's more, such findings, though brought to the fore only recently, have existed "from the early days of research on OT" (Beery 2015, 179).[7]

Among studies of oxytocin that have documented antisociality, Shamay-Tsoory et al. (2009) provide a telling illustration. They hypothesized that if oxytocin "is involved only in prosocial positive emotions, then the [exogenous] administration of OXT would diminish the levels of envy and gloating. By contrast, if OXT is generally involved in modulating social emotions, then the administration of OXT would be expected to increase the ratings of envy and gloating" (868). Shamay-Tsoory et al. contextualized their finding, that oxytocin "increases reported levels of envy and also has a moderate effect on gloating in healthy [subjects]" (869), thus:

> As envy and gloating are emotions related to negative feelings, such as resentment, the increase in these emotions following OXT administration is largely contradictory to the widely accepted prosocial hypothesis of OXT. . . . Rather than increasing only positive prosocial altruistic emotions, it appears that OXT may have a general effect on increasing the salience of social agents and therefore promote social behavior and a wider range of social emotions, such as envy. (868)

On this basis, Shamay-Tsoory et al. see the oxytocin system as "responsible for modulating the salience of social agents in social contexts" (869); thus construed, it makes sense that boosting oxytocin in research subjects would "provoke a wide range of emotions and [social] behaviors . . . such as trusting collaborators, attacking potential intruders, and competing with rivals" (869). Below, I return to this emphasis on salience in social settings.

Oxytocin strengthens prosocial and antisocial conduct, not only interpersonally, but also on the level of groups. De Dreu et al. found a heightened occupation with the welfare of one's own group, fostered indirectly by "aggression against the out-group" (2010, 1408–1409). They tested the hypothesis that ethnocentrism, defined as "the tendency to view one's own group as centrally important and as superior to other groups," is both "a key mechanism facilitating . . . in-group cooperation" and what oxytocin promotes (2011, 1262). Per their results, oxytocin fosters "intergroup bias because it motivates in-group favoritism and, in some cases, out-group derogation" (1264).

As such findings suggest, what has often been seen as oxytocin's univocal boosting of prosociality is actually a double-edged phenomenon. On De Dreu et al.'s formulation, "Through its influence on in-group favoritism, oxytocin contributes to the development of intergroup bias and preferential treatment of in-group over out-group members. Because such unfair treatment triggers negative emotions, violent protest, and aggression among disfavored and excluded individuals, by stimulating in-group favoritism, brain oxytocin may trigger a chain reaction toward intense between-group conflict" (2011, 1265). They therefore reject the sensationalist claim that oxytocin is "a 'cuddle chemical' or 'love drug.' . . . Rather than making humans prosocial, oxytocin functions to strengthen an . . . evolved and rather functional tendency to discriminate between in-group and out-group as well as to give members of one's own group preferential treatment. Such ethnocentrism has adaptive value to individuals and their groups but, unfortunately, also paves the way for intergroup bias, conflict, and violence" (1265).

Persson and Savulescu need us to surpass "parochial altruism" (2012, 83): optimally, we would view everyone, the world over, in the same altruistic light (122–23). Though they cite De Dreu et al.'s (2011) finding that prosocial boosts of oxytocin are restricted to one's own group (Persson and Savulescu 2012, 119), they do so without gleaning just how damaging studies like it are to their practical proof of concept for augmenting altruism biotechnologically.

Far from contesting the finding that oxytocin fosters prosocial responses strictly within one's group and may augment antisocial conduct toward outsiders, Persson and Savulescu simply persist in classifying oxytocin as a "moral bioenhancer" (2019, 10). Their sole concession is indirect: "That oxytocin by itself does not suffice for requisite moral enhancement does not show that it cannot be an indispensable aid" (2012, 120). Oxytocin merely "needs to be seconded by moral reflection" (2019, 10). Their argument here is self-defeating. Moral bioenhancement is supposedly needed because reason alone is insufficient for extending the scope of our moral concern. But when it turns out that prosociality, as such, is not clearly improvable via oxytocin, Persson and Savulescu abruptly change course and allocate a key, if indeterminate, role to rationality. If, however, reflection was inadequate from the start—hence the necessity of augmenting prosocial attitudes in the first place—why think it sufficient to override an oxytocin-mediated scenario that includes *greater* antisociality?[8]

Persson and Savulescu's claim that the exogenous administration of oxytocin has "moral effects," or "moral consequences" (2012, 121), is true only in the restricted sense that it has a moral impact of *some* kind on subjects' behavior. Research has not shown oxytocin to have the specific moral result they seek. What's more, the moral impacts it does have on behavior run counter to the widespread view that it strengthens human prosociality per se.

Shamay-Tsoory et al.'s view that the oxytocin system is "responsible for modulating the salience of social agents in social contexts" (2009, 869) suggests the existence of a single conceptual lens under which both prosocial and antisocial responses may be united. Alongside their growing appreciation of the link with antisociality, scientists increasingly accept this unifying lens of "social salience" (see, e.g., Bartz et al. 2011; Beery 2015; Gao et al. 2016; Ne'eman et al. 2016; Shamay-Tsoory and Abu-Akel 2016).[9] The upshot: Oxytocin "promotes positive social behaviors such as trust"—if and where it does so—"by increasing the salience of social cues. . . . The effects of OXT remain highly sensitive to person-specific and contextual factors, and thus, might also evoke protective and defensive-aggressive reactions, especially with respect to competing outgroups" (Hurlemann and Marsh 2017, 335–36). Carsten K. W. De Dreu's own review (2012) reached a similar conclusion. Further, research on oxytocin and nonhuman animals now supports a social-salience lens on its behavioral impacts (Anacker and Beery 2013; Beery 2015; Anacker et al. 2016).

Scientists' foregrounding of "general mechanisms" such as social salience runs counter to the view, instantiated by Persson and Savulescu, that "[a] widely acting hormone or neurotransmitter will be narrowly funneled to modulate complex, high-order mental processes that are specific to social cognition" (Churchland and Winkielman 2012, 398)—in the case at hand, that administering OT "broadly and invariantly improv[es] . . . prosocial behavior" (Bartz et al. 2011, 307–308). In terms of Persson and Savulescu's proof of concept, this matters greatly because implementing their universal program of moral bioenhancement would require blunt instruments, here, that oxytocin be "the moral molecule" (Churchland and Winkielman 2012, 393) where altruism was concerned. Such means would need to be easy to introduce, comparable to the addition of fluoride to drinking water for the sake of public health; that Persson and Savulescu are thinking along these lines is evidenced by their making precisely this comparison (2008, 174).

The comparison with fluoride reflects Persson and Savulescu's notion that simply increasing neurotransmitter levels in the brain would be beneficial, here, that since oxytocin "is a pro-social hormone . . . adding extra oxytocin would at the very least promote trusting pro-social behaviors" (Savulescu and Sandberg 2008, 36). This is a vast oversimplification of what research already cited shows. What's more, within the brain, oxytocin's impact takes the form of an inverted U-curve, meaning that, as documented for dopamine in Chapter 1, levels both low and high are associated with behavioral impairment (Groppe et al. 2013, 177–78; Zhong et al. 2012, 4–6; Feng et al. 2015, 523; Rilling et al. 2014, 246).

Despite the plethora of countervailing evidence, in 2019, Persson and Savulescu continue to believe that while it could not accomplish the entirety of moral bioenhancement, the "bioenhancer" oxytocin represents "one of the most interesting scientific findings so far" (10, 9). Similarly, in 2018, they assert that "it could be desirable to enhance our capacity for empathy and concern by drugs . . . like oxytocin" (191). Though their view oversimplifies even the earliest findings, by now, it is quite outdated.

3.2 Serotonin

Extensive research exists on the impacts of increasing and reducing amounts of available serotonin, with reduction induced by experimental depletion of l-tryptophan, the lone precursor of this neurotransmitter (Richard et al. 2009, 47). Studies of l-tryptophan depletion have involved "healthy" subjects, while research on serotonin's exogenous addition has mostly focused on those already taking selective serotonin reuptake inhibitors (SSRIs); an exception is Crockett et al. (2010), discussed later in this subsection. This class of drugs, routinely used for major depression but also prescribed for panic disorder and obsessive-compulsive disorder, functions by "selectively inhibit[ing] the reuptake of serotonin at serotonin transporters, and as a result . . . increase[s] serotonin concentrations within the synaptic cleft to further stimulate postsynaptic serotonin receptors" (Hillhouse and Porter 2015, 4). As studies featuring the addition of serotonin to healthy subjects to explore links between serotonin and aggression cannot ethically be run (Crockett 2014, 370), one has to rely on studies of people taking SSRIs and those on nonhuman animals whose serotonin is boosted exogenously. Since it is generally accepted that "an adverse mental or behavioral reaction . . . that is observed in regard to one SSRI is likely to be found with all the other[s]" (Breggin 2003/2004, 32), when discussing antisocial impacts, I will not address SSRIs individually.

It turns out that the exogenous addition of serotonin may have either an ameliorating or a precipitating impact on impulsive aggression (Okada and Okajima 2001). Increasingly, research addresses its role in promoting aggression and impulsivity. Though SSRIs have also been linked to increases in premeditated aggression, insofar as serotonin is tied to aggression, it is almost always the impulsive kind (Crockett et al. 2010; Coccaro 2012; Wiseman 2014a). SSRIs are also tied to "highly troublesome aggressive obsessions" (Modestin 1998, 587); though not acted upon, this ideation reflects internal disinhibition of a violent nature (587).

The aggression at issue in humans can be self- or other-directed. The latter type includes murder and assault (Breggin 2001; 2003/2004). Here, "It is a fantastic irony that Persson and Savulescu (2008) conclude the very article in which they posit the possible use of SSRIs as a means for reducing violent aggression with the cautionary tale of Seung-Hui Cho, the Virginia Tech killer of 2007. *At the time of the murders, Cho was being medicated for depression*" (Wiseman 2014a, 25). As for self-directed violence, "Studies show that many more suicides are *attempted* on normal doses of SSRIs beyond what is seen on placebo or many non-SSRI antidepressant drugs" (Kauffman 2009, 11). SSRIs "can induce obsessive suicidal ideation" of a violent nature in patients with no prior experience of it (Teicher et al. 1993, 193–94).

Peter Breggin has been especially tenacious in pointing out the risks of aggression/violence linked to SSRIs (2001; 2003/2004; 2004a; 2004b; 2010). Based on extensive work as a psychiatrist and medical expert (2004b, 2), he offered guidance to the US Food and Drug Administration (FDA):

> When evaluating the vulnerability of children or adults to SSRI-induced adverse drug reactions, the inquiry should be broadened from suicidality to include the overall problem of SSRI-induced mental and behavioral disturbances, such as manic-like syndromes, agitated depression, agitation, anxiety, akathisia, and insomnia. These phenomena can be understood as a continuum of stimulant adverse effects that, in their extremes, result in manic psychoses with violence and agitated depressions with suicide. (2004a, 1)

Elsewhere, Breggin adds hostility to the above list of effects (2003/2004, 33). Based on his clinical and forensic expertise, along with literature reviews, he identifies four "syndromes": aggression and/or violence figures in them all (46). In terms of impulsive conduct, beyond their ties to violence, SSRIs have been linked to property crimes (Glancy 1993; 1996, 389).[10]

Against the backdrop of these antisocial findings, one may already incline to skepticism about Persson and Savulescu's claim that SSRIs "make subjects more fair-minded and willing to cooperate" (2012, 120) in "one-shot" ultimatum and dictator games. In what follows, I address that claim directly. As described by Yamagishi et al. (2012, 20364), in ultimatum games, a sum chosen by experimenters is given to the "proposer," who decides how much, if any, to offer an anonymous "responder." The responder's sole options are to accept or reject that offer; if the offer is refused, both players walk away empty-handed. In these experiments, responders frequently reject unfair, or unequal, offers. The dictator game is like this, except that the second player lacks the option to reject the first player's offer (Brañas-Garza et al. 2014, 1). According to Persson and Savulescu, studies revolving around these economic games show that serotonin renders subjects making financial offers "more fair-minded" and respondents in the ultimatum game more prone to reject unfair offers (2012, 120), which phenomenon they take to stem from a concern with fairness per se.

That said, they express uncertainty, asking: Do such rejections "really signify a heightened sense of (un)fairness, or just greater aggressiveness and irascibility, which increase the probability that people will actually protest against what they see as unfairness?" (2012, 121). Here, as in their handling of De Dreu et al.'s (2011) finding for oxytocin, noted above, Persson and Savulescu fail to realize how far a concession they make undermines their own position. In any case, straightaway, they retreat to claiming that increasing serotonin has "moral effects. There are then prospects of moral bioenhancement" (2012, 121). The evidence they provide, however, warrants only the weaker claim that upping quantities of neurotransmitters like serotonin affects moral behavior—not the stronger one they require for practical proof of concept, that SSRIs augment subjects' "sense of justice/fairness."

In their staging of the ultimatum game, Crockett et al. found that higher levels of serotonin made healthy subjects less prone to countenance harm only to individuals and, here, only if they were personally involved in its infliction (2010, 17435–36); there was no impact on the impersonal variety (17435). This goes against the notion that serotonin augments a sense of fairness per se, as part and parcel of such a concern would be an aversion to *impersonal* harm. Such a result is not good news for Persson and Savulescu, who require an expansion of prosocial concern not merely to unfamiliar individuals but to unknown aggregates.

Crockett et al. also found that the aforementioned aversion to inflicting harm was greater in subjects who were high in trait empathy (2010, 17436). Given that Persson and Savulescu lodge empathy under altruism (2012, 109, 116), those requiring help, however, are the vast numbers of people who are empathically deficient. Further, they deem conquering *akrasia* key to our avoiding ultimate harm and expect neurobiological aid here from serotonin. Crockett et al.'s finding that what serotonin promotes is not impulse control per se—which SSRIs can impair—but rather an aversion to "personal harms," suggests that this expectation is unwarranted.

As with oxytocin, a more general stumbling block to Persson and Savulescu's proof of concept is our neurobiological complexity, such that even if "we were to amass a body of evidence that a single neurotransmitter (e.g., serotonin) reliably and substantially reduced people's propensity to physically harm others" (Crockett 2014, 370), which possibility is remote,

> before we pull out the prescription pads, it will be important to consider the potential unintended consequences of altering the function of that neurotransmitter. . . . Most neurotransmitters serve multiple functions and are found in many different brain regions. For example, in addition to its involvement in social behaviour, serotonin plays a role in a variety of other processes, including . . . learning, emotion, vision, sexual behaviour, appetite, sleep, pain and memory, and there are at least 17 different types of serotonin receptors that produce distinct effects on neurotransmission. (370–71)

These penetrating comments are especially notable for having been made by Molly Crockett—a neuroscientist whom Persson and Savulescu cite to support practical proof of concept for serotonin (2012, 120).[11]

In addition, like oxytocin and dopamine, serotonin does not deliver benefits by simple quantitative elevation. The emergence of obsessive and violent suicidal ideation, and of impulsive aggression directed to others, may actually be tied to excess available serotonin (Teicher et al. 1993, 195–97); further, in nonhuman animal studies involving exogenously added serotonin, rodents manifest behavioral correlates of risk factors for human suicidal behavior (Malkesman et al. 2009). Harris Wiseman thus rightly rejects the assumption that, "in cases of severe aggression and so forth, the dosage of SSRIs can be simply upped to the point that it begins to work. . . . Effectiveness and safety with SSRIs sit together between two fairly narrow margins" (2014a, 23).

Moreover, "After a certain point . . . concentrations [of serotonin] become fatally toxic. While it is true that there is a U-curve pattern of efficacy with most drugs," advocates of moral bioenhancement do not suitably recognize "the fatal potential of serotonin toxicity" (23). This phenomenon is medically recognized, however, as "serotonin syndrome" refers to a harmful, even "life-threatening," condition that stems from "excess serotonin" and spans "a clinical triad of mental-status changes, autonomic hyperactivity, and neuromuscular abnormalities" (Boyer and Shannon 2005, 1112). On grounds such as the foregoing, the notion of elevating levels of serotonin until the sought-for moral effect occurs is deeply flawed (Wiseman 2014a, 23).

What's more, the brains of those whose serotonin levels have been raised exogenously produce less serotonin, and withdrawal symptoms include mood swings and disproportionate anger (Wiseman 2014a, 23–24). Worth noting, finally, is an "apathy syndrome," induced by SSRIs, that is tied to behavioral and emotional indifference (Sansone and Sansone 2010). Though clinicians and patients often mistake it for a symptom of the underlying depressive condition, the texture and origin of this apathy are distinct (Marin 1991; Sansone and Sansone 2010). Apathy syndrome and the linkage of SSRIs to impulsive aggression prompt Wiseman's observation that SSRIs seem to "work, ultimately, by suppressing higher order brain function—powers that most agree are rather important in moral discernment and practical wisdom" (2014a, 24). Since the difficulty here is not with SSRIs, specifically, "but rather with the very way serotonin interacts with the brain, overcoming [it] is not something that can be achieved by simply 'making better drugs' " (24).

3.3 Genetics

According to Persson and Savulescu, beyond neurobiological manipulation, "altering our . . . genes" can affect moral motivation because "we share [our moral-attitudinal] core with non-human animals from which we have evolved" (2008, 169, 168).

That genes influence human traits is not in question. There are pronounced differences, however, in the nature and scope of that impact. Here, the key general point is that while a clear-cut physical feature like eye color is "under strong genetic control," genes' relation to complex phenotypic traits, such as kindness, trust, and aggressiveness, is nuanced and indirect (Sturm et al. 2008, 424; Duster 2003, 127–29; Levy 2004, 182; Rosoff 2012, 165–68; Malmqvist 2014, 47).

Having previously assessed research on behavioral impacts of oxytocin's exogenous administration, let us begin by considering the oxytocin receptor gene (OXTR). Nave et al. document the failure of attempts to tie trust to single nucleotide polymorphisms (SNPs) of this gene (2015, 781–82); more generally, their review found no "robust associations between OXTR SNPs and social behaviors" (781). As for characterizing associations that are detected, the social salience hypothesis stemming from research on the oxytocin hormone looks to be consistent with research on the OXTR gene (Smearman et al. 2015, 310).

Far from being anomalous, findings for OXTR exemplify strong limits on what genetic studies can reveal, especially regarding complex phenotypic traits. Benjamin et al. conducted a "genome-wide association study" with a sample size "an order of magnitude larger" than most prior ones (2012, 8027, 8030). Their investigation of individual SNPs did not show "any associations that are significant at the conventional threshold of genome-wide significance required in genetic association studies. This is unsurprising in light of the accumulating evidence that the effects of common variants on complex outcomes are small" (8029). Importantly, the study of Benjamin et al. was "well powered to detect individual markers that explain at least 1.25% of trait variation. . . . No single SNP in our sample attains this level of significance. . . . Moreover, 1.25% is an upper bound to the effect sizes we can rule out" (8029).

The scenario documented above obtains "even for traits that are known to be highly heritable, such as IQ" (Nave et al. 2015, 782). Though genetic findings may seem dramatic, "Trying to discover effects of a small number of genetic SNPs is now thought to be almost impossible," and huge samples would be needed "to identify possible, yet tiny, polygenic effects" (781). Benjamin et al., too, speak of "an emerging consensus . . . that genetic variants that individually explain a substantial share of the variation in complex traits are unlikely to exist" (2012, 8029). Based on the above, "Most published candidate gene studies . . . are almost surely false positives" (Nave et al. 2015, 781; see also Benjamin et al. 2012, 8030). For this reason, journals such as *Behavior Genetics* have tightened their editorial policies (Hewitt 2012; Nave et al. 2015, 781).

Moreover, close scrutiny of data on twins, cited by many—Persson and Savulescu among them (2008, 171)—as clear-cut evidence that genes strongly shape complex phenotypic traits, offers a picture of genetic, as distinct from environmental, contributions that is less sharply defined (Krueger et al. 2008; Zarpentine 2013, 147). Indeed, many impacts on these features, including in the case of twins, do not fall neatly under "genetic" or "environmental" per simple models of the gene-environment relation (McGue et al. 2005; Krueger et al. 2008; Danchin et al. 2011). A more subtle lens on heritability "has implications for research that aims to identify the specific molecular-level polymorphisms that underlie genetic effects on personality. In general, progress in understanding the molecular genetics of personality has been slow. The problem has been one of small effect sizes and associated difficulty in replicating effects from study to study" (Krueger et al. 2008, 1516).

In sum, "Excitement about the practical usefulness of molecular genetic data . . . needs to be tempered by an appreciation that much of the heritable variation is likely explained by a large number of markers, each with a small effect in terms of variance explained" (Benjamin et al. 2012, 8030). The stumbling blocks to practical manipulability are "even greater . . . because the phenotypes are usually several degrees removed from genes in the chain of biological causation" (8029). The existence of this causal remove supports a strong form of "interactionism," itself defined as a critical lens on "behavioral genetics that emphasizes the interaction between genes and environment" (Barendregt 2003, 73n7). Unlike those disposed to mechanistic explanations, interactionists put significant weight on social context and epigenetics, whose province is "heritable phenomena that regulate gene expression without involving changes to the DNA" (73–75; Sutherland and Costa 2003, 151).[12] With complex traits, including trust, altruism, and aggressiveness, interaction is especially nuanced.

When lauding prospects for the genetic manipulation of such traits, Persson and Savulescu ignore human complexity—as when they treat differences between men and women as natural givens such that men could be improved, genetically or neurobiologically, to be "more like" women currently are (2012, 111–12). If men and women generally differ in their manifestations of traits, here, sympathy (i.e., altruism) and aggression, "This is good evidence that the trait is biologically based" (108, 111). And if these distinctions are biologically embedded, then "in principle we could make men in general more moral by biomedical methods through making them more like the men who are more like women" with respect to sympathy and aggression (111–12). Here, Persson and Savulescu claim to translate the stance of Simon Baron-Cohen on sex-based differences in human empathy into a conclusion about altruism in their framework, which lodges empathy under it (111). Baron-Cohen's lens on empathy is controversial in its own right, but he at least notes interaction, albeit of a simple variety: while individual levels of empathy stem in part from biology, "Culture and socialisation play a role in determining if you develop a male brain (stronger interest in systems) or [a] female brain (stronger interest in empathy)" (2005, 25). When relying on him, Persson and Savulescu do not go even this far (2012, 111–12).

In the remainder of this subsection, I address their specific claim, under proof of concept, that "immoral behaviour is beginning to be elucidated. For example . . . criminality has been linked to an MAO mutation on the X chromosome, especially when coupled with social deprivation" (Persson and Savulescu 2008, 172); further, those receiving moral bioenhancement via genetic manipulation in childhood will later be grateful "since otherwise they might have been criminals" (2012, 113). Far from being straightforward, the link of the gene monoamine oxidase A (MAOA) with aggression exemplifies the previously documented scenario for complex phenotypic traits. Before I defend this position, it is useful to supplement Persson and Savulescu's remarks with pertinent comments of Savulescu's elsewhere.

Savulescu et al. observe that "the most compelling evidence of a genetic link to a form of criminal behaviour derives from the criminal profile" of a Dutch family in which "a mutation was . . . identified that resulted in the complete absence of functional MAOA enzyme" in a striking number of its male members (2006, 159).[13] They mention Caspi et al. (2002), the first study of how, if at all, varying levels of the MAOA enzyme, accompanied by childhood mistreatment, affect antisocial conduct in a broader population. Allegedly, Caspi et al. found that an association of low levels of MAOA (MAOA-L) with aggression "was displayed most dramatically in individuals who experienced childhood mistreatment" (Savulescu et al. 2006, 160); further, Savulescu et al. purport to rely on Caspi et al. when claiming that "the MAOA mutation is not associated with all instances of abnormally aggressive behaviour" (160).

Savulescu et al. gesture repeatedly toward genetic causation of aggression: people should avoid "production of a baby with extreme violent tendencies" (165); we should "[screen] for violent tendencies" (165) and use "eugenic selection . . . to reduce the incidence of genetically-based criminality" (167). Similarly, in an article entitled "Why Genetic Testing for Genes for Criminality Is Morally Required," Savulescu speaks of "a gene for severe impulsiveness" and "genes associated with criminality," illustrating "the scope of behavioural genetics" in a table that includes the entry "aggression and criminal behaviour" (2001b, 86, 90, 81–82; see also 2001a, 417).

When these sources suggest that MAOA is *the* basis of human aggression, they conflate an anomalous scenario in which the MAOA enzyme is absent (i.e., a mutation) and the existence of wide, normal variation in the amount that is produced (i.e., a polymorphism). What's more, they are not alone, for Thomas Douglas, a nontranshumanist advocate of moral bioenhancement, does so as well (2008, 233).

The MAOA gene, "on the X chromosome . . . encodes the MAOA enzyme, which metabolizes neurotransmitters such as norepinephrine (NE), serotonin (5-HT), and dopamine (DA), rendering them inactive" (Caspi et al. 2002, 851). Affected males in the aforementioned Dutch family have "[an] extremely rare" mutation whereby they produce no MAOA enzyme (851); this is a "point mutation," which "occurs when a single nucleotide is added, deleted or substituted" (Karki et al. 2015, 2). Further, the males with this mutation are affected by a syndrome in which impulsive aggression and borderline mental retardation are conjoined (Brunner et al. 1993, 578). Given its rarity, one cannot associate this mutation—"a null allele at the MAOA locus"—with more than a tiny amount of human aggression (Caspi et al. 2002, 851; Nelson and Trainor 2007, 541).

Since, avowedly, Caspi et al. address the MAOA polymorphism, not the mutation (2002, 851), their study *could not do* what Savulescu et al. claim, namely, reinforce the view that "the MAOA mutation is a significant risk factor for males developing violent or criminal tendencies" (2006, 160). A mutation is "any rare change in the nucleotide sequence, usually but not always with a disease causing attribute," while a polymorphism is "a variation in the DNA sequence that occurs in a population with a frequency of 1% or higher" (Karki et al. 2015, 2). Caspi et al. launched an enduring stream of research on "a repeat length polymorphism (containing a variable number of tandem repeats) that . . . contains four common alleles that have three to five repeats of a 30-base pair (bp) sequence. In vitro experiments indicate that these allelic differences . . . could result in two- to tenfold differences in transcriptional activity in the MAOA gene" (Nelson and Trainor 2007, 541). In other words, on account of the polymorphism, within the normal human population, individuals differ widely in the amount of MAOA enzyme that their brains produce (541). Notably for our purposes here, MAOA-L, the polymorphism whose possessors produce low quantities of the enzyme, "is extremely common and occurs in about 40% of the population. Clearly, most of these people are peaceable and have never committed a crime" (Hunter 2010, 667).

Apart from investigations of the MAOA polymorphism, it is well established that "maltreatment by an adult or caregiver during childhood is a prevalent and important predictor of antisocial [in particular, aggressive] behaviors in adulthood" (Haberstick et al. 2014, 25). Caspi et el. inaugurated research on whether MAOA-H (the polymorphism whereby individuals produce high amounts of MAOA enzyme) operates as a buffer such that mistreated children with that polymorphism would be less likely than those with MAOA-L to engage in antisocial behavior. Their central result, which they described as "initial" and needing replication, was that antisocial behavior was significantly less frequent among mistreated children with MAOA-H (2002, 853). A secondary finding was that, absent maltreatment, MAOA-L was not a risk factor for aggressive behavior (852–53). Although this finding has held up, attempts to replicate their core association of childhood mistreatment and MAOA-L with antisociality have been inconclusive (Huizinga et al. 2006; Reif et al. 2007, 2379–81; Haberstick et al. 2014).[14]

Where similar findings have been reported, effect sizes are much smaller than Caspi et al.'s (Haberstick et al. 2014, 25–26). Several studies have simply failed to replicate their core finding (Haberstick et al. 2005; Huizinga et al. 2006; Young et al. 2006). Caspi et al. (2002) linked MAOA-L with antisociality, viewing MAOA-H as helping to militate against it. Other experiments have found the reverse, tying MAOA-H, not MAOA-L, to male aggression (Manuck et al. 2000; Beitchman et al. 2004); Sjöberg et al. (2007) found the same pattern for girls.[15]

Since the relation of genes to complex phenotypic traits is nuanced and indirect, it is highly unlikely that blunt means could be used without our courting disaster.[16] Persson and Savulescu are not the only advocates of moral bioenhancement who do not adequately appreciate this point. Like them, Douglas is optimistic about its practical feasibility. He grants that, owing to "the bluntness of the instruments (likely to be) available . . . moral decline" is "a serious risk" (2013, 166), yet brushes that risk aside via a comparison with medical treatments:

> Many medical interventions are risky in a similar way. Almost any medical intervention will, *if pursued to too great a degree*, have the opposite effect than that intended. . . . Moreover, most medical interventions are rather blunt, and *it is thus difficult to prevent them from having overall negative effects in some cases*. . . . However, we do not, and should not, regard this as providing us with

> decisive reasons to abstain from medical treatments. Rather, we take it as giving us reasons to exercise caution in *using* such treatments, and to try to reduce the risks posed by the treatments over time . . . by *making them more precise*. (166–67, emphasis added)

Framing the problem in terms of "degree[s]" misses the point with respect to the complex traits at issue in moral bioenhancement, as does Douglas's notion, shared with Persson and Savulescu, that achieving greater precision is a solvable *technical* problem. Douglas's tight parallel with medical treatments is inapt. Individuals often consider it worthwhile to continue using an FDA-approved treatment for a serious illness that works for them but has unsalutary concomitants. The person tolerates these side effects because the boon to her health outweighs associated risks and unpleasantness. Of course, any approved treatment will be ineffective for some; further, where it works, an individual may find the side effects unacceptable. When a measure has "overall negative effects" (Douglas 2013, 167), that is because it fails to count as a treatment at all or as an acceptable treatment *for that person*. In both situations, the measure would be discontinued.

With bioenhancement of moral attitudes, the problem is not that a given measure would likely work well for wide swaths of the population though not for all. Rather, given our neurobiological and genetic complexity, conjoined with strong interactionism, we have no good reason to think that measures of comparable effectiveness to established medical treatments could be found.

3.4 Conclusion

Strikingly, even Persson and Savulescu acknowledge that we are delicately balanced organisms. But rather than directly address the implications of this for their own advocacy of moral bioenhancement, they use it to reinforce their claim that it is far easier to wreak harm than to provide comparable benefit:

> Even if it had been as easy to save life as to kill, which we have argued that it is not, it would not be true that our capacity to benefit would be as great as our capacity to harm by these means. This is based upon a general point about the conditions for the existence of a complex, organized state, such as human life. There are an indefinite number of conditions which are necessary to keep it functioning. The removal of any of these is enough to disrupt its functioning, but to ensure its function, we have to see to it that *all* of these conditions remain in place. . . . The life of a person is like a house of cards. It only takes the removal of one card for the house to fall down. (2013, 126)

Yet again, Persson and Savulescu make a damaging admission without gleaning its implications for the tenability of their own account.

4. Evolutionary Biology, Evolutionary Psychology, and Morality

Having undermined Persson and Savulescu's practical proof of concept for moral bioenhancement, I now challenge their theoretical contention that means of moral bioenhancement "are possible in principle because the central moral dispositions of altruism and a sense of justice are biologically based" (2019, 14). As previously observed, they must show theoretical proof of concept, for, if these attitudinal kernels do not exist, "there can be no . . . spreading" of them (2012, 108).

The theoretical argument of Persson and Savulescu is rooted in evolutionary psychology, a highly contentious endeavor in its own right. Juxtaposing their claims against the backdrop of evolutionary biology will reveal why we should not concur that our evolutionary legacy includes an altruistic attitude and sense of justice/fairness. Though, as before, I focus on Persson and Savulescu, insofar as "advocates of moral bioenhancement often draw upon arguments from evolutionary psychology to buttress the claim that our moral dispositions have a biological basis" (Sparrow 2014b, 27), my unmasking of these flaws problematizes all defenses of moral bioenhancement that rely on evolutionary psychology.

4.1 Defining "Altruism" and "Cooperation" within Evolutionary Biology

Those working in biology, philosophy, psychology, and economics use the term "altruism" in different senses "in order to fit the particular research contexts and needs of each discipline. This has generated much confusion, because the differences are . . . not always made explicit" (Clavien and Chapuisat 2013, 126). This lack of consistency also leaves the pertinence, if any, of empirical and theoretical findings to our grasp of human morality unclear (135–36).

Altruism has garnered extensive attention from evolutionary biologists. Christine Clavien and Michel Chapuisat (2013) identify four types: reproductive-, behavioral-, psychological-, and preference altruism. In biology, "altruism" refers to "reproductive altruism" (aka "biological altruism"), typically defined "as a behaviour that increases other organisms' fitness and permanently decreases the actor's own fitness" (Ramsey 2016, 33; Clavien and Chapuisat 2012, 1). Being "tightly associated with an evolutionary scenario," reproductive altruism "implies nothing about mental states" (Clavien and Chapuisat 2013, 133; Lichtenberg 2008, 3): social insects are common illustrations, and slime molds exhibit it (Clavien and Chapuisat 2013, 128, 136).

Because reproductive altruism reduces fitness, its very existence is initially puzzling (Clavien and Chapuisat 2012, 2). The predominant explanation of reproductive altruism is "kin selection," the "process by which traits are favoured because of their effects on the fitness of related individuals; the way in which natural selection [operates here] may be separated into direct and indirect components" (2; West et al. 2011, 232). The sum of these contributions is termed "inclusive fitness" (West et al. 2011, 233). Because indirect contributors are harder to pin down, they offer greater scope for disagreement among evolutionary biologists. An alternative explanation of reproductive altruism is selection at the level of groups, treated as "functional units" (Clavien and Chapuisat 2012, 3). Although kin selection enjoys more support from scientists, proponents of both explanations agree that "true reproductive altruism, with a permanent cost to the actor, will only evolve in groups of genetically related individuals" (3).

A second form of altruism is the behavioral variety. Per Clavien and Chapuisat's definition, "A behaviour is altruistic if it brings any kind of benefit to other individuals at some cost for the agent, and if there is no foreseeable way for the agent to reap compensatory benefits from her behaviour" (2013, 131). In much psychological and philosophical literature on behavioral altruism, "The standard currencies used are money or material goods" (131). From the perspective of evolutionary biologists, the term "altruistic" is often used too freely, as when it is said to characterize behavior noted by experimenters on single occasions, in isolation from "humans' everyday experiences [and] past evolutionary conditions" (133).

One must distinguish behavioral altruism from so-called reciprocal altruism, which is not actually altruistic because it offers "a direct fitness advantage" (West et al. 2007, 420). "Cooperative behaviours that benefit both the actor and the recipient(s) of the behaviour are termed *mutually beneficial*—although they may appear altruistic, they are not" (2011, 235–36).[17] "Reciprocal altruism" is thus better termed "reciprocal cooperation" (2007, 420). Behavioral altruism is routinely construed in terms of discrete episodes, while reciprocal cooperation is often ongoing, up to and including "life-long partnerships with highly iterated interactions" (Clavien and Chapuisat 2013, 133; Bergstrom et al. 2003, 244); examples are cleaning symbioses among fish and bacterium-plasmid relationships (Trivers 1971, 39–43; Bergstrom et al. 2003, 253–54). An upshot is that what qualifies as altruistic behavior in humans is a far narrower range of conduct than is usually construed as such (West et al. 2007, 421–23).

While reproductive altruism is tied to "core behavioral dispositions," psychological altruism is "based on facts about the psychological states of individuals"—their being "motivated by altruistic primary motives" (Ramsey 2016, 34; Clavien and Klein 2010, 269). Specifically, psychological altruism "is based on an act for which the ultimate desire is the well-being of another" (Ramsey 2016, 36). This, intention-centered, notion of altruism is the one most prominent in philosophy and psychology (Clavien and Chapuisat 2013, 127; Stich 2016, 4–5).

Reproductive and behavioral altruism are defined in terms of results, "independently of the actor's consciousness or subjective motivations" (Clavien and Chapuisat 2013, 128). In contrast, psychological altruism can count as the impetus to an act's performance irrespective of whether the sought-for outcome occurs or the conduct in question even promotes that goal (127; Ramsey 2016, 34). While reproductive altruism is manifest in creatures across the natural world, psychological altruism is likely not a product of natural selection at all.

Unlike psychological altruism, the "preference" variety does not require "genuine concern for others. . . . For example, a person who refrains from buying luxury items and prefers to periodically give her extra money to a charity displays preference altruism. However, if her other-regarding preference is itself motivated by the expectation to regularly feel a warm glow inside or by the hope to increase her chances to enter Paradise after death, it would not count as psychologically altruistic" (Clavien and Chapuisat 2013, 133–34). Thus defined, psychological altruism is "a special case of preference altruism," as only the former requires "genuine concern for others" for their own sake (134).

Based on this conceptual grid, one can identify researchers' illegitimate inferences from acts to agents' motivation. As Clavien and Chapuisat observe, what is called "altruism" in experimental economics tends to be "more fuzzy and less restrictive" than in evolutionary biology (2012, 5). Though inferences from behavior to motivation are routinely made, subjects' actions in economic games are actually "weak indicators of people's actual motivations" (5). The result: those exploring "altruism" within different fields are not "discussing the same phenomenon" (2013, 126).

4.2 Persson and Savulescu's Confusion regarding Altruism

The imprecise deployment of "altruism terminology" that Clavien and Chapuisat (2013) bring to the fore is evinced by Persson and Savulescu, who indiscriminately reference different types of altruism and nonaltruistic cooperation to support their claims about humanity's altruistic attitude. They also vastly oversimplify the pertinent terrain, as when they suggest that the sole relevant distinction under "altruism" is between kin-altruism and the non-kin variety (2012, 32–33). Further, while they purport to anchor their account of altruism in an evolutionary context, Persson and Savulescu give insufficient weight to fitness, defined in terms of "rate[s] of survival and reproduction [or replication]," as the ultimate explanation of why altruistic and other forms of cooperative behavior evolved (Clavien and Chapuisat 2013, 128).

Though they do not use the term, what concerns Persson and Savulescu is psychological altruism: "To want or be concerned that things go well for beings for their own sake is to have an attitude of *altruism*, *sympathy* or *benevolence* towards them" (2019, 8); what counts is "your moral *motivation*, your disposition to (*decide* and) *try* to do what you think you ought morally to do, rather than your capacity to *implement or put into effect* such tryings, to succeed if you try" (7). Though, within evolutionary biology, psychological altruism is not acknowledged, when Persson and Savulescu treat it as a product of natural selection, they take themselves to rely on that field. One may trace this disconnect to the fact that they are partisans of evolutionary psychology, which strives to account for humans' psychological features as adaptations to ancestral environments (Downes 2018). In operating thus, however, Persson and Savulescu leave evolutionary biology behind.

To illustrate: while reproductive altruism is the closest to pure altruism in the evolutionary sense, it does not qualify as altruism by their attitudinal definition. As Judith Lichtenberg observes, biological altruism is neither sufficient nor necessary for the psychological variety, and "even if we found no examples of evolutionary altruism, psychological altruism would still be possible" (2008, 3). In addition, having taken behavior that fits a certain description to reflect altruistic motivation (i.e., psychological altruism), Persson and Savulescu presume that this motivation is biologically rooted—this despite an acknowledgment that "one cannot observe the mental states of other agents than oneself" (2012, 23). In purporting to glean motivation from behavior, Persson and Savulescu follow many experimenters, who—unlike evolutionary biologists—wrongly infer straightaway that behind an act depicted as altruistic must be a corresponding motivation (Brañas-Garza et al. 2014; Clavien and Klein 2010).

Moreover, though, within evolutionary biology, altruistic conduct is a subset of cooperative behavior, Persson and Savulescu do not differentiate clearly between "altruism" and "cooperation" (2012, 33, 37–38). Further, they build a grateful attitude into behavioral reciprocity (32–33)—notwithstanding the fact that, in the context of evolutionary biology, it requires no cognitive ability at all. As Robert L. Trivers observes, psychologically speaking, gratitude is a specifically human emotion that "has been selected to regulate [our] response to altruistic acts" and that "is sensitive to the cost/benefit ratio of such acts" (1971, 49).

4.3 Persson and Savulescu on "a Sense of Justice/Fairness" and Economic Games

In *Unfit for the Future*, Persson and Savulescu anchor their argument that our sense of justice/fairness is an evolutionary adaptation in the notion of "tit-for-tat," which "sometimes designates a simpler pattern of reactions . . . in which the response to a failure to return a favour does not include anger, but simply consists in the discontinuation of the doing of favours to the ungrateful individual. However, this simpler pattern seems of less evolutionary value, since it allows ungrateful individuals to get away too easily. That is why we focus upon the richer pattern" (2012, 33n19). Supposing themselves to elucidate the latter, they state that nonreciprocators are "exclud[ed] . . . from future cooperation" and that reputational boons of acting cooperatively increase the likelihood that individuals will exhibit such behavior (37, 34).

Scrutiny of the preceding claims will show how detached from evolutionary biology Persson and Savulescu's so-called richer pattern of tit-for-tat actually is. First, contra their presentation (33n19), reciprocity, not tit-for-tat, is the appropriate conceptual genus. In game theory, "tit-for-tat" is the term given to the type of behavioral reciprocity under which Trivers (1971) classified cross-species symbioses involving fish (Guala 2012a, 3; Heath and Rioux 2018). In evolutionary biology, this purely behavioral phenomenon, called "weak reciprocity," does not require consciousness: bacteria, ants, and bees, for example, exhibit it. Further, weak reciprocity (aka tit-for-tat) is distinguished from the strong, intention-centered, variety, where individuals are motivated by a concern with fairness as such. Persson and Savulescu aim to show that our evolutionary legacy includes "a sense of justice/fairness." Put in the terms of evolutionary biology, they contend that strong reciprocity exists in us as a product of natural selection. It does not follow from the fact that weak reciprocity exists that the strong type, involving intentionality, cannot. The point, rather, is that they are quite different phenomena. The existence of weak reciprocity is uncontroversial, but since it does not require consciousness, let alone intentionality, weak reciprocity is irrelevant to Persson and Savulescu's argument.[18]

They deem the "simpler pattern" of tit-for-tat to be "of less evolutionary value" than their "richer" type (2012, 33n19). From the vantage point of evolutionary biology, the situation is the reverse: weak reciprocity is demonstrably and wide-rangingly valuable for its indirect contributions to fitness, while strong (i.e., intention-based) reciprocity—what Persson and Savulescu inaccurately call "the richer pattern" of tit-for-tat (33n19)—may well not even exist. Where natural selection is invoked to explain a given phenomenon, links to fitness, whether direct or indirect, must be defended. Despite their assertion that "a sense of justice/

fairness" is such a product, Persson and Savulescu largely ignore this central evolutionary concept. In terms of their theoretical proof of concept for moral bioenhancement, the existence of strong reciprocity is required, for, by their own argumentative lights, only if the pertinent moral feature exists in us biologically could it be targeted for biotechnological improvement.

Under their so-called richer pattern of tit-for-tat, Persson and Savulescu note the reputational benefits of acting cooperatively and punishment of those who act unfairly by their exclusion from subsequent cooperative ventures (2012, 34, 37). In evolutionary biology, however, both features are associated with weak, not strong, reciprocity. A withdrawal from further interaction may well be simply "a precautionary measure to avoid further losses" (dos Santos and Wedekind 2012, 23); it is "a strategy of self-defence that damages the free-rider but benefits the reciprocator" (Guala 2012a, 3). Reputational concerns also fall under weak reciprocity (Guala 2012b, 46), reflecting self-interest and promoting fitness, again, indirectly.

By definition, strong reciprocators are motivated by a desire to promote fairness, whose manifestations include making unfairness costly to its perpetrators (Gintis 2000). In *Unfit for the Future*, Persson and Savulescu's direct attempt to support the existence of strong reciprocity is brief (2012, 34):

(1) The emotions that "make up the tit-for-tat bundle . . . are bound up with our concept of *desert*."[19]
(2) Desert "is a consideration of *justice or fairness*."
(3) Therefore, "Individuals who are equipped with the tit-for-tat set of responses have some sense of justice or fairness." Uniting conceptual and empirical claims, they assert that justice is "a pre-cultural concept, of which traces can be found in some of the more social species of our mammalian ancestors. . . . The concept of a right can also be traced to behavioural dispositions exhibited by our animal predecessors."

As tit-for-tat does not fall under strong reciprocity at all, and weak reciprocity is not tied to the "concept of desert," claim (1) is false. Elsewhere in *Unfit for the Future*, Persson and Savulescu anchor their "sense of justice" directly in tit-for-tat: "The core moral dispositions, which are the foremost objects of moral enhancement, are altruism and a sense of justice as it primarily manifests itself in tit-for-tat" (108).

This conceptual confusion matters. What counts ultimately, though, is whether, by any route, they support their conclusion that humans and nonhuman animals manifest a sense of justice/fairness. Their defense of this conclusion is weak, and available evidence more generally militates against it. Having briefly discussed nonhuman animals, I will concentrate on human beings.

Persson and Savulescu claim that chimpanzees evince "a sense of fairness" (2012, 110), or strong reciprocity, punishing unfair behavior *simply because* it is unfair.[20] Here, they rely entirely on primatologist Frans de Waal. The notion that nonhuman animals are intolerant of inequity is controversial even for chimps, humans' closest relatives. Using a version of the ultimatum game revolving around food, Brosnan et al. (2005), whose coauthors include de Waal, claim that chimps are motivated to combat unfairness in its allocation across individuals. There is, however, good evidence that the phenomena are explained as well or better in a different way. Jensen et al. also staged a food-based ultimatum game, finding, contra Brosnan et al., that chimps "did not systematically make fair offers to conspecifics, nor did they systematically refuse to accept unfair offers from conspecifics even though they could discriminate between the quantities available to themselves and their partners" (2007, 109).

Further, in great apes, chimps included, Bräuer et al. (2006) found no evidence of an aversion to inequity in the distribution of food among individuals. Quite the opposite: "Apes ignored fewer food pieces and stayed longer at the testing station when a conspecific got favoured food. Moreover, the subject begged more when the competitor was present than when she was absent, and chimpanzees, in particular, also begged more when the conspecific got favoured food. . . . Thus, if food refusals are the key to infer inequity aversion, the apes in the present study were not inequity averse" (3126). The takeaway here is that, regarding strong reciprocity, the evidence for chimps is far from solid.

Persson and Savulescu also claim versions of their favored attitudes to exist beyond the sphere of primates (2012, 34, 109). Strong assertions of psychological continuity between nonhuman animals and us reflect their adoption from evolutionary psychology of the notion that our brains include many "specialized and domain-specific" adaptations, or modules, "each designed [by natural selection] to address a particular adaptive problem posed by the environment of evolutionary adaptation" (Cosmides and Tooby 1992, 220; Dupré 2001, 22)—"like a key fitting a lock" (Cosmides and Tooby 1992, 165). Persson and Savulescu evince a modular lens on morality when speaking of "the tit-for-tat bundle" of emotions (2012, 34). Not only is the existence of moral modules unsubstantiated for animals, their presence in humans is, as we will see, highly controversial.

An alternative route to explaining the evolution of morality is as an offshoot of broader cognitive abilities that were themselves adaptations. From this standpoint, it is notable that, even as they speak of nonhuman animals, Persson and Savulescu associate a sense of fairness/justice with rather sophisticated cognitive abilities, as when they claim that "a proper sense of fairness might require an ability to apply the notion across the board" (2012, 110). On this picture, organisms to which moral inclinations are attributed must be able to appreciate and respond to reasons. If these abilities are required for a sense of justice/

fairness, then one would have to show its existence in any type of organism said to display a moral sense; we have good reason to conclude, however, that even chimps do not possess the requisite cognitive structures (Ayala 2010, 9020–21).

Since the 1980s, most of the evidence that humans are inherently motivated by a sense of fairness comes from studies involving one-shot economic games, in particular, the ultimatum game (Guala 2012a, 4). Here, as previously described, experimenters give Player 1 a stipulated amount of money, and she decides what, if anything, to give Player 2. If Player 2 rejects an unfair, or unequal, offer, both walk away empty-handed. The interpretation in terms of fairness is this: Based on self-interest, Player 2 should accept any offer above zero as better than nothing. Many in that role, however, punish Player 1 by refusing unfair, or unequal, offers, which is (economically) costly to both. These rejections are taken as evidence of strong reciprocity, of punishers' being "driven by a preference for reciprocal fairness and inequity aversion" (Yamagishi et al. 2012, 20364). Allegedly, the strong reciprocator is motivated "to sacrifice resources in both rewarding fair behavior and punishing unfair behavior, *even if this is costly* [to her]," out of an impersonal concern to uphold the norm of fairness as such (Fehr and Henrich 2003, 57–58). Persson and Savulescu rely heavily on this interpretation of experimental findings to support their view that humans are motivated by a concern with fairness per se (2012, 35).[21]

"The picture of human motives painted by strong reciprocity theory is intuitively appealing—but is it empirically accurate?" (Guala 2012a, 4). From the standpoint of evolutionary biology, the notion that subjects' cooperation in these experiments "requires the novel evolutionary force of strong reciprocity" is a "misconception" (West et al. 2011, 250). For one thing, though strong reciprocity is defined in terms of motivation, subjects' motivation is barely considered expressly in studies alleged to support its existence (Clavien and Chapuisat 2013, 136).[22] Although inferences to motivation are routinely made, an equally if not more plausible interpretation of such "cooperation" is that "humans are antisocial, rather than prosocial" (West et al. 2011, 251).

Of course, one cannot directly observe motivation and thus confirm whether or not such a correspondence exists. But adjustments to the design of experiments centered on economic games can yield more nuanced interpretations of behavior and offer plausible hypotheses as to what is *unlikely* to be subjects' motivation. One might, for instance, compare the same subjects' behavior across different types of games, to see if those who reject unfair offers in one-shot ultimatum games also behave as strong reciprocators would in other scenarios, such as the trust game. Yamagishi et al. did just that, and the pattern of inconsistency in subjects' behavior undercuts the view that an occupation with fairness per se drives the refusal of unfair offers in one-shot ultimatum games: "A strong cooperator is characterized as having a disposition toward both positive *and* negative reciprocity, so it follows that strong reciprocators who reject unfair offers in the UG [ultimatum game] should behave in a fair manner and should reciprocate positively in other [settings, such as the trust game]. This prediction was clearly rejected by our findings. If the rejection of unfair offers in the UG is not an altruistic punishment of norm-violating behavior, what is it?" (2012, 20366). Far from signaling a commitment to strong reciprocity, the rejection of unfair offers in one-shot ultimatum games "reflects a tendency on the part of the responder to avoid being subjugated to the proposer" and "may be a product of frustration aggression" (20366–67).

Per Brañas-Garza et al., rejections of low offers are "equally compatible with competitive, spiteful motives. A spiteful responder who is concerned with her own relative standing prefers a zero-zero outcome over one that leaves her below the proposer. Thus, she will reject any offer below the equal split, just like an individual concerned with the fairness norm" (2014, 1). Their study combined the ultimatum and dictator games in an ingenious way: a subject motivated by prosociality and fairness should divide the money equally in the dictator game as well as reject low offers in the ultimatum game (1); those motivated in the opposite way should also reject low offers in the ultimatum game and give nothing to the second player in the dictator game (1). Brañas-Garza et al.'s hypothesized motive for "the rejection of unequal but positive offers combined with zero-transfers in the DG [dictator game] is . . . competitive spite" (2). At minimum, based simply on punishing behavior in the ultimatum game, one cannot delineate prosocial from antisocial motivations, such as "a desire for revenge" (2; Clavien and Chapuisat 2013, 132). That subjects who decline unfair offers in these experiments "react out of anger and seek revenge . . . is bad news for those who want to use this debate as a lever to link economic studies with investigations into human morality" (Clavien and Klein 2010, 283–84).

Methodologically, the very behavior in question, rejections of unfair offers in single-shot ultimatum games, may be an artifact of the experiments' construction. Per Anna Dreber and David Rand, antisocial findings are notable all the more because "nearly all economic game experiments exploring costly punishment are explicitly designed to suppress the opportunity for retaliation and feuds. . . . Such design features are highly unrealistic, and serve to cast costly punishment in the most positive possible light" (2012). As a result, "Costly punishment is usually the only way for [those receiving unfair offers] to manifest their disappointment, and in any case [these] punishers are protected by anonymity and by the rules of the experiment" (Guala 2012a, 11). When they are offered other avenues for conveying that disappointment, "Subjects' behaviour changes. A handful of experiments [cited by Guala] have explored and compared the effects of different sanctioning techniques, ranging from purely symbolic (reproach) to purely material punishment" (11). Further, in the one-shot ultimatum game, those who reject unfair offers are not exposed to retaliation; even if one sets aside "the problem of counter-punishment, 'costly' punishment works only if it costs relatively little" (Guala 2012a, 11). What's more, walking away with no money is not equivalent to doing so with *nothing*, for one may have preserved a good of higher value, such as self-respect. In sum, the evidence that "third parties . . . possess a robust moralistic desire to altruistically punish norm violators . . . on behalf of strangers" shows up increasingly as weak to nonexistent (Pedersen et al. 2018, 539). As a result, researchers increasingly reject the previously widespread view that allegiance to an impartial norm of fairness is what spurs subjects to reject unequal offers (539).[23]

Since direct inferences from behavior to motivation—made by experimenters and relied on by Persson and Savulescu—are problematic, I cannot now proceed to embrace a particular view of what subjects' motivation here actually *is*. Nor do I need to do so, as the above findings strongly problematize the view that rejections of unfair offers in one-shot ultimatum games testify to humans' motivation by "a sense of justice/fairness."

To close this subsection, I briefly discuss Persson and Savulescu's invocation of results from a different economic game, based on the Prisoner's Dilemma, to support the claim that tit-for-tat "makes possible one form of cooperation which might be called *reciprocal*" and that "our readiness to engage in reciprocal cooperation . . . involves a sense of justice or fairness" (2012, 36, 4). In the Prisoner's Dilemma, the classic game-theoretical formulation of the challenge that those deciding whether to cooperate confront, two parties must determine independently whether to stay silent about a crime jointly committed or defect by ratting the other out; though the optimal scenario for each is to be the sole defector, cooperating via silence yields a better outcome than if both parties defect. When this decisional dilemma is translated into an economic game, the currency is monetary rather than informational. The game itself can be played just once or iteratively. Where the experimental focus is tit-for-tat behavior, it is played in the latter way (Axelrod 1980).[24]

In the iterated version of the Prisoner's Dilemma (IPD), at every decision-point, tit-for-tat is manifested in each player's responding in kind to what the other has just done, cooperating or defecting as the case may be (Axelrod 1980, 7). Unlike Persson and Savulescu, when Robert Axelrod and William Hamilton (1981) and Axelrod and Douglas Dion (1988) apply tit-for-tat, as modeled by IPD, to evolution, they make clear that they address behavior only, with consciousness and motivation being irrelevant. Thus framed, the evolutionary application of IPD is closely tied to Trivers's discussion of interspecies symbioses (Guala 2012a, 3). Since IPD tests tit-for-tat behavior, which involves weak reciprocity, findings from these experiments are irrelevant to Persson and Savulescu's aim of supporting strong reciprocity and thus need not be considered further.

It remains controversial whether, by nature, humans are concerned with fairness as such. Although Persson and Savulescu do not relate their ideas in a precise fashion to guiding concepts in evolutionary biology, what they call "a sense of justice/fairness" seems to be strong reciprocity; at minimum, strong reciprocity is a necessary condition. Since we have good reason to question whether humans possess a biological nugget of strong reciprocity, either way, my conclusion that they fail to provide theoretical proof of concept for justice/fairness stands. To be clear, my point is not that humans are incapable of being motivated by a concern with fairness but rather that we have no good reason to think that a concern with justice/fairness for its own sake is a component of our biological endowment. What I have in mind here can be expressed in terms of Aristotle's distinction between senses of "natural," or "innate": as he saw, what belongs to our natural endowment is a capacity to develop knowledge and moral motivation, not the knowledge and motivation themselves (*De Anima* II 5, III 7; *Posterior Analytics* II 19 [Aristotle 1964]; *Nicomachean Ethics* II 1–4).

4.4 The Upshot: Persson and Savulescu Fail to Provide Theoretical Proof of Concept for Moral Bioenhancement

According to Persson and Savulescu, their favored moral attitudes exist within us in nugget form, meaning that moral bioenhancement is possible: "Because we share this core with non-human animals from which we have evolved," it is biologically embedded in us (2008, 168). And, due to its embedment, that core could be augmented biotechnologically (168). Their defense of these claims is extremely weak.

As the case of altruism illustrates, their theoretical proof of concept involves unjustified inferences from behavior to motivation: "No doubt, it is difficult to tell whether a non-human animal is capable of altruism in [their] sense, but it seems likely that this is so if an animal exhibits helping behaviour tailored to the individual needs of another animal when these are different from its own needs" (Persson and Savulescu 2012, 109). From the standpoint of evolutionary biology, this quite general claim is demonstrably false. Consider, for instance, cleaning symbioses among fish and warning calls issued by individual birds, which put themselves at some risk to benefit others in their group (Trivers 1971, 39–45). Cooperation "can provide a direct benefit because it provides a benefit to everyone in the group, including the focal cooperator through reducing the chance of group extinction" (West et al. 2011, 252). Motivation to bring the benefit that a given behavior provides may be present, but in most cases across the natural world, it is not and could not be. Further, on the behavioral plane, what looks like altruism may have been selected for because it offers "a direct fitness benefit to the cooperating individual," in which case the cooperative behavior is "mutually beneficial, not altruistic" (West et al. 2011, 238).

Though, overall, Persson and Savulescu exhibit confidence that we possess an attitudinal core of altruism, they venture doubts about its existence: "Because we are equipped with the tit-for-tat set of responses, our parochial altruism enables us to engage in consecutive, reciprocal cooperation, alongside synchronic cooperation, which itself does not presuppose altruism and trust as long as the participants are few enough to be able to keep an eye on each other constantly" (2012, 39–40). More pointedly, they concede that "neither evolutionary arguments nor social psychological experiments have *conclusively* established the presence of altruistic motivation. But we think that in conjunction with introspection and everyday observation they make up a very strong case in favour of it" (32n18). Importantly, this concession includes a distinction between motivation and behavior, which is compatible with many different internal states; Persson and Savulescu also grant here that an evolutionary lens may not yield the biological kernel they need. They plow forward, nonetheless, as though they have established that we possess it.

Persson and Savulescu's evolutionary-psychological outlook is offered as an overlay on evolutionary biology. But the fit between them is poor, as when they state that emotions comprising "the tit-for-tat bundle . . . are bound up with our concept of *desert*" (2012, 34)—the latter being a distinctively human idea (Joyce 2014, 270–71). Persson and Savulescu try, unsuccessfully, to situate this distinctively human concept in a broader evolutionary milieu when claiming that justice is "a pre-cultural concept, of which traces can be found" in some nonhuman species of social mammals, and that "the concept of a right can . . . be traced to behavioural dispositions exhibited by our animal predecessors" (2012, 34). Also without argument, they attribute altruism—said to include empathy and "*sympathetic concern* about the well-being of [the other] for its own sake"—to "apes and dolphins, and perhaps elephants" (109).

Persson and Savulescu treat psychological altruism and a sense of justice/fairness as belonging to our evolutionary legacy while essentially ignoring the concept of fitness at the heart of evolutionary biology. They might try to argue that psychological altruism and a motivational commitment to justice indirectly promote fitness. But, not only are indirect boons harder to pin down in evolutionary biology, they would be all the more so here.

We can gain a synoptic view of their argumentative failure regarding theoretical proof of concept for moral bioenhancement by taking a concerted, critical look at the evolutionary-psychological framework that Persson and Savulescu employ. For this proof of concept to succeed, they would have to substantiate the claim that their favored moral attitudes belonged to human biology as products of natural selection. Reference to Robert Richardson's (2007) critique of "the *evolutionary* claims of evolutionary psychology . . . as *evolutionary pretensions*" (viii) will cement our conclusion that doing so would be a very tall order, indeed. Two ideas central to evolutionary psychology (see, e.g., Phillips 2015; Cosmides and Tooby 1987, 302–303) are that "psychological processes are adaptations . . . to our ancestral environment," typically assumed to cover "the million or so years preceding modern recorded history, the late Stone Age or Pleistocene" (Richardson 2007, 13; Dupré 2001, 21), and that how current humans act evinces "the evolutionary or historical function . . . of the mechanisms governing our behavior" (Richardson 2007, 45). Third, psychological features that emerged as adaptations may be maladaptive now, under "conditions of increased crowding . . . larger social groups [and so on]. . . . Once [their evolutionary] history is exposed . . . we can redesign our environment" in light of what we have learned (20). Persson and Savulescu instantiate this methodological trifecta, where what must be redesigned is human biology itself (2012, 1–2, 10, 134).

Since evolutionary psychology "offers proposals *within* the broad framework of evolutionary theory," it must be assessed accordingly (Richardson 2007, 39). As John Dupré observes in his own critique, the aim here is not "to demonstrate that evolutionary psychology is . . . self-evidently false" but rather to show that "the grounding assumptions by which it is motivated are far more problematic and controversial than its practitioners generally allow" (2001, 43). The standard of proof for scientific hypotheses, already high, is even higher "for theories that matter more" (Richardson 2007, 34). In the case of evolutionary psychology, one must not only show that "some psychological feature is an adaptation" but also know "what that feature is an adaptation *for*" (19).

In evolutionary psychology, argumentation tends to be loose, as when, having claimed that a particular trait would have been useful to our ancestors in a given context, partisans conclude straightaway that this trait must have been an adaptation (Richardson 2007, 137; Grossi 2014, 343). Persson and Savulescu instantiate this pattern regarding their favored moral attitudes. The scientific requirements for one's legitimately deeming a trait an adaptation are, however, justifiably stringent, all the more if one embraces "adaptationism" as one's driving explanatory lens (Richardson 2007, 97–117). Following Robert Brandon (1990, 159–94), Richardson endorses "five conditions for qualitatively sufficient explanations of adaptation based on natural selection," namely, "evidence that selection has in fact occurred" (99); "an ecologically based explanation for the selection observed" (99); "heritability" (100); "information concerning the environment, population structure, and gene flow" (103); and knowledge of "which traits are primitive and which are derived" (104). Not all attempted explanations of this type fail: Richardson's example of where the fit is strong, borrowed from Brandon, is plants' tolerance of heavy metals (105–107; Brandon 1990, 163–74).

But evolutionary psychologists contend far more: "Knowledge of the adaptive problems humans faced, described in explicitly [modular] terms, can function as a kind of Rosetta Stone" (Cosmides and Tooby 1992, 221). Such claims are monumental exaggerations, as what we would have to know to make the case effectively for humans' own psychological features is prohibitive (Richardson 2007, 38). From this vantage point, it is not surprising, but expected, that Persson and Savulescu are unable to offer theoretical proof of concept for the features of our moral psychology that concern them.

Jerry Fodor argued that the brain includes "modular cognitive systems" that are "informationally encapsulated, neurologically hardwired, [and] innately specified" (1983, 112, 119). By analogy, evolutionary psychologists maintain that humans possess one or more moral modules—in Persson and Savulescu's case, biological kernels of altruism and justice/fairness—that emerged as evolutionary adaptations (Grossi 2014, 333–35). Others argue, more plausibly, that the advent of human morality is best explained as an "exaptation," that is to say, in terms of general cognitive abilities that are manifest in a wide range of human endeavors, including the moralities that we create (Levy 2004, 85–86, 94; Ayala 2010).

If advocates limited themselves to the broad claim that human minds "are the product of evolution," evolutionary psychology would be uncontroversial, for this contention says nothing about whether particular traits are adaptations (Levy 2004, 94; Richardson 2007, 11–12, 16–17). But the spotlight on adaptation leads to a problematic construction of the mind as comprising numerous discrete structures and operations—"functionally specialized . . . content-specific information-processing mechanisms" (Tooby and Cosmides 1992, 24). "Relatively isolated from the others and therefore acting relatively autonomously" (Levy 2004, 94), each can be modified discretely. Contra Persson and Savulescu, who commit themselves to this view, Harris maintains that the sole appropriate technological means of enhancement are cognitive methods that are "general in their application" (2011a, 102).

Since, from an evolutionary standpoint, altruism has naught to do with intention, psychological altruism is most unlikely to exist in the form of a biological kernel whose *scope* merely requires biotechnological augmentation, as Persson and Savulescu maintain (2012, 37–39). On the grounds provided in this section, the same applies to their "sense of justice/fairness." Their presumption that these moral attitudes are adaptations reflects an ill-advised devotion to evolutionary psychology.

5. An Alternate Focus on Erasing Antisociality

Clearly, Persson and Savulescu do not believe that their proof of concept for heightening prosocial motivation fails. Nonetheless, one finds alongside their focus on augmenting prosocial attitudes an emphasis on elimination: of cognitive bias "towards the near future" (2012, 28), which is not my focus here, and antisociality, broadly construed to include *akrasia*. By and large, Persson and Savulescu treat their prosocial and antisocial lenses as reflecting merely a difference of emphasis, but, as Fabrice Jotterand and I point out, fostering prosocial attitudes and eliminating antisocial acts reflect distinct psychological priorities and suggest different practical agendas (2019, 68–70).

5.1 Factors That Propel Persson and Savulescu's Alternate Focus on Elimination

At least six factors combine to promote their alternate, eliminative focus. The first is precisely that, in terms of preventing ultimate harm, what matters above all is our ceasing to perform antisocial acts (Jotterand and Levin 2019, 69). Second, our current situation is an emergency (Persson and Savulescu 2012, 88). Though they proceed as though proof of concept for augmenting prosocial attitudes has been shown, Persson and Savulescu recognize stumbling blocks (e.g., oxytocin's promotion of hostility toward out-group members). Targeting antisocial behavior directly may seem attractive, by comparison, as a streamlined route to the end of resolving our present emergency; for instance, the God Machine, an all-knowing machine intelligence, would "produce more moral behaviour" by simply "removing the freedom to act immorally" (Savulescu and Persson 2012, 417).

A third, related factor is Persson and Savulescu's utilitarian lens on staving off ultimate harm. For them, "It is a matter of such urgency to improve humanity morally to the point that it can responsibly handle the powerful resources of modern technology that we should seek *whatever* means there are to effect this" (2013, 130). Since well-being alone has intrinsic worth, and the "negative (instrumental) value [of ultimate harm] is indefinitely high," moral bioenhancement "would be compulsory" (2012, 15, 21; 2019, 12; 2008, 174). Such means could be imposed involuntarily or nonvoluntarily, and surveillance well beyond that used "in the fight against traditional crimes" would be needed (2008, 174; 2019, 14; 2012, 125). In terms of preventing ultimate harm, Persson and Savulescu's "fail-safe" is the God Machine, which would exhaustively monitor everyone's thoughts, desires, emotions, and intentions to ensure that "serious crime" does not occur (Savulescu and Persson 2012, 414, 416). Though "such interventions and such control are not plausibly moral enhancements of [a] person," if called for to avoid ultimate harm and associated "grave suffering," they would be requisite (417). Reflected here is a standard utilitarian notion that one provides benefit *by* minimizing or preventing harm.

A fourth contributor to Persson and Savulescu's eliminative focus is their conviction that, in terms of "magnitude" and "ways or means," it is immensely easier to harm a multitude than to bring comparable benefit (2019, 11; see also 2008, 173; 2012, 12–14).[25] The fifth element is their occupation with eliminating *akrasia* and its affective underpinnings (2019, 11). This feature, which does not clearly harmonize with their overt, prosocial focus, embodies transhumanist hostility to negative affect. In considering what follows, it is important to bear in mind that *akrasia* is a character trait and that Persson and Savulescu do not clearly distinguish erasing the trait from simply preventing akratic behavior. Sixth and finally, with transhumanists generally, Persson and Savulescu reject the treatment-enhancement distinction. This allows them to frame the project of psychological change in eliminative terms without appreciating that their antisocial and prosocial focuses anchor different programs.

5.2 A Focus on the Elimination of Negative Affect, with Particular Attention to *Akrasia*

That Persson and Savulescu are dead set on targeting antisociality is especially clear in their handling of *akrasia*, whose addressing is key to forestalling ultimate harm due to environmental factors, broadly construed. Humans possess "a number of strong motivational dispositions that are liable to interfere with their acting out of [their] central moral dispositions" and in that sense "mar human nature" (2019, 11; 2012, 99).[26] Though there are "plausible evolutionary explanations" of why we have the desires (e.g., gluttony, greed, lust, wrath) lodged under the seven deadly sins, they "can obviously obstruct humans acting altruistically and justly" (2019, 11). Taken to cover failed self-mastery across nonrational phenomena, *akrasia* is deeply antisocial and must, as such, be eliminated.

Akrasia has been a topic of interest in Western philosophy from Aristotle onward. *Akrasia* exists because "simply knowing what is morally right is not sufficient for doing what is morally right: you also need to be morally motivated" (Persson and Savulescu 2013, 130n23). Though their formulation of the problem is standard, Persson and Savulescu embrace the highly unusual notion that *akrasia* afflicts humanity as such, making species-wide "motivational enhancement . . . necessary" (130n23). There is a fundamental difference between the traditional view of *akrasia* as something that individuals must work to overcome (Aristotle, *Nicomachean Ethics* VII 3–10) and Persson and Savulescu's implausible notion that humanity as such has *akrasia* that must be cured. Effectively, they treat *akrasia* as a public-health/-welfare crisis afflicting the species, whose addressing therefore requires a very blunt instrument: comparable to "fluoride in the water," but unavoidable (Persson and Savulescu 2008, 174; Levy 2013, 38).

Toward the end of avoiding ultimate harm, their focus on doing away with aggression, combined with a view of humanity as akratic, calls into question the status of their aim as moral enhancement, pointing instead to what Jotterand and I suggest is a remedial, or therapeutic, orientation (2019, 64–65). This broadly therapeutic umbrella shows up in various, specific ways. Persson and Savulescu's evidence that moral bioenhancement is needed includes failed attempts to improve the conduct of psychopaths (2019, 9). An instance of said enhancement is hormonal castration of pedophiles (2013, 129), the hope clearly being that, owing to this neurobiological adjustment, the acts at issue will cease.[27] They also use the term "treatment" of heightening prosociality (2012, 107). When the focus is combating antisociality, the therapeutic tenor of their remarks is especially strong (cf. Jotterand and Levin 2019, 70). Anger, presumed harmful, illustrates what they hope "biomedical and genetic treatment" will address (Persson and Savulescu 2008, 172). Regarding *akrasia*, "biomedical treatment" for smoking and sugar "addiction" offers "an instructive comparison" with their notion of such treatment for "selfish . . . impulses" (2012, 117).

Because Persson and Savulescu do not distinguish, conceptually, between therapy and enhancement, reducing antisocial tendencies itself qualifies as moral enhancement (Savulescu and Persson 2012, 410). Outside of transhumanist discourse, the distinction between addressing psychopathology and boosting moral functioning absent pathology is widely viewed as important; for example, successful therapeutic interventions may not help those striving to augment functioning where no prior deficiency exists, and acceptable risk-benefit ratios vary. Further, while anger, for instance, is a feature of several psychopathologies, "negative" emotions are not categorically deleterious to human beings and thus "uncontested candidates for elimination" (de Melo-Martín and Salles 2015, 230). Persson and Savulescu's rejection of the treatment-enhancement distinction helps to explain why they typically fail to see their prosocial and antisocial frames as representing different lenses on humans' moral alteration. It also suggests that their alternate psychological focus on eliminating antisociality does not emerge ex nihilo, representing instead an isolation and intensification of a therapeutic way of seeing their entire project.

Their alternate focus on erasing antisociality allows one to make sense of Persson and Savulescu's otherwise odd claim that they "are not assuming either externalism or internalism about moral judgement" (2013, 130n23). Per "motivational judgment internalism" ("internalism," for short), "A person cannot sincerely make a moral judgment without being *motivated* at least to some degree to abide by her judgment" (Rosati 2016). Distinct from "strong" internalism is both the "weak" variety, which allows for *akrasia*, and "externalism," which "denies the existence of a necessary connection between moral judgment and motivation" (2016). Regarding internalism and externalism, Persson and Savulescu are not noncommittal, as they claim, but inconsistent. Their prosocial program reflects strong internalism, according to which being motivated to act in light of one's moral judgment would suffice for one's undertaking said action (Rosati 2016).

Their alternative focus on *akrasia*, a character trait, also suggests strong internalism. But their elimination program would do away with scenarios in which psychic conflict could occur and, if it did, block people's acting on antisocial impulses. This agenda suggests that they are not ultimately committed to internalism at all. Persson and Savulescu's God Machine—also known as the ultimate "moral technology" (Savulescu et al. 2014a, 103)—is no mere thought experiment (Harris 2014, 253): they truly want and need there to be a machine intelligence that, acting on us from without, would preclude the translation of antisocial impulses into behavior. If their prosocially focused program were nonnegotiable, then they would not be open to externalism or weak internalism; rather, overtly and by definition, they would support the strong variety. Indirectly, then, Persson and Savulescu acknowledge that they do in fact put forward two distinct agendas for our avoidance of ultimate harm.[28]

5.3 Not Being Antisocial Does Not Equate to Being Prosocial

Overall, apart from the God Machine, Persson and Savulescu operate as though their augmenting and eliminative emphases amount to the same thing; thus, antisocial inclinations are harmful because they "interfere with," or "obstruct," our acting from prosocial motivation (2019, 11).

It is theoretically and experientially implausible that one who is no longer antisocial would, thereby, have become more prosocial—would, for instance, want to benefit a wider swath of others for their own sake. There are other, more likely, possibilities. Contra Persson and Savulescu (2008, 177n45), such a person may well become docile (Sparrow 2014a, 28; Murphy 2015, 372). She might also become equally indifferent to everyone or engage in a tepid form of well-wishing toward one and all without a trace of motivation to actively do well by others.

6. Trading Psychological Richness and Freedom for Survival

As Raus et al. observe,

> The particular approach one takes to normative ethical questions may have important implications. For some utilitarian thinkers, if an intervention achieves behavioral control, this may be sufficient for it to be labeled a moral enhancement. . . . For a rights-based ethicist, the "freedom to fall" will typically be considered . . . an essential part of morality. For a virtue ethicist, passive interventions do not amount to moral enhancements, whereas . . . such interventions may count as enhancements for utilitarian ethicists. . . . These

> underlying normative views are important and may have a huge impact on one's preferred definition of moral enhancement. (2014, 272)

Persson and Savulescu's commitment to humanity's moral uplifting is contingent. More generally, their utilitarian lens on preventing ultimate harm makes them willing to sacrifice what makes human existence *worth* conducting. Though their prosocial and antisocial focuses both reflect a willingness to sacrifice psychic complexity, moral cultivation, and freedom, their eliminative agenda is especially impoverishing. The biotechnological erasure of antisociality would not count as moral enhancement, for if the program were wholly successful, the psychological capacity to have antisocial impulses, including all those linked to *akrasia*, would no longer exist. All the more does the God Machine, which would erase the very possibility of immoral action, fail to qualify as moral augmentation.

6.1 The Vanishing of Psychic Complexity, Moral Cultivation, and Freedom

Whether the target was prosociality or antisociality, we would not become morally better people as long as the focus was on acts (Harris 2013a, 172). This would also not occur if our role in the process were wholly or largely passive (see further Raus et al. 2014, 272; Focquaert and Schermer 2015). Persson and Savulescu's willingness to countenance our passivity is already evident when their focus is prosocial, since bioenhancement could be compelled, but it is more pronounced when they feature elimination.

Further, as Plato saw, human freedom has internal and external dimensions, and preconditions of the former include psychic complexity. By condoning psychic simplification (Jotterand and Levin 2019, 70), Persson and Savulescu show their willingness to relinquish the very possibility of internal freedom. They are also ready to constrict our external/political freedom, through centralized, requisite bioenhancement and the overriding agency of the God Machine, which would relentlessly monitor everyone, intervening as needed absent individuals' awareness. Not only would privacy be lost (Persson and Savulescu 2012, 125), but self-deception about our motives and the relation of these to acts would be an unremitting, externally rooted prospect. They treat this self-deception as morally irrelevant (Savulescu and Persson 2012, 413–14). They are also cavalier about freedom, which is allegedly preserved as long as the choice of immoral acts is "psychologically or motivationally" unavailable (Persson and Savulescu 2012, 112–13).

When gauging our worldly situation from a moral standpoint, Persson and Savulescu do not distinguish adequately among three scenarios: that situation is better because (1) external possibilities are fewer (e.g., an unprecedented strengthening of firewalls might vastly, if temporarily, reduce opportunities for incursions into financial systems); (2) the world is replete with exemplary moral agents, who construe as appropriate only a subset of literally available options; and (3) due to psychic simplification, actors have the ability to consider only a subset of these options. Because scenario (1) comprises external shifts, it can be combined with (2) or (3); the latter two, however, are mutually exclusive. A focus on improved prosocial motivation might suggest that Persson and Savulescu are committed to scenario (2). In reality, though their antisocial focus does so more, their prosocial focus also points to scenario (3).

An initial impression that they favor the second scenario might be strengthened by their claim that one with improved prosocial motivation would possess all the virtues that count (2008, 171–72). Tellingly, Persson and Savulescu misunderstand what virtues (e.g., courage) are, treating them as value-neutral qualities that "criminals could exhibit. . . . [These] do not need separate treatment . . . because they accompany strength of motivation" (172).[29] As this statement illustrates, their prosocial focus involves psychic attenuation. Since nothing humans are involved in can be value neutral (Levin 2017b, 162), emotions, moods, and motivations cannot qualify. All the more does this apply to virtues, which are *defined* in terms of exemplariness. As they misconstrue what virtues are, Persson and Savulescu wrongly presume that they would be concomitants of augmented prosocial motivation. This motivation, as they present it, would dispose us toward others in an impersonal, standardized way.[30] It could have useful results, to be sure, but it reflects key limits of utilitarian approaches, including psychological thinness and a depreciation of strong interpersonal ties.

If augmented prosocial motivation were achieved, Persson and Savulescu would deem moral enhancement to have occurred; at the same time, augmenting prosocial attitudes is valuable only as a means to avoiding ultimate harm. The possession of traits such as psychological altruism cannot, however, hinge on results since context-befitting conduct of exemplary agents may not reliably produce corresponding outcomes. But Persson and Savulescu's devotion is to one practical outcome and, derivatively, to all the acts and omissions that promote it. If another path looked to be more expeditious, that would have to be their favored option (Jotterand and Levin 2019, 69). Ostensibly, a direct focus on erasing the very possibility of antisocial acts fits the bill, and they suggest as much (Savulescu and Persson 2012, 417; Jotterand and Levin 2019, 69). Here, psychic simplification would be the direct focus, with all facets of rationality and affect deemed possible sources of interference targeted for erasure.

As I have been arguing, Persson and Savulescu suggest distinct agendas for our internal modification, prosocial and antisocial, without clearly appreciating that they do so. They frame their prosocial agenda in terms of scenario (2) mentioned above, according to which the world is replete with exemplary moral agents, who construe as appropriate only a subset of literally available options. However, their own driving, utilitarian preoccupation with avoiding ultimate harm points to scenario (3). Perhaps, tacitly, Persson and Savulescu acknowledge this, insofar as their increasingly prominent notion of our psychic "improvement" involves simplification, per scenario (3), whereby agents have the capacity to entertain only a subset of options. At bottom, however, they fail to glean fundamental differences between these two psychological scenarios.

That failure is also evident in their handling of freedom: because certain motivations are "out of the question," the freedom of those modified based on their antisocial program is no more restricted than that, say, of Aristotle's morally virtuous person (Persson and Savulescu 2012, 112–13). Although nonvirtuous actions are not literally unavailable to Aristotle's moral exemplars, it has become second nature for them to consider as viable only those actions expressive of virtue, whose content will reflect what a given context demands (*Nicomachean Ethics* VI 8). In contrast, per the antisocial agenda of Persson and Savulescu, the very possibility of motivation to act wrongly would be edited out of the human constitution; to make certain that no significant antisocial acts squeezed through, their external "fail-safe," the God Machine, would make such acts literally undoable (Savulescu and Persson 2012, 414). They wrongly presume that freedom is maintained if the motivation to perform immoral acts is absent, omitting to consider how these impossibilities relate to agents' character and inner states. Bizarrely, by their lights, that *good* agents are free is the harder sell (2013, 128).

As John Harris has argued, freedom is premised on our being psychologically capable of wrongdoing but choosing to act rightly (2011a; 2016, 56–76). To illustrate this point, Wiseman contrasts a moral agent who is "capable of aggression but . . . simply refrains from so engaging . . . who stands up for the weak and oppressed in the face of the cruel and despotic," with a "pacified agent," who is "nonaggressive simply because he or she is incapable of aggression" (2014a, 27). If anything counts as moral deterioration, such an outcome does.

Persson and Savulescu qualify their own claim for freedom's endurance by noting that, even if it were diminished, "interventions, such as the God Machine" would be warranted for the sake of humanity's preservation (Savulescu and Persson 2012, 417).[31] They require the God Machine because biotechnology may not be "perfectly effective" at eliminating antisociality, construed broadly to include not only aggression but everyday acts deemed akratic—a lens that they take John Stuart Mill's *On Liberty* to support (416).

As Harris, too, observes (2014, 257–59), Mill's invocation here is inapt. Mill's own restriction of liberty for the sake of avoiding harm is embedded in a nuanced account that features freedom, putting a high burden on those who would restrict it (1978, 9–12). Forestalling violent aggression, of course, is a legitimate ground for so doing, but akratic conduct as Persson and Savulescu depict it is generally not. One may certainly disapprove of what others do (e.g., taking a lavish vacation rather than giving the funds to charity), but forcibly intervening to stop their behavior is disallowed (Mill 1978, 74–75). Freedom must be cultivated, and this can occur only in a free society (56–61). Mill ends *On Liberty* thus: "A State which dwarfs its men, in order that they may be more docile instruments in its hands even for beneficial purposes—will find that with small men no great thing can really be accomplished; and that the perfection of machinery to which it has sacrificed everything will in the end avail it nothing, for want of the vital power which, in order that the machine might work more smoothly, it has preferred to banish" (113).

Sacrificing freedom and psychic complexity, we would render the notion of moral enrichment all but meaningless (see also Jotterand 2011, 7–8). Persson and Savulescu envision dedicated moral education from a young age in terms of "brainwashing" (2011, 443). Not only would the salutary impact on emotions delivered via a pill be no different, in principle, from that associated with reading Tolstoy (Savulescu et al. 2014a, 101), but the biotechnological path, if available, would be favored as a more efficient route to the "same" end. Robert Sparrow rightly opposes this view: "Someone who reads Tolstoy arguably learns *reasons* to be less judgemental and in so doing develops greater understanding: someone who takes a pill has merely *caused* their sentiments to alter. In so far as moral action requires acting for the right reasons, the person who has learned tolerance from Tolstoy has more and better reasons for action" (2014d, 115).

Persson and Savulescu's blindness to the fruitful potential of well-considered educational initiatives is in keeping with an evolutionary-psychological lens on complex human traits (Dupré 2001, 72). Evolutionary psychology gives very short shrift, indeed, to our "significant phenotypic plasticity," in light of which "there is no reason to think that we are necessarily maladapted to contemporary environments" (Zarpentine 2013, 144). Further, "While ontogenetic and neuropsychological complexity raises serious problems for [moral bioenhancement], it is this same complexity that helps facilitate the capacity for phenotypic plasticity. This capacity is itself an evolutionary response to environmental variation" (148). Prospects for familiar modes of our moral improvement are actually better, not worse, than those for high-tech means (Levy 2012; Zarpentine 2013, 148–51). Indeed, of the two approaches, only the first has shown proof of concept (Zarpentine 2013, 151; Lichtenberg 2008, 6).

6.2 Avoiding Ultimate Harm Should Not Be Our Governing Priority

In Western philosophy, the position that we should not be willing to sacrifice our freedom merely to continue existing is first defended expressly in the dialogues of Plato. The categorical precedence of freedom over bare existence is a strand of philosophical argument that endures to the present day. Having briefly considered Plato, I turn to Karl Jaspers, whose defense of this stance in the 1950s, at the height of the Cold War, is fruitfully juxtaposed against Persson and Savulescu's focus on human extinction, routes to which include weapons of mass destruction.

For Socrates as Plato presents him, what truly matters is not merely continuing to exist but living well (*Apology* 30b [Plato 1995]; *Crito* 47e–48b [1995]). Socrates's resolve to proceed thus is untouched even by the prospect of death because the goods (*ta agatha*) in question are incommensurable (*Apology* 28b–31c, 34d–38a; *Crito* 45a–48b): paying the price for continuing to live—renouncing philosophical inquiry—equates to losing himself. Through Plato, Socrates issues his still-resonant challenge to us all to consider that what is shameful is reflexive prioritizing of inferior human goods and a failure to appreciate that an unexamined life is unworthy of human beings (*Apology* 38a).

Plato reaffirms this commitment in subsequent dialogues, where, increasingly, he presents philosophical theories of his own (see, e.g., *Gorgias* 463a–465d [1903]; *Phaedo* 72e–77a [1995]; *Symposium* 210a–212a [1901]; *Republic* 436a–444e). In the *Republic*, for the first time in Western thought, human flourishing is unpacked in relation to freedom, defined in terms of harmony, above all, within the soul (Gregory and Levin 1998, 409–10). Giving pride of place to freedom in relation to psychic complexity and virtue's cultivation, Plato makes the case that how one exists matters incalculably more than for how long (*Republic* 444c–445b, 571a–591d).

While Plato's *Republic* focuses on individuals and, secondarily, on communities (592b), Jaspers, like Persson and Savulescu, is urgently concerned with humanity at large. The driving worry of many at the time was to avoid our perishing—a goal they presumed achievable through "a technological conquest of technology" (Jaspers 1961, viii). In *The Atom Bomb and the Future of Man*, Jaspers argued that the supreme threat was instead to human freedom and that peril of this type was not amenable to technical solutions (viii).[32]

For Jaspers, technical and strategic matters are the province of "intellect," while the purview of "reason" is what I call the "big human metalevel queries" that have long been the province of philosophy, including the nature of freedom and its role in our flourishing (Levin 2017b, 164). Both intellect and reason are needed for our flourishing, but science and technology, which embody intellect, can be availing only if they are guided by *human* priorities set outside of their own arenas (Jaspers 1961, 209, 235, 264). Thus, according to Jaspers, science requires aid from philosophy "in its search for goals and its own meaning. [Philosophy] seeks, if not directly to imbue science with value, at least to challenge science's commitments, and to repeatedly *raise the question of value* as the starting point of human interests" (Walters 1988a, 140). Absent this guidance, "The belief that everything can be 'fixed' is apt to mislead us. In the end, we want to 'fix' man himself, to make him over according to plan. . . . In practice, attempts at such planning can only be disastrous, in view of our limited knowledge and capacity" (Jaspers 1961, 279–80). Transhumanists' notion of humanity's self-transcendence via science and technology represents this vantage point in the extreme.

Jaspers is by no means indifferent to human survival (1961, 231). Since, however, its merit and that of freedom are incommensurable, decisions that prioritize survival over freedom betray our humanity. Because freedom is the condition, or ground, of human existence (214), what we think and do always relate in some way to it, regardless of whether we frame our thoughts and doings in that way. Human existence is therefore risky, as our freedom can be misused by act or omission (214–15). Unavoidably, for Jaspers, "We live in a paradoxical situation. It is only in freedom that we can become truly human, but when we are given freedom, we stray into evil paths. . . . We must choose the path of peril. For this peril is inherent in humanity" (226). It is freedom, not bare existence, whose jeopardy should most concern us (169, 173, 331; see also Gadamer 1981, 76–77).

Existential and political freedom are interdependent (Jaspers 1961, 215–16, 272; Walters 1988b, 238). Far from exempting the West, Jaspers's concern with the imperilment of freedom in the era of atomic weapons applies "equally, if not more," to it (Walters 1988a, 239). He is concerned that the constriction of freedom (e.g., via censorship) in democracies, where it is most taken for granted, could promote "blind obedience" and "docil[ity]" (Jaspers 1961, 230).

"The basic question is what makes life worth living. To achieve a life that is worthy of him, man must survive—but he will survive only if he achieves that life. . . . Now, at the brink, mere life depends on worthy living. . . . For such a life it cannot suffice to be safe, peaceful, and prosperous" (331). Here, Jaspers rejects the view, suggested by Persson and Savulescu (2012, 102), that well-being is properly defined in material terms. There is no guarantee that we could avoid ultimate harm even if we pulled out all the stops, but we would gravely weaken freedom—and thereby, our humanity—in the process. Together with ancients such as Plato, Aristotle, and the Stoics, Jaspers recognizes that "man is superior to his life" (1961, 332). In today's debate over transhumanism, avowed support for this view crosses the divide in stances on radical enhancement itself: among advocates, Harris is the most notable defender of this position, while Sparrow and I are critics of transhumanism who uphold it.

Persson and Savulescu countenance our doing *whatever* it takes to avoid ultimate harm, but continued existence is not a distinctively human end. If, upon reflection, they would not endorse any and all such measures, the reason would have to be that other values and priorities took precedence over it; beyond favoring a more even distribution, across humanity, of material well-being, Persson and Savulescu give us no idea of what those values and priorities, if any, might be. Though they would preserve humanity, their project betrays it.

7. Conclusion

Wiseman asserts that since "there is no such technology to turn us into moral automatons," addressing that scenario "serves only to misdirect discussion away from a more fine-grained analysis of the particular presently/soon-to-be-available interventions that have been set forth—like SSRIs for reactive aggression (or oxytocin for generosity, and so on)" (2014b, W6). I do not agree. First, my refutations of Persson and Savulescu's theoretical and practical proof of concept apply to any consideration of moral bioenhancement, Wiseman's included, that reflects similar assumptions. Second, what we see as mattering most will greatly affect resource allocation. If we opt to concur with Persson and Savulescu that survival should be our top priority, we should do so with full awareness of the distinctively human goods that we jeopardize by making that commitment.

Thus far, in terms of what we stand to lose by featuring the avoidance of ultimate harm, I have concentrated on the psychological plane. In the following chapter, I consider likely sociopolitical implications of our striving to implement species-wide moral alteration à la Persson and Savulescu, whether the chosen template was prosocial or antisocial. Further, within transhumanist argumentation, their utilitarian lens, and its accompanying sociopolitical effects, is not unique. For, alongside transhumanists' insistent vaunting of a commitment to individual and political freedom/autonomy, they display a commitment to an "ideal" form of utilitarianism, centered on "objective" goods, that spells trouble for liberal democracy.

4
Utilitarian Commitments of Transhumanists and Their Sociopolitical Implications

1. Introduction

Chapters 1 to 3 challenged transhumanists' views of the mind on philosophical and scientific grounds. A thorough assessment of transhumanism also requires that its guiding ethical commitments be made transparent so that they and their sociopolitical implications can be more fully explored. In this chapter, I argue that transhumanists' avowed commitment to personal autonomy in decisions about bioenhancement is undercut by evidence in their accounts of a utilitarian obligation to enhance that could jeopardize liberal democracy.

Ethical stances always have sociopolitical implications, and every politics presupposes an ethical position (Nagel 1988, 171). But the link between ethics and politics is especially tight for utilitarianism, whose supporters have tended to think that the justification for utilitarian political governance is more powerful than that for such decision-making by individuals (Williams 1973, 136). In fact, classical utilitarians viewed their approach mainly "as a system of social and political decision, as offering a criterion and basis of judgement for legislators and administrators" (135).

Routine avowals of a bedrock commitment to autonomy, often combined with libertarian propensities, frame transhumanist advocacy of bioenhancement as anything but utilitarian. When, as often happens, transhumanists' claims are taken at face value, they are critiqued for a lack of concern with broader welfare (Koch 2018). In fact, they evince a driving concern with welfare, at the species level.

In foregrounding the utilitarian cast of transhumanist argumentation, I build, to a degree, on the work of Sparrow and Erik Malmqvist, who have argued that transhumanist reasoning is consequentialist. Utilitarianism is, by far, the best-known form of consequentialist thought, according to which the moral worth of every action lies in its results, and "it is by reference to their consequences that actions, and indeed such things as institutions, laws and practices, are to be justified" (Williams 1973, 79). Per Malmqvist, "Like other consequentialist

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arguments, [transhumanists'] moral continuum argument proceeds from a claim about value to a claim about how we ought to act. It moves from the claim that therapy and enhancement offer equal or comparable benefits to the claim that we should enhance, not just treat or avoid disease" (2014, 44). Though this value-action "continuum" exists and is important, my own critique goes further and in a different direction: while Malmqvist "challenge[s] the moral continuum argument from within the broadly consequentialist framework on which the argument itself relies" (44), I uncover transhumanists' utilitarian commitments in multiple arenas, showing their logical, and potentially drastic, sociopolitical conclusions.

"A central question in thinking about the politics of human enhancement" is whether moral permissibility "inevitably slides into" moral obligation apropos of parental decisions to enhance (Sparrow 2014c, 141). I am confident that the answer is "yes" and document this moral slippage. Sparrow rightly questions "a naive faith in the resilience of liberal democratic political cultures," noting that "future discussions of the ethics of enhancement should pay much more attention to the political preconditions and presuppositions of claims about any putative moral obligation to enhance future human beings" (140). His own political criticisms address particular issues, such as sex selection and there being one optimal genome in a given societal context (2011a; 2011b).

My broader critique is based on a detailed ethical argument that transhumanists display utilitarian commitments meshing with the "ideal" type, which aims to maximize the existence of objectively valued goods. While Sparrow sees transhumanists as disconnected from the notion that "human flourishing consists . . . in the achievement of various objective goods" (2011b, 34), on my account, this role is played by their ideal utilitarian stance. What's more, we glean the full human impact of embracing transhumanists' agenda only if we treat its ethical and political aspects together. When Sparrow states that "the real worry about the new eugenics is not its philosophical logic but rather its cultural or political logic" (2014c, 147), he assumes a detachability of logics that, in my view, does not exist.

2. General Features of Utilitarianism

For utilitarians, only well-being, gauged in terms of states of affairs, has intrinsic worth, meaning that "the justificatory force of any moral reason ultimately rests on well-being" (Williams 1973, 83; Sen 1979, 477–78; Krutzinna 2016, 529). Utilitarians aim to maximize well-being, calculated in terms of the overall balance of benefit and harm; per "negative utilitarianism," to maximize benefit is to minimize avoidable harm (Smart 1958). Benefit and harm are gauged through one of three lenses: pleasure (the hedonistic view), preferences, or objective measures such as rationality (the "ideal" form). The course of action deemed to maximize well-being is morally required, and no means of promoting well-being are, on principle, precluded.

By utilitarians' "criterion of rational choice" (Smart 1973, 42), the best decision and the most rational one are identical. When the utility of possible states of affairs is gauged, the probability of their occurrence matters greatly (Smart 1956; 1973, 42–62). The terms "rational" and "irrational" are used to evaluate courses of action based on relative probabilities (1973, 47). In calculating how we are morally obliged to proceed at a given time, utilitarians give such deliberative weight to empirical factors that to proceed "irrationally" *is* to operate "unscientifically" (Williams 1973, 139; Smart 1973, 47). Further, utilitarians enjoin impartiality: in our calculations, we must not privilege ourselves individually, and should count equally the welfare of current and future generations (Smart 1973, 63).[1]

Utilitarians would always rather "promote utility through institutional amplifiers" (Watkins 1963, 95). Utilitarian rationales anchor priority-setting and initiatives in the arena of public health/-welfare (Buchanan et al. 2000, 11; Bayer and Fairchild 2004, 491; Powers and Faden 2006, 81–82; Bayer et al. 2007, 12; Goodin 2007, 123). Though their dominant justification is utilitarian, measures such as mandated immunization for vaccine-preventable diseases are consistent with liberal democracy and help make it possible for individuals to be active members thereof. By and large, those in liberal democracies accept these measures and thus, at least implicitly, their utilitarian justification. In the United States, they are typically not exceptionless, and mechanisms are in place for safeguarding personal discretion.

When arguing for their agenda, transhumanists give evidential import to parallels with familiar public-health/-welfare measures. In so doing, they reflect a current, broader tendency to extend the scope of "public health" beyond familiar initiatives. Transhumanists' spin on this trend is distinctive, as they invoke these parallels to support our engineering of a species change. Unlike familiar utilitarianism, which instructs us to give equal weight to current and future beings, transhumanism gives such precedence to the latter that it "assign[s] . . . moral responsibility to the present generation for the potential harms caused to all future generations" (Buchanan et al. 2000, 231).

3. "Health" and "Public Health": Relating Transhumanism to Wider Trends

Since transhumanists urge us to surpass human limits altogether, at first blush, little seems to tie their discourse to the realm of public health. In actuality, their accounts reflect current trends involving health generally and public health in particular. We must therefore consider these.

For some decades in the United States, my concern here, individual and population health have been the focus of discrete professional settings, clinical medicine and public health, respectively.[2] In its original Code of Medical Ethics in 1847, the American Medical Association (AMA) presumed that doctors' restricted conveyance of information to patients best promoted their welfare. This paternalistic lens on the doctor-patient tie, which goes back to the Hippocratic Oath, continued to dominate clinical medicine for over a century after the AMA's code debuted.

Bioethics emerged as a professional field of inquiry in the early 1970s. Its launch was sparked by new medical technologies (enabling, e.g., the use of dialysis to manage chronic kidney disease), combined with important social movements, like those for civil and women's rights, that aimed to challenge authority (Bayer et al. 2007, 3–4). Since the advent of bioethics as a profession, the ethical value of patient autonomy—backed by legal decisions, such as *In re Conroy* (NJ Supreme Court 1985), which added artificial nutrition and hydration to the class of refusable, life-sustaining measures—has become increasingly central. Though questions of broader resource allocation have relevance, the guiding idea is that in clinical medicine, values and priorities of individual patients should be given central weight.

The terms "public health" and "population health" are often used interchangeably (Glantz and Bareham 2018). Public health has two distinct emphases: maximizing aggregate welfare and social justice (Faden and Shebaya 2015). In contrast to the individual focus of health as a value in clinical medicine, public health is "by its very nature, a public, communal good, where the benefits to one person cannot readily be individuated from those to another" (2015); occupied with society-wide resource allocation, public health is "inherently political" (Burris and Gostin 2007, 358). Though preventive measures (e.g., mammography) have an important role in clinical medicine, in public health, "Prevention is preeminent" (Bayer et al. 2007, 28). "Paradigmatic" initiatives undertaken for the sake of public health and -welfare include immunization, fluoridation, water treatment to prevent illness, free public education, antismoking measures, and laws requiring the use of motorcycle helmets (Faden and Shebaya 2015; Bayer et al. 2007, 28; Heidenheimer 1973). The identity of these measures reflects the "intrinsic outcome-orientation" of public health (Faden and Shebaya 2015). Since "only the state can truly safeguard the public's health and well-being," these hinge on governmental initiative and enforcement (Bayer et al. 2007, 28; Faden and Shebaya 2015).

At present, "Traditional lines between clinical and other aspects of health promotion are blurring at a rapid pace" (Powers et al. 2012, 6). Notions of what "health" covers now fall "on a continuum. On one side . . . lie *narrow* conceptions that view health as essentially biophysical. According to this view, health is the absence of disease" (Weinstock 2011, 425). One way to get at the import of how "health" is defined is to juxtapose Daniels' "hard-line" construction of health in terms of "normal species functioning" (1985, 26–35; 1990; Sabin and Daniels 1994) against the expansive view of the World Health Organization (WHO):

> Health is a state of complete physical, mental and social well-being . . . not merely the absence of disease or infirmity. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being. . . . Health . . . is dependent on the fullest co-operation of individuals and States. . . . Healthy development of the child is of basic importance. . . . Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures. (2019a)

Health is not definable in a context-independent way (Weinstock 2011, 434; Burris and Gostin 2007, 359). Rather, "The decision to include more rather than less within the ambit of 'health' is ultimately a moral/political rather than an ontological or metaphysical one" (Weinstock 2011, 424). This means that "when we adopt . . . broad views . . . we are making a political decision, to the effect that whatever importance and priority attaches to health in arenas that span the gamut from informal public debate to public policy, priority setting ought to attach to all dimensions thereof" (426). Political and ethical rationales for adopting a particular lens on health are thus interconnected.

In keeping with WHO's definition and greater attention, within bioethics, to "social determinants of health" (Wilkinson and Marmot 2003), the scope of "public health" is expanding. In contrast to "a targeted and by definition narrower approach that focuses on discrete governmental interventions to prevent the immediate causes of morbidity and premature mortality," public-health theory increasingly supports "a broad approach, addressing the socioeconomic and cultural foundations of morbidity, mortality, and well-being" (Bayer et al. 2007, 29). Daniel Weinstock suggests that the "paradigm" for health's promotion is itself shifting from the frame of clinical medicine to public health—an interpretive change that "risks running afoul of normative strictures concerning the bounds of legitimate state action in the area of health" (2011, 425). As with WHO's broad construction of health, one can raise the question of what, ultimately, public health would *not* encompass: "Given a widening understanding of . . . the factors affecting prospects for population health, public health can be viewed as being so expansive as to have no meaningful institutional, disciplinary or social boundaries. Everything from crime, war and natural disasters; to population genetics, environmental hazards, marketing and other corporate practices; to political oppression, income inequality and individual behavior has been claimed under the rubric of public health" (Faden and Shebaya 2015).

What is seen as the rightful scope of public health at a given juncture relates to what the "harm principle" is thought to cover,[3] for, within liberal democracies, this principle "is often viewed as the most compelling justification for public health policies that interfere with individual liberty"—a notable example being its longstanding use "to justify various infectious disease control interventions including quarantine, isolation, and compulsory treatment" (Faden and Shebaya 2015). Due to "the principle's broad persuasiveness, it is not uncommon to see appeals made about harm to others in less than obvious contexts" (2015).

To apply the harm principle as a check on personal discretion, we must be able to demarcate purely self-regarding conduct—which, in liberal democracy, enjoys extensive protection—from that which is (or is also) deleterious to others. When we embrace broad constructions of "health" and "public health," it becomes harder to make the distinction between "self-" and "other-regarding," to the point that it may be all but dropped (Bayer et al. 2007, 85–86).

Because utilitarian rationales translate readily into sociopolitical requirements, this trajectory involving public health should concern us. Public health is "by definition an arm of the state" (Bayer et al. 2007, 29). Therefore, "Classifying something as a public health matter could be an effective way of taking it out of the realm of legitimate discussion. . . . Government actions aimed at securing health may be less scrutinized than actions aimed at more controversial ends, leaving public health officials with too much power and too little democratic accountability" (Faden and Shebaya 2015).

Linguistic appearances notwithstanding, increasing attention to "personal responsibility for health" fits with the notion that we are shifting to a public-health paradigm, with its preventive core (Hood and Friend 2011; Juengst et al. 2012). This emphasis on accountability has been building for quite a while: "As the spectre of epidemic infectious diseases gradually reduced in the twentieth century, new attention was paid to the role that individual behaviour played in the achievement of population health" (Porter 1999, 314).

Some who foreground this responsibility "are clearly concerned with moral right and wrong. People have an obligation, in this view, not only to themselves but also to their fellow citizens and taxpayers. . . . Accordingly, failure to accept one's responsibility for health is deemed to be grounds for penalties which would not be otherwise justified. If people fail in this responsibility . . . they may forfeit any claims to their neighbor's aid" (Wikler 2007, 90). Due to this broader obligation, individuals "might be obligated to submit before actually becoming ill to policies which enforce this responsibility, including those which interfere with ordinary liberties" (90). Further, individuals are equally accountable for acts and omissions: not to forestall detriments to health harms oneself, obviously, but also the community. Thus, Scott Burris and Lawrence Gostin point to “an increase in the prevalence of that most modern of ills, being ‘at risk’ ” (2007, 364). We may well ask, Will there come a point when this wider accountability is indistinguishable from an obligation to calculate in a utilitarian way on the individual plane?[4]

If we enact constructions of health, public health, and personal responsibility that are more wide ranging than liberal democracy as we have known it can readily absorb, there is no guarantee that it will remain intact. The above trends are also evident in transhumanism. This is not surprising, for transhumanists, like everyone else, “are part of a specific culture and a specific society at a concrete point of time in history. They also cannot break out of the present, always shaping the futures they tell us about on the basis of *present* knowledge, *present* estimates of relevance, *present* values and *present* worldviews” (Ferrari et al. 2012, 225).

4. Transhumanists’ Display of Utilitarian Commitments and Their Sociopolitical Implications

Transhumanists evince utilitarian commitments in several ways, including expansive constructions of public health.

4.1 An Expressly Utilitarian Rationale for Moral Bioenhancement

In transhumanist argumentation, links to utilitarian thought are typically unacknowledged or denied. An exception is Persson and Savulescu’s defense of moral bioenhancement. If we are to avoid ultimate harm, our pivot of moral justification must “shift” from rights to benefit and harm (2012, 21–22). Persson and Savulescu reject the act-omission doctrine: the notion that our moral accountability for harm we directly cause is greater than that for harm we permit to occur through inaction (60–62). Further, their attack on *akrasia* foregrounds impartiality, another mainstay of utilitarianism, whereby we are disallowed from favoring ourselves over unknown others.

Persson and Savulescu’s utilitarian rationale for moral bioenhancement anchors a sociopolitical requirement: “If safe moral enhancements are ever developed, there are strong reasons to believe that their use should be obligatory, like education or fluoride in the water, since those who should take them are least likely to be inclined to use them. That is, safe, effective moral enhancement would be compulsory” (2008, 174). To appreciate the force of their likening it to familiar public-health and -welfare measures, we must compare it with existing practices of this type.

In the United States, fluoridation is handled at the state and local levels (US Department of Health and Human Services Federal Panel on Community Water Fluoridation 2015, 318). By the close of 2012, "Approximately 200 million people . . . were served by 12,341 community water systems that added fluoride to water or purchased water with added fluoride from other systems" (319). Though "hard to avoid," drinking fluoridated water is not mandatory, as one can purchase bottled water to which fluoride is not added post purification (Levy 2013, 38; HHS Federal Panel on Community Water Fluoridation 2015, 324). Persson and Savulescu's other example, education, is legally required up to age 16 or 17 (depending on the state), but exemptions for home-schooling are allowed (Ray 2011, 2).

Persson and Savulescu also mention vaccination (2008, 167), the classic example of a justifiably stringent measure for the sake of public health. "Despite our citizens' love of freedom, mandatory immunization is generally well accepted" (Orenstein and Hinman 1999, S19). Since the start of the 1980s, all fifty states have legally provided for "implementation and enforcement of mandatory vaccination for school entrance" (Omer et al. 2009, 1982; Feikin et al. 2000, 3145).[5] Immunization is not strictly mandatory "in practice" (Charo 2007, 1906), however, as most states allow religious exemptions, and a significant number grant exemptions on "philosophical or personal" grounds (Omer et al. 2009, 1982). Here, considerations of aggregate welfare are balanced against a commitment to personal autonomy that undergirds our liberal democracy (Gostin et al. 2002, 627); allowance of exemptions or other workarounds signals that, within limits, individual discretion is being preserved. This is an example of how we address "the tension between social good and individual liberties, rights, and interests, which has long been the moral problem at the heart of the enterprise of public health" (Buchanan et al. 2000, 30). In liberal milieux, ongoing work is required to preserve this balance as societal circumstances and attitudes change.[6] Far from signaling that this concerns them, Persson and Savulescu evince a clear willingness to sidestep liberal freedoms.

Implementing moral bioenhancement would require a blunt instrument, similar to the way in which public health is improved via fluoridation—a comparison that Persson and Savulescu invoke. Initially, it might be administered via "drugs in the drinking water [or] aerial spraying of population centers" with neurobiological enhancers (Sparrow 2014b, 21). To promote coverage across generations, a "universal . . . program" of germ-line genetic modification would doubtless be sought (21). From the fact that the means would be blunt, it does not follow that the imposition of moral bioenhancement would be simple. The governmental infrastructure, including public-health and police powers, would have to be extensive. States preside over fluoridation, immunization, and education. Though hands-on implementation of moral bioenhancement would involve states and municipalities, to ensure that the composition and dosage of moral-enhancement measures were uniform nationwide, the program would have to be spearheaded at the federal level.

Moral bioenhancement would interfere with individual discretion on a level that familiar public-health provisions do not. As long as most people are immunized for vaccine-preventable diseases, the rest may be protected via herd immunity (Diekema and Marcuse 2007, 282; Omer et al. 2009, 1981; Lachmann 1998, 300). As Harris observes, moral bioenhancement has no protective counterpart (2013b, 286). While the world may be able to bear the existence of a few with *akrasia*, one individual with a nuclear or biological weapon can wreak disaster. Thus, moral bioenhancement must, in practice, be compulsory (Persson and Savulescu 2008, 174).

As noted, Persson and Savulescu supplant rights with benefit and harm. They invoke harm throughout *Unfit for the Future* (2012), not only in the phrase "ultimate harm" but also when denying a moral difference between acts and omissions. This concern with avoiding harm fits with their presentation of moral bioenhancement as a public-health/-welfare initiative (2008, 174). Further, apropos of ultimate harm, their focus is prevention.

For Persson and Savulescu, our moral deficiency is a species-wide emergency. Thus, implementation of moral enhancement would be remote from routine practice in our handling of infectious disease, being akin to the stricter compliance with protective measures that is needed once crises have been declared. Emergency measures are taken in the face of "epidemics," which are "increase[s], often sudden, in the number of cases of a disease above what is normally expected in that population in that area" (Centers for Disease Control and Prevention [CDC] 2012). The term "pandemic" applies to "an epidemic that has spread over several countries or continents, usually affecting a large number of people" (2012). In these terms, moral deficiency represents a species-wide pandemic.[7]

After the terrorist attacks of September 11, 2001, there was support for increasing governmental control and stringency in situations posing urgent harm to the public's health caused by an infectious disease or the intentional release of a toxic substance (Gostin et al. 2002). Per the Model State Emergency Health Powers Act, drafted at the request of the CDC, governors may declare public-health states of emergency in the face of the "occurrence or imminent threat of an illness or health condition that . . . poses a high probability of a large number of deaths, a large number of serious or long-term disabilities, or widespread exposure to an infectious or toxic agent" (Gostin et al. 2002, 622, 625). Because the impact of a "disease outbreak, whether intentionally instigated or naturally occurring," is "potentially catastrophic," a speedy response is key (623).

Targeted comparison of this act with what Persson and Savulescu urge brings out just how significant a departure from liberal-democratic practice its adoption would be.

Setting the stage for their proposal (hereafter, "the Model Act"), Gostin et al. observe that "health codes among the 50 states and territories have evolved independently, leading to profound variation in the structure, substance, and procedures for detecting, controlling, and preventing disease" (624). Article 1, Section 9, of the Constitution of the United States and the Tenth Amendment limit Congress's legislative authority over states. Taking for granted that states will continue to anchor responses to public-health emergencies, Gostin et al. are concerned to standardize and strengthen their authority to do so (622–23). For Persson and Savulescu, too, unstandardized enforcement and authority across states would be unacceptable. But since the moral failings that moral bioenhancement would remediate are not geographically restricted, federal standards and oversight would be needed. Moreover, since the moral "pandemic" is international, coordination on that level would be requisite.

The Model Act has itself been critiqued for overly constricting civil liberties (Annas 2002). Compared with what Persson and Savulescu endorse, however, it is downright permissive. Gostin et al. evince some concern to balance emergency provisions with individual liberty to the extent that crisis conditions allow (2002, 626–27). Although the Model Act sanctions the involuntary isolation or quarantine of those deemed to be at or pose a risk, individuals could apply for a court order "to show cause why [they] . . . should not be released" (Center for Law and the Public's Health at Georgetown and Johns Hopkins Universities 2001, 30). In contrast, Persson and Savulescu frankly admit that, with perfect legitimacy, moral bioenhancement could simply be imposed against people's will (2008, 174).[8]

In addition, the Model Act distinguishes sharply between states' usual authority and its increase during "an extreme public health emergency" (Gostin et al. 2002, 625–26). Emergencies would also be limited in duration to the existence of an active biological threat. In contrast, what Persson and Savulescu interpret as a moral emergency is the status quo in much of the world. As a result, latitude for liberty violations to address the threat that humans' moral deficiency represents would be temporally unbounded. Further, since their moral emergency is speculative, and proof of concept for moral bioenhancement is lacking, Persson and Savulescu would have unspecified authorities assume what the Model Act calls "emergency powers," absent a counterpart to its insistence that crisis declarations "be grounded in a thorough scientific understanding of public health threats and disease transmission" (Center for Law and the Public's Health at Georgetown and Johns Hopkins Universities 2001, 6, 8). Finally, the Model

Act's mandated measures should be "authorized in a manner allowing public scrutiny and oversight" (Gostin et al. 2002, 627). In contrast, since Persson and Savulescu sanction the imposition of moral enhancement "without the informed consent of the subjects" (2019, 14), they are unconcerned with transparency and public evaluation. What's more, note their use of the term "subjects" rather than "citizens." The full clause, "without the informed consent of the subjects," combined with their observation that "implementation [of moral bioenhancement] may be quite risky in the beginning" (13), prompts a concerning realization: initial recipients of moral enhancement would, effectively, be viewed as research subjects yet lack the protections deemed essential to respect for persons starting with the Nuremberg Code of 1947. This is not made explicit; rather, the program's utilitarian justification is simply assumed.

Damage associated with exceptionless imposition of moral bioenhancement would be tangible and intangible.[9] Those who were not demonstrable sources of harm when moral bioenhancement was administered would be included nonetheless so that no one fell through the cracks. But "99% of the persons who are affected . . . never posed a serious security threat, nor will they ever do so. It is vis-à-vis them—not (suspected) terrorists—that liberty infringements have to be justified" (Bublitz 2019, 31). True enough, but even if one could ascertain that 99% of people did not pose this type of threat, they would still require moral bioenhancement on grounds of *akrasia*. Going forward, "An increasingly higher percentage of the technologically possible consumption will be out of bounds, morally speaking" (Persson and Savulescu 2012, 77). Individuals would not "voluntarily" undertake "such harsh restraints," and democratic governments are unlikely to spearhead a shift to "a politics of parsimony, voluntary restraint, and decreasing welfare" (79, 84). Authoritarian governments "are better placed than democracies to implement unpopular reforms effectively. . . . Whether this greater efficiency is a good or bad thing depends upon whether the unpopular reforms are overall beneficial or harmful" (86). The requisite measures are "likely to be widely unpopular" and must occur rapidly (88). The question becomes: Can liberal democracies "handle anthropogenic climate change and other environmental problems, without ceasing to be liberal democracies?" (89). Though they do not answer this query outright, Persson and Savulescu provide the ingredients for a clear "no."

They see *akrasia* as a widespread pathology that moral bioenhancement would treat (117). Contra Persson and Savulescu (76–77), being unwilling to radically reduce one's standard of living does not obviously reflect a character flaw. Moreover, where limited self-control does reflect poorly on one's character, it is one thing to glean moral blameworthiness, but quite another to frame that limit as a pathology requiring treatment. Those who objected to this diagnosis would, however, lack all recourse.

Ruth Faden and Sirine Shebaya's observation that "classifying something as a public health matter could be an effective way of taking it out of the realm of legitimate discussion" (2015) applies to Persson and Savulescu's framing of our moral emergency that moral bioenhancement would defuse. When mandating exceptionless enhancement, they rely on a public-health rationale but scrap the core mission of public-health ethics to reach a balance between public good and individual liberty—which commitment is crucial to the maintenance of liberal milieux (Powers et al. 2012, 6).

A core feature of liberal democracy is "the provision to its citizens of extensive civil rights and liberties" (Persson and Savulescu 2012, 5). Because democratic freedom is largely responsible for our current extremity, we cannot address what ails us within a "democratic form of government, unless the will to act morally grows stronger in the public" (8, 104). As "the prospect that liberal democracies will be able to deal with climatic and environmental problems seems gloomy," citizens of those democracies must undergo moral bioenhancement (8). Persson and Savulescu say they favor "not [the] abandonment of . . . democracy, but enhancement of the morality of its voters" (90). But the public resolve that they wish to see would stem from moral bioenhancement, and to ensure that this bioenhancement occurs, they are willing to hit the pause button on liberal democracy (see also Bublitz 2019, 31–32).[10]

Moral bioenhancement would be supplemented by "rather extensive surveillance by the state," which requires "setting aside what people in liberal democracies have come to regard as rights, in particular the right to privacy. Likewise, the freedom of media needs to be restricted" (Persson and Savulescu 2012, 125). Universal surveillance would be provided by the God Machine, whose traits would include infallibility (2016, 267).

From the standpoint of liberal democracy, commentators have voiced worries about the God Machine:

> Denied even the ability to know when our freedom is being curtailed, we would lack the motive to rebel; and lacking a constitutional and democratic framework for control of the God machine, we would have no recourse whatsoever. . . . Once censorship exists, citizens have no knowledge of what precisely has been censored and why. They don't know what they don't know. . . . That is why liberal democracies view censorship with great suspicion and are vigilant to oppose the handing of such powers to officials. (Harris 2014, 255–56)

Moreover, because the God Machine operates "beyond democratic control . . . there is no opportunity for citizens . . . to vote the enhancer out of his position or to resist particular policies" (Schlag 2019, 14–15).

Persson and Savulescu's "response" to such concerns is stunningly inadequate:

> It is possible to imagine that GM [the God Machine] is regularly reviewed by a democratically elected assembly. . . . If some of [the] act-types which are originally permitted start being frequently committed, the case for preventing them grows stronger. But some types of action should be on the black list irrevocably, like killing and torturing innocent and non-consenting people—and other types should be on the white list irrevocably. If members of the assembly were to be in the process of deciding to change the status of the latter two types, GM should be fixed to interfere with such a reclassification. This certainly sets limits to democracy, but remember democracy is not infallible: notoriously, in Germany in 1933 Adolf Hitler was democratically elected. (2016, 267)

By whom, one wonders, would the God Machine "be fixed" to prevent democratic adjustments? And how could constitutional provision be made for democratic oversight, given that the decision procedures, operation, and maintenance of this machine intelligence would be occluded from public view? Far from reassuring critics, Persson and Savulescu concede that unidentifiable agents will preside over the infallible God Machine, severing its operations from democratic control. Further, their suggested linkage of democracy with Nazism is a cheap shot at democracy per se that evades rather than tackles the alarming fact that they are all too ready, even eager, to jettison liberal democracy.

4.2 Transhumanists' Broader Suggestion That We Should See, and Thus Value, Bioenhancement in the Light of Classic Public-Health Measures

Beyond the realm of moral enhancement, we have reason for concern that sociopolitical requirements would flow from implementation of transhumanists' agenda so as to put liberal democracy at risk. For, in defense of cognitive bioenhancement, a number of transhumanists deploy parallels with familiar public-health and -welfare measures. They make these connections without flagging the backdrop *as* that of public health, let alone owning the utilitarian justification that anchors them. Since what they trumpet in decisions about bioenhancement is individual autonomy, we might not even register pockets of argumentative reliance on the sphere of public health as sounding a countervailing note. But we should, as these references to public health are signs of transhumanists' willingness to defend their proposals on utilitarian grounds.[11]

Andy Miah supports cognitive bioenhancement by linking it to the salutary impact of fluoridated water (2013, 298). Others, such as Gregory Pence, tie their advocacy of vigorously heightening cognitive ability to the tremendous value of immunization against vaccine-preventable disease (2012, 135, 186). The ethical rationale for embracing vaccines and cognitive bioenhancement is said to be the same: boons to recipients and societal well-being (Chan and Harris 2006; Bostrom 2003a). By moving directly from infectious disease to cognitive bioenhancement, Bostrom extrapolates without supplementary argument from the public-health arena to cognitive enhancement, the case of interest to him (2003a). A population focus is evident, too, when transhumanists tout cognitive bioenhancement as a block on humans' otherwise violent tendencies (Savulescu 2005; Savulescu and Kahane 2009).

In their defense of cognitive bioenhancement, Chan and Harris (2006) reject the moral distinctness of disabilities and inabilities "from the point of view of the legitimacy of altering that state" (see also Hughes 2004, 232–34). Concerning inabilities, healthy, unvaccinated people are no different from those whose memory and concentration would benefit from augmentation inasmuch as vaccinations for the first and psychostimulants for the second have the same rationale (Chan and Harris 2006). "If neuro-enhancement is of benefit," we should promote its use on the same basis that we already endorse "other beneficial interventions, from fluoridation of drinking water to the wearing of seatbelts in motor vehicles" (2006). With equal warrant, all of these are called "enhancement strategies" (2006). Unlike familiar public-health and -welfare measures, vigorous means of cognitive bioenhancement do not exist. To expedite their emergence, we are obliged to participate as subjects in targeted research (Harris 2010, 195–96).

In terms of public welfare, cognitive bioenhancement would boost societal, even global, "economic and scientific productivity" (Shulman and Bostrom 2014, 85).[12] If its use spans the population, well-being, gauged by productivity, will rise dramatically because "individual-level effects . . . would be complemented by synergistic effects" (88). Further, productivity and, thus, "economic success," would continue to surge as cognitive upgrades became more powerful (89; Bostrom and Roache 2011, 140). Through "iterated embryo selection" in the context of in vitro fertilization (IVF), a hypothetical reproductive technology that would "[compress] multiple generations of selection into a few years or less" (Shulman and Bostrom 2014, 85), a posthuman level of cognitive ability would eventually be reached.

Jeesoo Nam (2015), too, concentrates on productivity. He would have us use cognitive bioenhancement as a tool of social justice, one of two guiding concerns of public health (129–30; Faden and Shebaya 2015). According to Nam, cognitive bioenhancement would "have a large impact on closing the kind of severe inequality gaps that we ought to be concerned about," and we are morally obliged to use it "in cases where traditional capability enhancements are either not effective or cannot be pursued" (2015, 132). As the power and extent of cognitive bioenhancement are, in principle, limitless, it would rightly supplant traditional education (128–30)—itself a longstanding, crucial public-welfare measure. By manipulating biological capacity, one "encourages active participation in the process of trade and commerce" (128). This involvement "entails several positive externalities, benefits that are borne by people other than the recipient of enhancement.[13] Employed individuals contribute to the production and output of society while traditional welfare recipients simply consume them. The positive benefits of this are clear since the sum total of consumption in a society cannot be greater than the sum total of its output" (128).

In a nutshell, we should avidly pursue cognitive bioenhancement because, substituting it for traditional welfare, we would heighten average and aggregate well-being. Reflected here is an increasingly prevalent "efficiency ethic" that depreciates "noneconomic contributions to the quality of human life or the welfare of society" (Sarewitz 1996, 124, 123)—or, at minimum, presumes that all other worthy boons would accompany rising productivity. Once upgraded cognitive ability is seen as requisite for its effects on "the general well-being of society in terms of its productive capacity . . . the realm of individual action will become harder to distinguish from that of social action" (Bayer and Moreno 2007, 106).

That a number of transhumanists invoke familiar public-health and -welfare endeavors in their defenses of bioenhancement is more revealing than they seem to realize. Its presentation as similar to these makes cognitive bioenhancement itself a public-health and -welfare measure or lends it the same justification. Either way, the ethical anchor is utilitarian, and this carries the prospect of sociopolitical requirements. That state enforcement is a desired or logical outcome of the moral imperative to enhance is evident in the writings of transhumanists themselves.

An illustration is Bostrom's extension of a utilitarian warrant for vaccines to cognitive bioenhancement. "There may . . . be a positive externality of enhancing our own health. If we are less likely to contract a contagious disease, others benefit by being less likely to get infected by us. Being healthier, we may also contribute more to society and consume less of publicly funded healthcare" (2003a, 501). Overall impacts on public health, including harm-avoidance, make vaccines morally requisite. Bostrom then simply assumes a comparable rationale for cognitive bioenhancement: "If in the case of intelligence enhancement the positive externalities outweigh the negative ones, then a *prima facie* case exists not only for permitting genetic enhancements aimed at increasing intellectual ability, but for encouraging and subsidizing them too" (502). Even if "political realities" do not currently permit a more forceful stand, "At least we can conclude that an enhancement that has both significant intrinsic benefits for an enhanced individual and net positive externalities for the rest of society should be encouraged" (502).

From the standpoint of public health, Sarah Conly argues that "there is no clear [moral] distinction between disincentivizing an action [such as smoking] and simply making it impossible to perform" (2013, 6). Instead of reflecting a principled check on freedom's restriction, limits on strict governmental steerage stem from our current social environment (12, 186). Preliminarily taking one's cue from the status quo is a standard utilitarian move. Similarly, Bostrom backs off not on whether bioenhancement could be the subject of a legal mandate, but only on the timing of its institution: "The best policy for the foreseeable future may . . . be to not legally require any genetic enhancements, except perhaps in extreme cases for which there is no alternative treatment" (2003a, 500). In the meantime, "The scope for ethics and public policy . . . extend[s] far beyond the passing of laws requiring or banning specific interventions" (500).

Per Bostrom, to help us reach the point when "the social climate . . . is ready for mandatory genetic interventions" (500), governments can and should exert pressure. Through avenues such as the "provision of health care services, regulation of the insurance industry . . . [and] education . . . we may influence the direction in which particular technologies are applied. We may appropriately ask, with regard to genetic enhancement technologies, which types of applications we ought to promote or discourage" (500). The boundary between (dis)incentivizing and coercion is not clear-cut. Concerning the "provision of health care services" and "regulation of the insurance industry," might incentives and disincentives be reflected in higher insurance premiums for coverage of unenhanced children or even in its outright denial? If state provisions included financial support for enhancement, say, on a sliding scale, it would be hard to see an absence of coercion in resulting procreative decisions "favoring" bioenhancement by those who could not pay out of pocket for healthcare coverage. Bostrom presents duress as an interim tactic that would help us reach the point where a transition to requirements *could* more feasibly occur.

The public-welfare focus of Jefferson et al. is "civic virtue," key to whose elevation is cognitive bioenhancement (2014, 509–14). Here, a political requirement is expressly invoked: If bioenhancement fosters civic virtue, "There will be a prima facie case for the state to allow and perhaps promote or even require [its] use. . . . After all, contribution to civic virtue has often been taken to help justify a role for the state in providing and requiring education" (525). Absent a governmental mandate, "If a significant portion of the benefits from my biomedically enhancing myself are positive externalities . . . then I face insufficient incentive to enhance myself . . . and I might not enhance, or not enhance myself to a sufficient degree" (525).

Where the frame is public health/-welfare, with its utilitarian anchor, the justification for mandatory bioenhancement becomes stronger to the extent that "the costs (or the forgone benefits) accrue to individuals other than the (un)enhanced person" (Levy 2013, 38). Though Neil Levy is not a transhumanist, the rationale he notes is manifest in transhumanists' invocation of public-health/-welfare measures to support their own radical proposals. Although a utilitarian could (and Mill, for one, does) defend noninterference with individuals' choices as itself generally maximizing well-being,[14] this is not how defenders of radical enhancement on utilitarian grounds proceed.

Taking our cue from Conly (2013), we might compare the sociopolitical trajectory that Bostrom (2003a) entertains for cognitive ability—from pressure to legal mandate—with the well-established case of smoking. Smokers have long been pressed to quit and youth not to begin by excise taxes and legal prohibition, respectively (Gruber 2001, 193–94, 197–98). Per the Affordable Care Act, insurance premiums for tobacco users can be elevated by 50% (US Centers for Medicare and Medicaid Services 2019). In addition, smoking bans now exist in a range of venues, including restaurants, bars, nonhospitality workplaces, public transportation, and airports (Gruber 2001, 198; US Department of Health and Human Services 2006, 574; American Nonsmokers' Rights Foundation 2019).

Though rates of smoking in the United States have declined substantially, smoking "remains the leading preventable cause of premature death" (HHS 2014, 11). Further, "The annual burden of smoking-attributable mortality can be expected to remain at high levels for decades into the future, with 5.6 million youth currently 0 to 17 years of age projected to die prematurely from a smoking-related illness" (12). The severe health impacts of smoking are indisputable, being especially harsh for pregnant women, fetuses, and youth (HHS 2016, 5). Smoking also diminishes "workplace productivity" (Gruber 2001, 203; HHS 2006, 616). In sum, smoking continues to represent "[an] extraordinary threat" to public health/-welfare (669).

"Patterns of tobacco use are changing," with nicotine vaping, via devices such as e-cigarettes, "fast becoming a new 'tobacco' industry" (HHS 2014, 12; Johnston et al. 2018, 3; Palazzolo 2013, 17). Vaping by the young is most concerning. From 2011 to 2015, e-cigarette use by high-school students grew 900% (HHS 2016, vii). During 2018, rates of nicotine vaping by 12th, 10th, and 8th graders over the previous 12 months were 29.7%, 24.7%, and 10.9%, respectively (Miech et al. 2019b, 1); in terms of prevalence, these numbers reflect increases of 10.9%, 8.9%, and 3.4% compared with 2017 (1). In sheer numbers, compared with 2017, roughly 1.3 million more adolescents engaged in nicotine vaping (Miech et al. 2019a, 192). Within this group, rates of nicotine vaping continued to rise sharply during 2019 (Miech et al. 2019b).[15]

E-cigarettes have been wrongly marketed as "healthy" (Glantz and Bareham 2018, 217). Beyond nicotine, they contain toxic chemicals and heavy metals (Hess et al 2016; HHS 2016, 7; Olmedo et al. 2018). Also like the conventional sort, e-cigarettes elevate the risk of myocardial infarction and pulmonary impairment (Glantz and Bareham 2018, 225). What's more, though "passive exposure consists only of what the EC [e-cigarette] user exhales," this vapor has "potential adverse health effects for people who are involuntarily exposed," particularly infants and children (Hess et al. 2016, 2, 7).[16]

E-cigarettes are marketed as a stopgap measure that can help people wean themselves off conventional cigarettes and, eventually, all nicotine products. Recent reviews gainsay this claim (Hess et al. 2016, 2). Most adult users "continue to smoke conventional cigarettes" (Glantz and Bareham 2018, 217); by drawing in smokers "who are interested in quitting but reducing the likelihood of those smokers to quit successfully," e-cigarettes exacerbate the very problem that they are advertised to improve (222). Indeed, high nicotine levels in e-cigarettes help to draw users of conventional cigarettes to them. Prior to the launch of a 5% nicotine salt solution by Juul Labs in 2015, "Most e-liquids were in the 1%–2% nicotine range," with 3% the typical peak (Jackler and Ramamurthi 2019, 623). Rushing to compete, other purveyors now offer e-liquids with nicotine concentrations of up to 7% (623).

Moreover, e-cigarettes function as a "gateway" to the conventional variety (Glantz and Bareham 2018, 227; Jackler and Ramamurthi 2019, 627). Above all, they are "expanding the nicotine market by attracting low-risk youth who would be unlikely to initiate nicotine use with conventional cigarettes . . . many of whom then transition to smoking cigarettes" (Glantz and Bareham 2018, 216, 219). This clearly documented link in the case of low-risk youth "rais[es] concerns that e-cigarettes may renormalize smoking behaviors and erode decades of progress in reducing smoking" by that group (Berry et al. 2019, 10).

In their review, Stanton Glantz and David Bareham conclude that e-cigarettes "are maintaining and expanding the tobacco epidemic" (2018, 227). Tellingly, e-cigarettes "are increasingly sold by the same multinational companies" that purvey the conventional variety (227). What's more, in December 2018, Altria—parent company of Philip Morris USA, whose brands include Marlboro and Virginia Slims—acquired a 35% stake in Juul Labs, the highly successful producer of e-cigarettes (Kaplan and Richtel 2018).

At present, "The vision for public health achievements from reduced use of combustible products and reduced nicotine addiction is at risk" (Gottlieb 2018). Ongoing harms to public health from smoking are both serious and preventable (Homa et al. 2015, 108). On utilitarian grounds, therefore, stricter governmental action is defensible (Goodin 2007, 123–24). The same ethical warrant for familiar antismoking measures supports an outright ban on the sale of conventional cigarettes (Proctor 2013). Though this ban would represent a significant change, the shift to prohibition has already been paved via duress, above all, economic pressure. On the same utilitarian basis, if tightened regulation fails to "revers[e] the epidemic that is underway," a ban on e-cigarettes may be justified (Gottlieb 2018; 2019). It would be quite another thing, of course, to accept the analogous trajectory that Bostrom adumbrates for cognitive bioenhancement.

My point here is that if cognitive bioenhancement is seen as a public-health/-welfare measure, a legal mandate could emerge as the justified successor to duress if results of the latter were deemed insufficient.

4.3 Procreative Decision-Making: A Utilitarian Defense of Maximal Capacitation and Its Sociopolitical Implications

As transhumanists' foremost concern is the capacities of future beings, they are necessarily invested in the content of procreative decisions. In their handling of this topic, we witness a key tension between transhumanists' usual proclamation that choosing bioenhancement is simply one legitimate expression of personal autonomy and the tacit, utilitarian undergirding of its valorization.

When responding to critics' position that the very availability of bioenhancements would undermine autonomy—that of parents-to-be and/or their children—transhumanists' aim is circumscribed: to show that this would not be so. They proclaim an allegiance to individual freedom of choice. Indeed, transhumanists routinely insist that procedurally construed, autonomy would be not merely preserved, but enriched, in part because the availability of bioenhancement technologies would give self-determining individuals more options to choose among. The upshot in terms of procreative decision-making? Bioenhancement is a good that prospective parents should be allowed to select.

Should this suffice to make us sanguine that if technological enhancement were not one's cup of tea, declining to enhance one's children-to-be would be as viable a choice as any other? In a word, "no," for when transhumanists argue directly for the consummate merit of their own position, they evince a quite different ethical perspective: here, they display central utilitarian commitments. What's more, since their dominant aim is to promote the rightness of their vision, the utilitarian lens they adopt when defending bioenhancement takes argumentative precedence over the more permissive ethical stance they voice when aiming simply to establish, against critics, that radical-enhancement technologies should be on the slate of options from which parents may choose.

The Principle of Procreative Beneficence (PB) is the best-known prescription regarding procreative decisions that transhumanists advance. According to PB, "prospective parents" are morally obliged "to aim to have the child who, given her genetic endowment, can be expected to enjoy most well-being in her life. . . . There *is* reason to obtain and use all genetic and other information about disease susceptibility *and* non-disease states to make a decision to select the most advantaged child" (Savulescu and Kahane 2009, 275–76).[17]

Per Savulescu and David Birks, "There should be very good reasons for not adopting the utilitarian solution of maximising well-being" (2012, 7). Savulescu and Kahane's defense of PB embeds utilitarian tenets, including the governing requirement to maximize well-being, which alone has intrinsic worth; the notion that "you cannot have too much of a good thing" (Haworth 1984, 19); a heavy reliance on levels of scientific and technological advance when determining what, specifically, we are morally obliged to do; and, as Michael Hauskeller observes, a guiding moral obligation to subsequent generations (2013, 179).

In keeping with standard philosophical methodology, my argument here does not take express assertions or denials of utilitarian affiliation as decisive straightaway but rather weighs, all together, commitments and implications of transhumanists' accounts. Having rejected strict, self-sacrificing act utilitarianism as characterizing his own position, Savulescu claims that while "people think I am a utilitarian . . . I am not. I, like nearly everyone else, find Utilitarianism to be too demanding" (2014b). But if the view he rejects does not exhaust utilitarian approaches, Savulescu's categorical denial is premature. He notes elsewhere the existence of an ideal type, according to which "what matters is . . . doing worthwhile things. Certain things are good or bad for people, whether or not these people want to have the good things or avoid the bad things. The good things . . . include . . . rational activity" (Savulescu and Birks 2012, 1). In my view, advocacy of PB fits best with an ideal utilitarian stance on which cognitive ability is the featured good.[18]

One could, of course, find some aspect of utilitarian thought appealing without being a utilitarian. Indirectly, Savulescu concedes the former. He and Birks identify the three standard utilitarian types, distinguished based on the reference point—pleasure, preferences, or ideals—for assessments of well-being (2012, 1). Not only do Savulescu and Kahane make the same threefold distinction when explicating their own "welfarist" stance, but their welfarism is partially elaborated, albeit tacitly, in relation to this utilitarian grid (2011).

PB's common ground with utilitarianism is stronger than broad congeniality, however, for defenses of this principle exhibit central points of convergence with utilitarian thought (see also Overall 2012, 126)—all of which Savulescu recognizes expressly as features of it. In decision-making, well-being, or welfare, is the ultimate arbiter (Savulescu and Birks 2012, 3, 5). Well-being is gauged in terms of the overall balance of benefit and harm (6). Because the moral imperative is to maximize welfare, what best promotes it is morally required (1). No means are in principle off the table (6), and contextual factors—particularly the state of scientific-technological advance—greatly affect what tools for the promotion of well-being are available (2, 6). Further, "Utilitarians are concerned to ensure that the well-being of future generations is maximised" (6).

Savulescu and Kahane (2011) send mixed signals on whether one can successfully defend welfarism without defining well-being and, if one cannot, how substantive its proper definition must be. They acknowledge that well-being is "a normative concept" (46–47; Ray 2016, 35). Explicating PB, they claim that "in order to aim to have the most advantaged child, we need to form reasonable opinions on difficult questions about the nature of well-being and the good life, and about the weight we should give to the prospects of future children when these compete with other moral considerations. . . . These are questions we cannot avoid if we are to make the right procreative choices" (Savulescu and Kahane 2009, 289).

Savulescu and Kahane wrongly equate addressing "what affects human well-being" with having "agreed" on an account of what well-being *is* (2011, 47). This equation seems to legitimate their focus, with transhumanists generally, on boosting capacities absent consideration of settings in which they might be employed: quite simply, where capacitative adjustments would augment well-being, there exists "a strong moral obligation based on beneficence to provide them" (Savulescu 2006, 326). That the welfarism of Savulescu and Kahane "does not rely on some special and controversial conception of well-being" is presented as a boon (2011, 48). PB is "neutral with respect to . . . philosophical disputes about the nature of the good life. . . . All [PB] asks us is to apply in our procreative decisions the same concepts we already employ in everyday situations" (2009, 279).

PB is supposed to be a logical extension of how good parents already operate with respect to children's well-being and "neutral" concerning what motivates people to reproduce (Savulescu and Kahane 2009, 275n3, 279, 289). In fact, it embeds a highly restrictive account of rational and responsible procreation. Contra familiar norms of good childrearing, this principle morally requires parents "to do everything within their power to produce and raise the best children possible" (Buchanan et al. 2000, 162)—with "best" defined in proponents' terms.

Defenses of PB sidestep the fact that accounts of well-being simply *are* controversial, necessarily resting on a vision of worthwhile aims. Beyond the nebulous goal of indefinitely augmenting featured abilities, transhumanists defend no such aims. They purport to avoid controversy by concentrating on "all-purpose goods" (Weinstock 2011, 433), in their case, capacities. Now, most would likely agree that lacking at least a modicum of certain "primary goods" in the vein of John Rawls (1999, 54–55; Buchanan et al. 2000, 167–68) impedes people's flourishing. It matters greatly to one's assessment of transhumanism, however, that what advocates turn a spotlight on discretely, including rationality and "negative" emotion, is framed, unpacked, and incorporated by adherents of different philosophical approaches and ethical theories in distinctive and often incompatible ways.

In addition, PB is "a maximizing principle" (Savulescu and Kahane 2009, 280). Per its normative core, distinctive of consequentialism, maximizing featured goods makes lives "go best" (Sparrow 2011b, 40n8; Savulescu and Kahane 2009, 274). Philosophically and otherwise, this notion is exceedingly contentious: even if we agreed on the import of certain capacities to flourishing, it would not follow that beings' prospects in this regard were elevated in precise tandem with capacitative augmentation (Hauskeller 2013, 20). Transhumanists' view of the mind embeds a constrictive designation of worthwhile faculties, on whose maximization they insist. Thereby, transhumanism violates value pluralism in the liberal-democratic sense of nonpartiality among the specific projects that people favor, being compatible with only a narrow range (see also Parens 1998, S14).

Transhumanists' focus on radically augmenting the capacities of future beings reflects an ideal utilitarian stance. For ideal utilitarians, intellectual experiences and states of mind are "intrinsically good" or at minimum objectively so (Smart 1973, 27, 66; Moore 1993a, 282–83; 1993b, 159). An ideal-utilitarian lens, manifest in defenses of PB, places a moral requirement on parents-to-be and relevant others based on transhumanists' notion of what matters most about us. Among objective goods to be maximized, cognitive ability is preeminent: for transhumanists, it is the sine qua non for all purposive undertakings, one whose advantages and elevation are in principle without a ceiling. As I construe transhumanists' ideal utilitarian position on cognitive enhancement, their target is not an experience or a state of mind, but instead, and more nebulously, cognitive ability, ramped up in keeping with the state of scientific-technological advance at a given time.

Analyzed in a fine-grained way, advocacy of PB reflects a three-stage logical process that I illustrate here via the prizing of cognitive bioenhancement in relation to autonomy. When aiming to persuade critics that cognitive enhancement should be an available option, advocates of PB allege that it would heighten autonomy. In what I call Phase 1, the allowability of cognitive bioenhancement is established due to its being a good. Phase 2 represents the different, decidedly utilitarian, line of approach committing advocates to the view that enhancement is morally obligatory; in between is Phase 1.5, where enhancement is not simply a good but an immensely desirable booster of well-being.

Addressing Phase 1 means seeing how transhumanists construe autonomy when concerned to foster receptivity to the very phenomenon of bioenhancement. Critics worry that enhanced progeny will be deprived of the right to self-determination, to whose realization what Joel Feinberg called "an open future" is key (1980). Jürgen Habermas (2003) is a well-known proponent of the view that, to safeguard individual freedom, or autonomy, bioenhancement should be disallowed. His focus is situations where a prospective parent "makes an irreversible decision that deeply intervenes in another's organic disposition" (14); such a decision "may prove to restrict the choice of [the resulting] individual's way of life" (23), thus negatively affecting autonomy (24). In particular, "Interventions aiming at enhancement reduce ethical freedom insofar as they tie down the person concerned to . . . irreversible intentions of third parties" (63). For the sake of prospective children's autonomy, then, these interventions are ethically precluded (63).

Transhumanists' Phase-1 approach to supporting bioenhancement signals their recognition that, to answer this line of critique, they must support the moral permissibility of enhancement in accordance with the broad procedural construction of autonomy that led opponents to deem enhancement of progeny-to-be an autonomy violation. In Phase 1, far from ranking autonomous decisions based on the merit of their content, transhumanists presume that what renders decisions legitimate is that they reflect the values and priorities of their makers; this is why I deem the autonomy at issue here broadly procedural.

Beyond foregrounding the procedural autonomy of prospective parents, transhumanists maintain that bioenhancement would heighten the autonomy of future children indirectly, by expanding the range of options that are viable given their capabilities—and even, more directly, by enhancing autonomy itself (Schaefer et al. 2014). In Phase 1, enhancement is a good that parents-to-be should be allowed to choose (Savulescu 2005, 38). By the procedural standard of this phase, and assuming for argument's sake the moral permissibility of bioenhancement, (a) parents who opted against it, (b) those who took bioenhancement to its technological limit at a given time, and (c) those who trod an intermediate course would all be expressing their autonomy, with none morally critiqued for their choice of path.

Transhumanists must do all they can to keep the focus on autonomy as broadly procedural because of the imperative they face to avoid an evident linkage of their efforts to prior eugenic thought. They reject any and all substantive ties thereto and are quite aware that, therefore, the dividing line between moral permissibility and a moral requirement is key.

When differentiating his own stance from prior eugenics, Savulescu features harm-avoidance in the narrow sense of preventing disability and disease (2005, 38). One sees this narrow construction of harm apropos of Phase 1 also in the work of Bostrom (2003a, 499), who opposes the call by Annas et al. (2002) for an international treaty making human cloning and germ-line engineering (i.e., heritable genetic modifications) crimes against humanity.

Though they typically reject the treatment-enhancement distinction, transhumanists rely on it here in Phase 1, where they strive to defuse criticism versus arguing directly for the merits of their own position. The above lens on harm reflects their need for and insistence on a bulwark between individual implementation and sociopolitical steerage. In contrast, as we will see, when transhumanists lobby directly for bioenhancement through a utilitarian lens, their construction of harm expands to cover any condition or state of affairs that could be, but is not, improved technologically.

Transhumanists cannot and do not rest content with Phase-1 autonomy. By their own lights, parental freedom to decline cognitive bioenhancement for their progeny must be curtailed since well-being alone has intrinsic worth, with cognitive ability the prime objective good. Humans' acting autonomously in a broad procedural way will undermine welfare, judged with reference to transhumanists' maximizing, objective yardstick, when what is inferior from that standpoint is embraced. Hence, the very autonomy they profess to safeguard in Phase 1 when seeking to establish that bioenhancement is permissible must be set aside when they get down to the brass tacks of defending their own position.

There is another way to see why transhumanists require this. Saying that prospective parents should be allowed to select bioenhancements begs the question of whether we should allocate resources directly to the prospect of making these options available. Trumpeting their point that individual discretion would govern the use of bioenhancement technologies, transhumanists take it for granted that resource allocation and successful development have occurred. But why dedicate massive resources in this way merely to make available technologies that individuals might or, equally well, might not employ?

After Phase 1, the argument for PB becomes utilitarian, of the ideal type. Let us now consider that argument, by which a strong recommendation that prospective parents choose the good of cognitive enhancement (Phase 1.5) glides into a moral requirement (Phase 2). Advocates' utilitarian frame is precisely what makes the slide from its defense as highly valuable to its embrace as morally required appear quite natural.

Per Phase 1.5, PB "instructs women to seriously consider IVF if natural reproduction is likely to lead to a child with a condition that is expected to reduce well-being significantly, even if that condition is not a disease" (Savulescu and Kahane 2009, 281); that is to say, it provides "strong reasons" for them to do so (281). So-called negative affect and traits on the autism spectrum—which many have tied to greater, e.g., creative, ability (Happé and Vital 2009; Mottron 2011; Treffert 2014; Best et al. 2015)—join genetic diseases in the burgeoning collection of harms that prospective parents are "instruct[ed]" to avoid imposing on their children, if need be via assisted reproductive technologies like IVF. As Savulescu and Kahane stop just short here of levying a moral requirement, their remarks reflect Phase 1.5.

In the same paragraph, however, they cross into Phase 2, for "unless the risks and costs are substantial, parents *ought* to select the most advantaged child" (2009, 281). What is more, "As means of selection become safer and our ability to use them to select non-disease characteristics increases . . . PB will require most reproducers to select the most advantaged child unless doing so is predicted to lead to a very significant loss of well-being to existing people" (281). For utilitarians, here, Savulescu and Kahane, well-being is what matters, with means being morally indifferent apart from their impact on it.[19]

The key block on a moral requirement is a contingent factor involving the state of scientific-technological advance: that requirement is front and center, with the concessive "unless" further qualified by "substantial" and "very significant" regarding demonstrable downsides (Savulescu and Kahane 2009, 281). Again, this is characteristic utilitarianism, by whose lights "whether genetic modification of human beings is right or wrong turns crucially on . . . questions that can only be answered by empirical scientific research" (Savulescu and Birks 2012, 2). Caveats such as the above are also standard utilitarian fare, since supporters of that ethical theory may grant that, even with technologies' advance, in select instances we might foster well-being best overall by not pushing the pedal of enhancement as hard as we possibly could.

Savulescu embraces Phase 2 elsewhere. Technological enhancement is "a moral obligation. . . . If we have an obligation to treat and prevent disease, we have an obligation to try to manipulate [biological and psychological features] to give an individual the best opportunity of the best life," namely, that "with the most well-being" (2005, 37–38; 2001a, 419). Channeling the view of transhumanists generally, he announces that "the next stage of human evolution may be rational evolution" (2005, 38). Based on transhumanists' starkly binary mode of thought, those who oppose their views evince a form of irrationality (More 2003; Silver 2007, 13). This stance is reflected in Savulescu and Kahane's claim that "general constraints on rationality . . . instruct us to aim to have the most advantaged child" (2009, 282).

Because prospective parents' obligation is "to create children with the best chance of the best life" (Savulescu and Kahane 2009)—or, on Harris's formulation, to optimize "possible functioning" (2010, 53)—those choosing utmost enhancement would be, objectively, the very best within the sphere of procreative decision-making. Once "normal" functioning is replaced by the "possible" variety, bioenhancement passes Harris's "emergency-room test" (91) of being not only reasonable but morally obligatory. So strong is our "moral obligation . . . to try to manipulate [biological and psychological features] to give an individual the best opportunity of the best life" that "once technology affords us . . . the power to enhance our and our children's lives," the harm we wreak by "fail[ing] to do so" will be just as grave as if we "gave [our children] a toxic substance that stunted or reduced these capacities" (Savulescu 2005, 37–38).

The utilitarian goals of providing benefit and minimizing (or avoiding) harm often conflict. One might think that, where they clashed, transhumanists' relative emphasis would fall squarely on the former. But their arguments' governing lens is frequently harm-avoidance, with moral requirements on particular actions reliant on technical possibilities at a given time. This extension of the scope of "harm" prompts us to recall Faden and Shebaya's observation that due to the harm principle's "broad persuasiveness, it is not uncommon to see appeals made about harm to others in less than obvious contexts" (2015). Any judgment of harmfulness "involve[s] *some* ideology, impl[ies] that some standard . . . has been departed from" (Watkins 1963, 112). Their expansive lens on harm-avoidance buttresses transhumanists' rejection of autonomy understood in a broad procedural way.

When utilitarians assess moral accountability, acts and omissions count equally. Because utilitarianism "attaches value ultimately to states of affairs . . . it essentially involves the notion of *negative responsibility*: that . . . I must be just as much responsible for things that I allow or fail to prevent, as I am for things that I myself, in the more everyday restricted sense, bring about" (Williams 1973, 95). The utilitarian notion of providing benefit by minimizing harm applies in a special sense here. Transhumanists reject the distinction between addressing disease and tackling "non-disease characteristics" as conceptually indefensible and morally irrelevant (Savulescu and Kahane 2009, 281; Levin 2014b, 3–4). For them, anything that improves well-being is an enhancement. When transhumanists move from defending the view that bioenhancement technologies should be on the slate of parental options to lobbying directly for their use, the scope of "harm," or "disability," swells, as harm is done any time technology that could be used to improve a valued feature is not deployed (see also Hauskeller 2016, 125).

"We all suffer from disabilities of various kinds—conditions inherent to our nature which reduce our well-being and make it more difficult to realize a good life" (Savulescu and Kahane 2009, 290). Further, "If parents could increase the prospects of future children's lives by selecting children who are far more intelligent, empathetic or healthier than existing people, then PB instructs parents to select such future children. In comparison to such possible future persons, most existing persons may count as suffering from disability" (290). Boons like upgraded cognitive ability are thus reinterpreted in terms of limitations—or prospective harms—that they lessen or surpass. [20]

All enhancement decisions should be based on "how well," versus badly, "a life" is likely to go (Savulescu and Kahane 2009, 285). Disability, as ordinarily construed, is merely "a species" of the genus "instrumental badness," or "harmful condition[s]" (286). The same point is made in different terms when the concept of disability is itself defined "in a broader and more inclusive way" (2011, 47). Regardless, with "what is of intrinsic value: well-being" as the ultimate reference point, there is no ceiling on what could be viewed as harmful (46; 2009, 290).

Similarly, according to Harris, disability is "a condition that someone has a strong rational preference not to be in and one that is moreover in some sense a harmed condition. . . . On this view a harmed condition is defined relative both to one's rational preferences and to conditions which might be described as harmful. Disability then is defined not relative to normal species functioning but relative to possible alternatives" (2010, 91–92). Harris's warrant for restrictions on procreative decision-making is presented in general human terms: we should eliminate "condition[s] that someone has a strong rational preference not to be in" (91). Here, "someone"—like Savulescu's "an individual" (2005, 38)—means "anyone." This generic frame of reference mirrors decision-making in public health, which aims to "protect not individual citizens, but rather citizens considered as a group" (Beauchamp 2007, 53). Advocates of PB adopt this focus on "the level of the population, recommending enhancement for no one in particular" (Hall 2017, xi): we are enjoined to "participate in the avoidance of risk to [it]" (22).

Transhumanists' generic concern is indicated, too, by the fact that procreative adjustments would often be germ-line genetic ones. Whether or not their arguments directly address procreation, transhumanists' notions of objective good, rational decision-making, and harm/disability are supposed to capture what is best at the species level. Because we are accountable for the continued existence of limits that we do not do everything possible to forestall, our moral responsibility is vast (see also Sparrow 2011a, 277). The obligation to forestall harm, thus construed, ultimately belongs to humanity itself (More 2003). Those who disagree are seen as irrational, showing by their divergence why cognitive bioenhancement is desperately needed. From the standpoint of a liberal society, this flouting of the notion that "we are all 'reasonable people' who have come . . . to believe different things" is quite concerning (Buchanan et al. 2000, 178).

Regarding cognition, humanity's biological situation has held steady for quite some time. In terms of brain volume, as well as the size and functions of specific areas (notably, the neocortex), the profile of *Homo sapiens* remains essentially unchanged (Hawks 2013; Rakic 2009; Sherwood et al. 2008).[21] A dramatic shift has occurred, however, in how the cognitive parameters of human existence are interpreted: given technological developments that transhumanists anticipate, these parameters are seen increasingly as (1) limitations that are (2) remediable—in that sense not unlike familiar diseases or disabilities that do or may eventually admit of cure. Further, limitations become preventable liabilities if they are technically addressable at a given time but unaddressed. The associated moral condemnation is particularly strong when the harm being permitted involves children, or future generations.

Apart from transhumanism, there is already significant concern about "medicalization," an expansion of what are viewed as deficits, hence as needing remediation. Transhumanists' construction of human limits as preventable harms fuels a dramatic extension of this worry. There are no limits in principle on humanity's moral responsibility when it comes to elevating their featured capacities (cf. Sparrow 2011b, 36). For transhumanists, "The whole human condition is best understood as . . . a disability in need of fixing. . . . We are, ultimately, *always* . . . defective . . . simply by virtue of being human" (Hauskeller 2016, 145). Thus, individual druthers notwithstanding, if radical augmentation became a live option, then continuing to be human would itself represent an avoidable harm. Not only may the "moral imperative" to enhance require the relinquishment of our very standing as human, but posthumanity is precisely where transhumanists' line of thought and aspiration leads (Hauskeller 2016, 78–79).

Among capacities, the objective merit of rationality/cognitive ability is unparalleled, for it would drive humanity's self-transcendence and, in radically augmented form, be the fulcrum of posthuman existence. Ideal utilitarians may believe that certain goods (e.g., knowledge) have intrinsic merit as contributors to well-being. And when well-being is specified in terms of experiences or states of mind, these have intrinsic value, for well-being just is, or comprises, them. Because sheer ability does not have merit independently of the ends it serves, the pivotal role of rational/cognitive ability can be expressed only in terms of instrumentality. This classification, however, fails to capture the categorically higher status of this mental good as compared with goods, such as wealth and fame, that are purely instrumental.

Not directly present on the list of objective goods to be maximized, increased autonomy would be a byproduct or concomitant of elevated cognitive ability (Schaefer et al. 2014, 126–28). Enhancing autonomy "should open up a whole host of options that were not as easily accessible before" (132); though heightened autonomy may "[remove] a handful of options . . . from the menu, many more will be opened up" (131). Procedurally construed, as here, autonomy excludes others' imposition of their views.

But what if these views are the rational ones to hold? For utilitarians, values such as autonomy have quite different weights than they do in deontological and liberal frames (Nagel 1988, 156; Nozick 2013, 30–33; Dekker 2009, 92–93; Haworth 1984, 5). By their "criterion of rational choice" (Smart 1973, 42), the favored course is the one that most promotes well-being. Autonomy is valued instrumentally, insofar as it promotes rational choice. Within transhumanists' ideal utilitarian frame, maximizing rational ability would itself be the supremely rational course. A commitment to anything less is "irrational" (Savulescu 2013a, 54). Procedural autonomy must be scratched as welfare reducing because it preserves decision-options that are objectively illegitimate.

Though Savulescu and Kahane recognize that PB lends itself to an impersonal defense, they do not glean their own utilitarian rationale for the principle's embrace (2009, 277, 282–83). Allegedly, PB is fully compatible with liberal democracy, as it encapsulates a moral requirement that should not be legally enforced (279). The utilitarian frame of PB, however, undermines this attempt to cordon off moral from legal obligations: "If one's ultimate moral commitment is to the advancement of well-being, it is difficult to deny that coercive interference with reproductive choices might be justified when very much well-being is at stake" (Malmqvist 2014, 53n4). Because "the technologies to modify the human genome require the manipulation of human life at the embryonic stage, the new eugenics involves shaping *future* persons" (Sparrow 2014c, 143)—and thereby, future citizens/society. Since the state has an interest in the character of its "future citizens," it should concern itself with procreative decisions, such that, "were it to become possible . . . to significantly enhance future human beings the question would immediately arise as to whether these enhancements should be made mandatory" (144). The justification could be "negative" social and economic externalities and/or "positive" ones, such as productivity and civic virtue (145; Bostrom 2003a, 500–502; Buchanan 2008, 27–28; Jefferson et al. 2014, 525; Shulman and Bostrom 2014, 2, 4; Nam 2015, 127–28).

Transhumanists' official story locates the availability and use of bioenhancement technologies solidly within a liberal-democratic vision of individuals' choosing, without constraint, as long as they do not interfere with others' ability to do the same. "It is individuals and couples . . . *not governments* . . . who will seize control of these new technologies" (Silver 2007, 10); thus, recourse to technologies such as embryo selection "would not be associated with any restrictions on reproductive liberty" (261). Liberal democracy will remain intact, providing a strong check on any sort of return to prior eugenics (Green 2007, 165). Indeed, transhumanists routinely insist that personal freedom, the crux of liberal democracy, would be not merely preserved but enriched through one's chosen augmentations (see, e.g., Miah 2013, 299; Sandberg 2013, 57; Vita-More 2013a, 21). The opportunity for radical enhancement is even deemed "the birthright of every creature" (Bostrom 2019, 5). For transhumanists, "Those who seek to prohibit genetic enhancement [are the ones who] pose a serious threat to political liberty," as precluding or limiting bioenhancement is "coercive to people with a preference to use it" (McWhorter 2009, 411; Loewe 2016, 230).

Transhumanists are "overwhelmingly and staunchly civil libertarian, defenders of juridical equality and individual rights" (Hughes 2010, 629).[22] Libertarians, who represent an extreme within the liberal tradition, see "individual persons as monads who are free to make decisions on their own" (Powers et al. 2012, 8–9; Ferrari et al. 2012, 226). There is thus "a tension between [transhumanists'] consequentialism and their (apparent) libertarianism when it comes to the rights of individuals to use—or not use—enhancement technologies as they see fit" (Sparrow 2011b, 33). At most, a libertarian standpoint permits nudges, "understood . . . as interventions in choice architecture. . . . There is no attempt to contravene the will of individuals, in contrast to what some hold to be a necessary feature of paternalism. Second, the interventions must not overly burden individuals who want to exercise their freedom in ways that run counter to welfare" (Faden and Shebaya 2015).

Transhumanists essentially ignore social influences on attitudes and identities (Levy 2016, 22). Having an outsized faith in the biological resolution of human challenges, they minimize or discount sociopolitical impacts of the existence and use of bioenhancements, including harms to democracy itself. Strikingly, however, those who take it for granted that liberal democracy is safe from fundamental threat, even if bioenhancement is avidly pursued, span the continuum of positions on bioenhancement. Caplan et al. and Daniel Wikler—who, though not transhumanists, are generally sympathetic to enhancement—cordon off the voluntaristic focus of procreative choices now, which they view as secure, from past instances of force and coercion (Caplan et al. 1999, 1284; Wikler 1999, 191). Bill McKibben, a critic of bioenhancement, presumes that choices regarding it would be "mere consumer decisions" (2003, 37). Similarly, Daniel Kevles anticipates that decisions would be "private . . . shaped by the dynamics of democratic consumer culture" (2015).

In the debate over bioenhancement thus far, attention to sociopolitical implications has focused not on the future of liberal democracy itself but on two likely impacts of the availability of enhancement technologies. There are social-justice concerns, namely, worries about unfairness in access to them, such that already sharp inequalities may worsen. The second focus of attention involves duress: the prospect that individuals, including parents-to-be, who are disinclined to enhance themselves or their children will feel pressed to use bioenhancements or risk competitive disadvantage.[23]

Putting the spotlight on transhumanists' utilitarian commitments helps us to see that these worries about deleterious outcomes, though certainly important, do not penetrate to the heart of what should alarm us. For, as Sparrow in particular has argued, we should not be sanguine about the sustenance of liberal democracy (2014a–d). To see most clearly why widespread confidence in its endurance is misplaced, we must approach the sociopolitical plane by way of the utilitarian ethical lens to which transhumanists show far greater allegiance than meets the eye.

5. Resource Allocation

Much of the debate over transhumanism presumes the existence of bioenhancement technologies and addresses their regulation (for a recent collection that addresses this topic, see Jotterand and Dubljević 2016). To be sure, any that came to exist should be subject to "systematic regulation," for without it, "reprogenetic technologies," for example, would be "limited mainly by the constraints of the market and the piecemeal constraints of professional self-regulation" (Parens and Knowles 2007, 264).

That said, challenging transhumanism based on possible outcomes of and responses to the availability of pertinent technologies has limited range, for if consequences identified as undesirable could be alleviated or forestalled by law, regulation, and subsidies, then the moral claim they made on us might be met by our continued monitoring and addressing of those features. The same applies to the notion of assessing technologies in tandem with their development, as the Presidential Commission for the Study of Bioethical Issues advocated in 2015 regarding "novel neural modifiers" (30).

Transhumanists insist that once powerful bioenhancements existed, individuals would have a right to choose them on their own and their children's behalf. This emphasis on results gives an unearned argumentative edge to transhumanists: up front, we grant a commitment to develop immensely high-tech interventions and accept that the paramount concern is how we respond if and when they become available (see also McWhorter 2009, 431).[24] Thereby, we sanction "the transition from a merely claimed possible future to the issues that undoubtedly *will* arise" (Nordmann 2007, 33n3); whereas, right now, precedence should be given to the question of whether we may, let alone should, commit resources to the targeted pursuit of transhumanists' radical agenda at all.

Per transhumanist argumentation, the same utilitarian lens that could anchor sociopolitical requirements to use bioenhancements justifies massive public investment, straightaway, in their development. From that standpoint, "the present system" is a major impediment, and we should change our current "disease-focused regulatory framework . . . into a well-being-focused framework" (Bostrom and Roache 2011, 143, 146); within it, pharmaceutical companies, for example, could "focus directly on developing nootropics for use in non-diseased populations" (7).

Transhumanism and the human-centered, liberal-democratic lens it would supplant differ tremendously in their guiding "values and visions" (McWhorter 2009, 432). When we "commit resources to [one] project rather than to others," we signal our answers to questions "not just about what we will do but about who we will be, what sort of lives we will lead and will allow those around us to lead, and what those lives will mean" (432). What transhumanists urge is public investment in technologies that would permit those who wished to pursue transhumanists' own posthuman fantasy. Far from reflecting a liberal commitment to value pluralism, their rational essentialism, for instance, represents an extreme even among rational-essentialist positions.

Transhumanists would like to see a whirlwind of public support for their agenda: "Society needs a culture of enhancement," and "transhumanist ideas and ideals need to be infused into public life at all levels, from popular culture and art to politics and religion" (Bostrom and Sandberg 2009, 333; Bruere 2013). Public support would be a valuable tool for transhumanists if it led to pressure for public funding. Transhumanist appeals for broad support and large-scale public funding feature overall welfare (de Grey 2004, 726; Bostrom and Sandberg 2009, 332; Transhumanist Declaration 2009; Bostrom and Roache 2011, 143–44; Sandberg and Savulescu 2011, 107; Pence 2012, 183–90; Szabados 2018).[25] Since, unavoidably, children-to-be of those who opted for bioenhancement in the early days of its availability would shoulder substantial risks without a clear promise of benefit for themselves (Chan and Harris 2006; Bostrom and Sandberg 2009, 313–14), transhumanists must assume a utilitarian justification for this state of affairs.

One reason to stress how often transhumanists actually invoke overall welfare as a rationale for public support and funding is that otherwise, we might focus disproportionately on their interest in market forces and frequent linkage of personal discretion regarding bioenhancement to the idea that funding for this endeavor could stem largely from private sources. This insistence itself ignores the meshing of "private" and "public" sectors that would be inevitable in research toward that end. When it comes to guiding values and large-scale resourcing, these domains are not separate (Blank 2016, 240–41)—nor are they separable, given everyone's embedment in a particular historical and societal milieu. Universities, public and private alike, increasingly depend on "federal grants [and] awards from private foundations" (Gallup and Svare 2016). Funders' own value-commitments and priorities have an increasingly tight grip on researchers' decisions about what areas to tackle and what ones to ignore: "Patterns of funding will provide direction: the more active the governmental funding, the more public and refined the oversight" (Bonnicksen 2007, 83).

Shulman and Bostrom take the intermingling of public and private for granted when projecting that embryo selection would have a pronounced impact on

> the supply of extremely talented individuals, particularly in generations after the first. This could have major impacts on cognitively demanding fields. . . . As . . . national health records come to contain DNA, they could be correlated with tax records, test scores, and education levels. . . . Regulatory agencies . . . could help or hinder the growth of private genomics companies. Grantmakers could increase or decrease their support for research into human gamete production from stem cells, which could affect the number of embryos available for conventional embryo selection and the feasibility of [iterated embryo selection]. Adoption rates could also be influenced by subsidizing or restricting the use of embryo selection and genetic testing for prospective parents. (2014, 89–90)

Transhumanism is weak from nonutilitarian perspectives, as evidenced by proponents' undue willingness to constrict personal autonomy and their extreme rational essentialism. It is also faulty on utilitarian grounds. Since proof of concept for transhumanists' envisioned future has not been shown, it would be irrational to hitch public policy, not to mention humanity's prospects more generally, to their notion of posthumanity. It would also be immoral, as "morality requires that public monies be spent effectively and not wasted on futile (and possibly risky) interventions" (Krutzinna 2016, 533). We face serious, persistent social-environmental sources of harm, including those for which documented, cost-effective solutions exist (see also Graham 2002, 71; President's Council on Bioethics 2003, 282). Much as we might wish the contrary, resource allocation necessarily occurs under conditions of scarcity: "As the hypothetical gets displaced by a supposed actual, the imagined future overwhelms the present. . . . This overlooks the opportunity costs: we can only do so much when our resources . . . are limited" (Nordmann and Rip 2009, 273). On empirical grounds, and with aggregate welfare in view, we should dedicate far more than we currently do to ameliorating social-environmental harms, through greater dedication to measures such as childhood nutrition and education. In addition, our traditional public-health system "is seriously deficient and can be repaired only with sufficient political will and economic resources" (Gostin et al. 2002, 628). If committed to wholeheartedly, such projects would be radical, and stand to be radically effective.

In utilitarian decision-making, probability estimates are pivotal (Bayer et al. 2007, 18). Fueled by fantasy, transhumanists' estimates for their cherished future are so high that the word "will" constantly appears in their writings, as though they were speaking prophetically. Their failed proofs of concept matter greatly. Further, in any given present, we may delude ourselves that linguistic formulations give us a clear handle on the future (Grunwald 2006, 56). No one, now, can answer the question of what *will* transpire with respect to bioenhancement. As the utilitarian J. J. C. Smart wisely cautions, "Where the future is so dim a man must be mad who would sacrifice the present in a big way for the sake of it" (1973, 64).

As Alfred Nordmann observes, when the query "Why should we now accept this or that promise of a technological future?" replaces "What will the future bring?"

> Technological programs are seen for the way in which they make claims on the present. . . . In any situation in which we find ourselves we are obliged to act according to the best of our knowledge and ability. . . . Rather than adopt a believing attitude towards the future, an ethics beholden to present capabilities, needs, problems, and proposed solutions will begin with vision assessment.

> Envisioned technologies are viewed as incursions on the present and will be judged as to their likelihood and merit: How credible are these claims, and do these technologies solve acknowledged problems? (2007, 40–41)

6. The Moral Permissibility of Using Reproductive Technologies to Avoid Disease and Disability

Before bringing this chapter to a close, I should make clear why, having rejected transhumanists' lens on procreative decisions, I view selective abortion following the detection of disease or disability as morally permissible. In the extensive literature on this topic, "carrier screening" refers to testing by prospective parents to assess their risks of transmitting a genetic disease during procreation; if significant risks are documented, "diagnostic testing" during pregnancy indicates whether a particular fetus has the condition. The phrase "prenatal testing" covers both. If prospective parents use IVF, preimplantation genetic diagnosis (PGD) is the corresponding procedure to diagnostic testing.

The original impetus for developing assisted reproductive technologies was to address infertility (Robertson 1994, 8). Increasingly, prospective parents employ IVF, PGD, and prenatal testing in an effort to avoid having children with diseases and disabilities. Use of these technologies to promote the health of progeny is widely seen as morally acceptable: it both serves the best interests of children and is "understandable in terms of the burdens and concerns [parents] would experience, such as increased child care and child rearing costs, more worry, etc." (Robertson 2003, 457).

Mutations involving a single gene cause many serious diseases, among them cystic fibrosis, Tay-Sachs disease, sickle cell anemia, thalassemia, hemophilia, fragile X syndrome, Lesch-Nyhan syndrome, and Marfan syndrome (Torres et al. 2012; National Human Genome Research Institute 2017; WHO 2019b). These diseases tend to be "rare," meaning that they affect fewer than 200,000 people nationwide (National Institutes of Health 2017). While many symptoms can be managed, most rare diseases are currently untreatable (2017). Beyond testing for these conditions, that for Down syndrome and other neural tube defects, such as spina bifida, has become a fixture of prenatal care (Mayo Clinic 2019a; 2019b). Risks of neural tube defects increase with maternal age, and this testing is viewed as particularly salient for women over 35 (2019a; Kotova et al. 2015).

The use and acceptability of prenatal testing may be seen in terms of the priority long given by parents to having healthy children (Robertson 2003). Before it was available, people used external "surrogates" (e.g., "beauty and symmetry") to gauge the health of potential mates (459); preimplantation genetic diagnosis and prenatal diagnostic testing are simply more precise ways of promoting this longstanding goal (459).

Disability theorists challenge the presumption that prenatal testing is essential to "good prenatal care" (Parens and Asch 1999, S1). Due to their concern with "the view of life with disability that is communicated by society's efforts to develop prenatal testing and urge it on every pregnant woman," many theorists endorse the "expressivist" objection (Asch 1999, 1652; Parens and Asch 1999, S2). Those who embrace it view selective abortion, following positive diagnostic tests, as "morally problematic in a way that other means of preventing disability are not. Such other means include, for example, taking folic acid to reduce the likelihood of spina bifida, or eschewing medication that is known to stunt the growth or harm the organs or limbs of a developing fetus. Such acts (or refraining from such acts) on the part of the pregnant woman are designed to protect the health of the developing fetus" (Parens and Asch 1999, S3).

Disability theorists distinguish between terminating a pregnancy to avoid having any child, which they deem morally acceptable, and doing so to preclude one's having a particular child (Saxton 2017, 80). In the latter instance, a single characteristic "is the basis for the decision not to continue the pregnancy or to implant the embryo. . . . Termination of the process only occurs because of something learned about *this child*" (Asch 2000, 236). Diagnostic testing, followed by selective abortion, "does not protect the developing fetus from anything. It prevents disability by simply killing the fetus" (Parens and Asch 1999, S3). Proceeding thus disvalues currently existing people with disabilities and existence with disabilities more generally. Even where "prospective parents do not intend to send a hurtful message . . . many people with disabilities receive such a message and are pained by it" (S3). For "the message at the heart of widespread selective abortion on the basis of prenatal diagnosis is the greatest insult: we are 'too flawed' in our very DNA to exist; we are unworthy of being born" (Saxton 2017, 85). In various ways, obstetricians and genetic counselors have helped to fuel this misconception (Shakespeare 1998, 668; Parens and Asch 1999, S8–S9; Asch 2003, 334).

The expressivist objection is related to the "social model" of disability, which emerged in the early 1980s (Hall 2017, 41). Disability theorists delineate impairments, which are ineliminable biological constraints, from disabilities, or limitations on access and opportunity that stem from current society (Wendell 2017, 164). Per the social model, impediments presumed to be sheerly biological reflect societal institutions and priorities that can and should be adjusted to attenuate or, better, eliminate those obstacles (Asch 1999, 1650–51).

According to Tom Shakespeare, a liability of the social model is its "neglect of impairment as an important aspect of many disabled people's lives. . . . The social model so strongly disowns individual and medical approaches that it risks implying that impairment is not a problem. . . . For those who have degenerative conditions which may cause premature death, or any condition which involves pain and discomfort, it is harder to ignore the negative aspects of impairment" (2017, 199). In keeping with this recognition, a key feature of "critical disability studies" is its rejection of a stark binary between impairment and disability (Meekosha and Shuttleworth 2017, 177–78; Hall 2017, 38–44).

Some genetic conditions both restrict opportunity and occasion great suffering (Buchanan et al. 2000, 99); examples are Tay-Sachs disease and Lesch-Nyhan syndrome (99–100). Tay-Sachs disease is a severe, degenerative condition whose symptoms include "progressive loss of mental ability, dementia, blindness, increased startle reflex to noise, progressive loss of hearing leading to deafness, difficulty with swallowing, seizures that may begin in the child's second year. . . . Even with the best of care, children with Tay-Sachs disease usually die by age 4, from recurring infection" (National Institute of Neurological Disorders and Stroke 2019). Lesch-Nyhan syndrome "is characterized by motor dysfunction that resembles cerebral palsy, cognitive and behavioral disturbances, and uric acid overproduction. . . . Cognitive impairment and behavioral disturbances emerge between ages two and three years. Persistent self-injurious behavior (biting the fingers, hands, lips, and cheeks; banging the head or limbs) is a hallmark of the disease. . . . Gouty arthritis may occur later in the disease" (Nyhan et al. 2014). Those with this incurable syndrome may survive into their teens or twenties, though sudden death can occur beforehand (2014; Neychev and Jinnah 2006). Less severe, but still serious, conditions, such as Marfan syndrome, hemophilia, and fragile X syndrome, also involve suffering and impact people's opportunities (Fragile X Clinical & Research Consortium 2012; CDC 2018; National Heart, Lung, and Blood Institute 2019).

In offering the above examples, my purpose is not to judge the worth of lives. Rather, I offer them to illustrate Shakespeare's point that "while environments and services can and should be adapted wherever possible, there remains disadvantage associated with having many impairments which no amount of environmental change could entirely eliminate" (2017, 201). To reject the view that disability is wholly or predominantly a social construct is not to go to the other extreme and accept a highly reductive "medical model" (Asch 1989, 73; Shakespeare 1998, 669–70; Hall 2017, 34–35, 38–41). Nor is it to deny that societal attitudes and infrastructure bear substantially on how constraining—physically, socially, and psychologically—many conditions are or that societal deficiencies should be ameliorated (Parens and Asch 1999, S11; Buchanan et al. 2000, 287; Asch 2003, 318).

Misinformation about what living with disabilities is like for those who do so abounds (Asch 2003, 318–27; Parens and Asch 1999, S7–S11, S14–S15). We need to enrich the context within which procreative decisions relating to disability are made (Asch 1989, 89–92; 1999, 1654–55; Parens and Asch 1999, S19–S21). To that end, systemic adjustments are needed to the education and practice of genetic counselors (Biesecker and Hamby 2000, 348–50). For prospective parents and those who counsel them, opportunities for direct contact with individuals and families living with the disabilities under discussion are essential (Asch 1989, 91; 2003, 334; Saxton 2017, 79). Infrastructural improvement will better position those who provide information and counsel "to help prospective parents ask the fundamental questions they should be asking: Why do I want a prenatal test? Do I understand what I think I am trying to prevent? What do I know about spina bifida, Down syndrome, or whatever? Will having a child with one of these conditions prevent me from gaining what I want in having a child?" (Parens and Asch 1999, S19). It does not follow that those who were suitably informed and reflective about prenatal testing would proceed in a uniform way, as seeing that "there are erroneous beliefs that need to be dispelled may not show that the desire for prenatal testing stems from misinformation alone" (S11). Enriching the context in which decisions relating to prenatal testing occur would be valuable and important no matter their content (S20; Shakespeare 1998, 678; Baily 2000, 69–70).

Particularly in settings where the views and experiences of those living with disabilities are directly and amply represented, it is morally acceptable for obstetricians and genetic counselors to encourage carrier screening by those in at-risk groups, as having this information would figure in thoughtful procreative decisions. The same applies to diagnostic testing where screening has documented risks of transmission. Where risks involve a severe condition, such as Tay-Sachs or Lesch-Nyhan, not to have carrier screening and, if indicated, diagnostic testing, is at minimum irresponsible (Overall 2012, 158):[26] due, above all, to the extreme suffering, staggering constraints on functioning, and early demise that such conditions bring, but also on account of parents' investment in reproductive experiences that would be unlikely to fulfill their procreative aims (Ruddick 2000). As for prenatal testing more generally, those who are confident that they would continue a pregnancy whatever diagnostic testing revealed stand to do best by the child and themselves if they have the results in time to make fitting preparations (Baily 2000, 69).

I do not favor a lens on genetic conditions such that, the less severe they are, the greater the presumption that individuals should see their pregnancies through. Further, where disabilities are serious, the point is not that "everyone . . . will experience [the worst] difficulties, only that they may, and that these are problems parents reasonably wish their children not to have" (Steinbock 2000, 119). As individuals and citizens, being good moral agents means that we are responsible for not capitulating thoughtlessly to prevailing norms. It does not entail that responsible procreative decisions in the face of "positive" tests for a given condition be identical. In my view, people are not obliged to avoid having children with disabilities, but it should be morally and legally allowable for them to do so.

Thus, I join those who do not find the expressivist argument persuasive (Baily 2000; Steinbock 2000, 121; Robertson 2003, 457–58; Overall 2012, 166–67). This objection makes direct inferences from particular actions to conclusions about the impetus for and significance of those acts. Here, negative moral assessments of agents themselves are implied. But individuals' decisions not to have children with certain diseases and disabilities "rarely have . . . a single motivation or meaning" (Parens and Asch 1999, S3). In addition, if we aim to preserve liberal democracy, we should not "count the occurrence of offense, as distinct from rights violations, as a sufficient ground for curtailing liberty" (Buchanan et al. 2000, 281).

When it comes to the requirement of justice that we treat similar cases similarly (Childress 2004, 207), I favor a process-oriented approach to an outcome-centered one.[27] The latter assesses decisions based on their content, for instance, whether or not selective abortion follows a positive diagnostic test for Down syndrome. Focused instead on process, and assuming that procreative decisions occurred in an enriched milieu, one would properly consider the factors weighed and the path by which individuals reached their conclusions. Procreative liberty derives its purchase from its role in self-determination (Robertson 1994, 4). If we value this liberty highly, we must leave scope not only for decisions that reflect individuals' varying circumstances but also for variation in their interpretation of those situations (see also Asch 1989, 89; Ruddick 2000; Overall 2012, 167).

This latitude covers individuals' assessments of what they can and wish to shoulder in the way of childrearing responsibilities given the nature and content of projects to which they are most committed. Equally informed, thoughtful deliberations can have different, defensible results (cf. Parens and Asch 1999). For example, frankly weighing her priorities and the information she has received, one whose guiding commitments have long featured theoretical intellect may affirm these and conclude that raising a child with Down syndrome is not a project to which she wishes to or could, psychologically, commit as the child deserved (Ruddick 2000, 101). On that basis, she can reflectively decide to abort a fetus in which Down syndrome has been detected. Alternatively, this person might conclude that she welcomed the opportunity to raise this child, acting on a commitment to explore less exercised facets of her heart and mind, and being open to an experience that may be as rewarding in its way as what her life thus far has featured (Ferguson et al. 2000, 85).

"Disabled" and "nondisabled" have long been treated as binary terms. Within this frame, "nondisabled" equates to "healthy," making disability incompatible with health. By viewing us all as potentially disabled human beings, Irving Kenneth Zola (1989) seeks to redress a longstanding situation in which the application of "disability" is artificially restricted to those with visible or prenatally diagnosable conditions. Health and disease are not always visually differentiable, and appearances can be misleading; for example, depending on how "health" is defined, those with certain disabilities (e.g., Down syndrome) may have "no associated medical problems" (Shakespeare 1998, 669). On the flip side, with the increasing prevalence of chronic diseases, such as diabetes, heart disease, and cancer (Raghupathi and Raghupathi 2018), many who appear healthy may be diseased as well as disabled in ways that are not detectable by the untrained eye.

For conditions caused by mutations in single genes, there are reliable genetic diagnoses. This is not the case for most diseases, including common ones like type 2 diabetes and heart disease, which stem from interaction between multiple "predisposing" mutations and "lifestyle and environmental factors" (Centre for Genetics Education 2016; Genetics Home Reference 2019). The profile that guides prenatal testing also does not fit conditions that are "caused by acquired mutations in a gene or group of genes that occur during a person's life. Such mutations . . . occur either randomly or due to some environmental exposure (such as cigarette smoke)" (National Human Genome Research Institute 2018). What's more, some disability has nothing to do with genetics, as when people are seriously injured in accidents (Shakespeare 1998, 679). This breadth of scenarios challenges a misguided emphasis on prenatal testing as *the* way to forestall disease and disability in one's progeny (Shakespeare 1998, 678–79; Bérubé 2017, 94). Uniting the relinquishment of this errant view with Zola's (1989) point that we are all potentially disabled human beings should help to broaden the scope of the empathy and protectiveness that we extend to one another.

Though acknowledging shared humanity is compatible with selective abortion, withholding this recognition forestalls experiences of interpersonal and communal belonging on the part of as many as can partake thereof, in whatever fashion. This "disrelating," as one might call it, reflects self-deception on the part of those who wish to retain the notion that they, unlike the disabled, are and will likely remain in sound condition: many of these same people may have less visible diseases and disabilities; in any case, no one can count on being able to skirt adversity. Disrelation also ratchets up considerably the burdens of those who are interpreted as outsiders.

To priorities already mentioned, I add the following. First, bearing in mind the cautions of Jeffrey Botkin, we should make prenatal testing (for a limited range of conditions) available regardless of ability to pay (2000; Buchanan et al. 2000, 310–12). Second, beyond the context of reproductive medicine, we must act concertedly to improve the world, economically, socially, navigationally, and interpersonally, for those with disabilities, thereby reducing societal barriers to their fuller inclusion (Asch 1999, 1651; 2003, 327–32). Third, we should redouble our commitment, in terms of research, to ameliorating and forestalling disease and disability (Bérubé 2017, 98).

Procreative liberty and the use of available measures to avoid transmission of diseases and disabilities usually align since "most prospective parents will voluntarily, even eagerly, avail themselves of genetic information and interventions that will prevent harmful conditions for their children" (Buchanan et al. 2000, 256). Even so, the costs of raising children with disabilities can be quite substantial, and in the abstract, there might be a utilitarian basis for the state's exerting limited pressure owing to its role in the "stewardship of collective resources" (Daniels and Sabin 1998, 28). But human existence is not conducted in the abstract. The importance of preserving a liberal-democratic milieu, along with the history of eugenics, means that we have more to lose than gain by depending on utilitarian justifications in the procreative realm.

7. Conclusion

If reproductive technologies "are used to achieve goals not clearly grounded in our ordinary understandings of why reproduction matters to individuals," they may not be covered by procreative liberty (Robertson 2003, 449). Freedom of choice to avoid disease and disability comports with goals of human reproduction (446–50). Far from involving efforts to aid human beings, "with their physical and mental limitations," procreative decisions befitting transhumanist fantasy "posit the removal or reduction of physical and cognitive limits and the appearance beyond these limits" of a higher species (Nordmann 2007, 32). Transhumanists "wish to deny that [human] vulnerability is a basic unalterable condition but consider it an unfortunate accident. Their envisioned technology is to enforce this denial and transform [humans] into what they really are or deserve to be, namely immortal, omniscient, omnipresent, all-powerful" (37).

Transhumanists take to an extreme an already surging perfectionism (Curran and Hill 2019). Parents and their children "have internalized irrational social ideals of the perfectible self that, while unrealistic, are to them eminently desirable and obtainable. . . . Parental expectations for their children's achievements . . . across the industrialized world . . . are at extremes that . . . are cause for concern" (413). At the same time, parental investment in children's autonomy is waning (414). In line with this trend, it is not inconceivable that the notion of acceptable procreative aims would shift sufficiently for pronounced bioenhancement to seem widely attractive. The above tendencies should be resisted, not least because the notion that objective and subjective well-being skyrocket together is undercut by findings for perfectionists and "maximizers," who suffer by subjective measures (Schwartz et al. 2002; Curran and Hill 2019).

Procreatively and otherwise, the demand to maximize featured goods "places unacceptable demands on individuals and would lead to self-stultifying perfectionism" (Overall 2012, 126). The devaluation of humanity encapsulated in transhumanists' perfectionistic ideal of posthumanity, detrimental across the board, has especially serious implications for those to whom the term "disabled" has been traditionally applied (Hall 2017, 119–39). When transhumanists claim that not maximizing a targeted capacity as far as technologies allow at a given time brings harm/disability, they do a great disservice to humanity, most of all to the above individuals. To be clear, I do not reject perfectionism as such; in Chapter 7, I defend a version of it that is dedicated to *human* flourishing.

Insofar as conceptual linchpins of transhumanism reflect utilitarian commitments, significant limits could be set to individual discretion. Due to its bearing on our ability to grapple directly and openly with what transhumanism represents, the usual tacitness of advocates' utilitarian commitments is most concerning, for it increases the likelihood that critical assessments of transhumanism will miss these undercurrents. To the extent that they do, opponents appear to concede what they should not: that moral quandaries involving bioenhancement could be addressed via laws and regulations that—once relevant technologies existed—helped to shape results.

The bulwark of transhumanists' defense against the claim that common ground exists between their views and prior eugenics is that it was state managed, while transhumanism features individual freedom of choice. To preserve this line of defense against the charge of substantive ties to eugenic history, transhumanists must make a strong case that personal discretion would steer decisions relating to bioenhancement. That their rejection of important links zeroes in on this point of contrast shows their awareness of its pivotal role. Transhumanists' utilitarian commitments entail sociopolitical requirements that make wholesale denials of ties to earlier eugenics unsustainable. In the following chapter, I argue that on this and other bases, the connection of transhumanism to prior eugenics is close, indeed.

5

Creating a Higher Breed

Transhumanism and the Prophecy of Anglo-American Eugenics

1. Introduction

When transhumanists distance themselves from eugenic history, Nazi eugenics is typically at the fore, either directly or by implication. Reference to it does not settle the matter, however, for an investigation of links between transhumanism and Anglo-American eugenics yields important connections that span notions of human agency, views of our mental faculties, ethical commitments, and implications for democracy as we know it. In many cases, points made about transhumanists' views will involve central positions of theirs addressed in Chapters 1 to 4. Here, the stances in question garner added resonance from their close linkage to positions of Anglo-American eugenicists.

Transhumanists and these prior figures insist that human agency, channeled into scientific and technological innovation, supplant Darwinian evolution and henceforth direct human improvement. Their general lenses on the mind are similar, for the products of said agency would be used to dramatically heighten both rationality and prosociality and to weaken, or better, eliminate, "antisocial" traits. In terms of ethical justification, parties invoke close parallels between bioenhancement and familiar measures taken to foster public health. Recourse to public health fits closely with earlier eugenicists' overall, overt utilitarian lens on human improvement. As argued in Chapter 4, however, transhumanists' own use of rationales from public health reflects a utilitarian ethical frame that is also evident in their encompassing notions of well-being and harm-avoidance. The result: an ideal-utilitarian obligation to enhance oneself and one's progeny that may be politically enforceable.

Failing to glean this state of affairs, transhumanists have mostly insisted or presumed that liberal democracy will remain intact. The credibility of this assurance that it will not merely endure but even be furthered is challenged increasingly, however, from within the discourse of enhancement supporters themselves. Some transhumanists recognize that pursuing radical enhancement will involve movement away from liberal democracy. Further, bioenhancement via procreative decision-making has recently been endorsed, often but not always by

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nontranshumanists, for the express purpose of augmenting societal well-being (Jefferson et al. 2014; Douglas and Devolder 2013; Elster 2011; Buchanan 2008). To embrace societal welfare as a basis for procreative decisions is to risk subordinating personal druthers, by implication or even expressly, to social ends (Duster 2003).

The term "transhumanism" was first employed by Julian Huxley (1957), a British eugenicist, but this shared term is just the tip of the iceberg regarding common ground between current transhumanism and Anglo-American eugenics. Though I do not claim, with Tom Koch (2010), that the positions of transhumanists and Anglo-American eugenicists are identical, attention to writings from both periods allows one to show how close the parallels between them are on the level of ideas and, in some cases, the very terms of their formulation. Knowledge of these connections casts unsettling light, indeed, on transhumanists' yearning to realize what they deem perennial human ideals (Bostrom 2003b, 38; 2005b; Stock 2003, 2; Vita-More 2013b, 78).

2. The Need for a Fuller Assessment of Transhumanists' Claims about Earlier Eugenics

The following are representative illustrations of how transhumanists handle the relation of their thought to prior eugenics. In their dismissals of the very notion that common ground exists between their project and eugenic history, Nazi eugenics is often featured expressly, as when Savulescu insists that his vision of bioenhancement "is not based on race or on the Social Darwinist values that the Nazi program was," being wedded instead to individual and familial freedom (2013a, 41). Echoing this view, Natasha Vita-More maintains that, in sharp contrast to earlier eugenics—practiced by "the Germans under the influence of Hitler"—transhumanism is all about "freedom of choice" (2015).

Alternatively, transhumanists present eugenic history as unitary in the sense of covering Anglo-American and Nazi varieties.[1] Thus, Savulescu describes eugenics as "the movement early last century which aimed to use selective breeding to prevent degeneration of the gene pool by weeding out criminals, those with mental illness and the poor, on the false belief that these conditions were simple genetic disorders. *The eugenics movement* had its inglorious peak when the Nazis moved beyond sterilization to extermination of the genetically unfit" (2005, 38; emphasis added). Similarly, having observed that following World War II, eugenic undertakings in the United States and Germany "were rightly repudiated," Lee Silver demarcates future "embryo selection from [those] abhorrent eugenic policies . . . with the claim that embryo selection would be freely employed in Western society by prospective parents who were not beholden to the will of the state. As a consequence, the use of the technology would not be associated with any restrictions on reproductive liberty" (2007, 254, 261; see further Pence 2012, 106–108).

Where both Nazi and Anglo-American eugenics are mentioned, the former is all but certain to shape one's estimation of the whole. This dominance is likely even where Nazi eugenics is merely alluded to rather than mentioned, as when Bostrom deplores "the sorry track record of socially planned attempts to improve the human gene pool. . . . In each case, state policies interfered with the reproductive choices of individuals. If parents had been left to make the choices for themselves, *the worst transgressions of the eugenics movement* would not have occurred" (2003a, 499; emphasis added; see also 2005a, 206; Savulescu and Kahane 2009, 282).

As Diane Paul observes, accounts that tether eugenics to "compulsion and jackbooted Nazis allow champions of the new technologies to sharply demarcate their projects from eugenics—to emphasize discontinuity. . . . Indeed, if eugenics is equated with coercion, it allows the enthusiasts to claim either that reprogenetics is not eugenics at all or that it is eugenics of a benign sort" (2007, 7).[2] This scenario, illustrated above, gives an unearned edge in plausibility to transhumanists' rejection of all substantive ties to eugenic history. And this, in turn, has helped thus far to limit opportunities for a fuller assessment of the relation of that history to transhumanist advocacy in terms of theoretical commitments and their practical implications.

This evaluation has two facets. First, far from arising in a vacuum, Nazi eugenics was influenced by the already-existent Anglo-American tradition, inaugurated by Francis Galton, who coined the term "eugenics" in 1883 (Galton 1909, 75). When it came to law and policy, Germany singled out the United States for praise and emulation because its promulgation of laws on sterilization, immigration, and marriage contrasted with Britain's emphasis on voluntarism (Paul 1992, 669; 2007, 4; Kühl 1994, 25–26, 116n26). In fact, Germany's Sterilization Law of 1933—"the first major triumph of Nazi racial hygiene"—deliberately emulated US precedent (Proctor 1988, 7; see also Duster 2003, 141).

In 1911, sterilization laws existed in six states (Kevles 1995, 47). To promote the broader, legal embrace of sterilization in the United States, Harry Laughlin published his "Model Eugenical Sterilization Law," which "served as a guide for the men who drafted state sterilization laws in the 1920s and 1930s" (1922, 446–61; McWhorter 2009, 415–16). By the close of the 1920s, twenty-four states had legalized sterilization (Kevles 1995, 111). In contrast, the practice was not legal in Germany before 1933 (Proctor 1988, 96). German interest in American legal precedent on this topic is already documented in medical and scientific publications during the second half of the 1920s (Kühl 1994, 24). The existence of sterilization laws in the United States, together with Laughlin's model, helped expedite the Nazis' institution of Germany's own law within six months of assuming power (37–39). The Nazis could cite, too, earlier US research on the alleged biological transmission of "criminality" across generations in two families, the Jukes and the Kallikaks (39–40). The influence of US legal precedent in the area of sterilization outlasted World War II, for, at the war crimes tribunals, it prevented the allies from classifying Germany's sterilization law as such a crime (Proctor 1988, 117). German admiration was also directed at the United States for its legal restrictions concerning marriage and immigration, including the American Immigration Act of 1924 (173–74; Kühl 1994, 25–26).

US and German admiration was bidirectional; for example, ruing the fact that our Constitution precluded national legislation in areas such as marriage and sterilization, leaving them to states' discretion, American eugenicists not only took pride in US influence on Nazi policy but envied the Nazis' ability to promulgate laws for Germany entire (Kühl 1994, 39, 50). *Eugenical News*, a publication of the Eugenics Record Office in Cold Spring Harbor, New York, was a route through which awareness of eugenics was promoted in the United States during this period (Allen 1986, 245–46). In a 1937 article published there, Laughlin lauded *Erbkrank*, a German film whose US distribution he facilitated, for its showcasing of Germany's headway in "applied negative eugenics" (Kühl 1994, 49; Laughlin 1937, 66). Laughlin denied that the film was racialist despite its embrace of the idea that Jews were prone to retardation and moral turpitude (1937, 66; Kühl 1994, 49). Beyond the foregoing, in the 1920s and '30s, a web of ties existed among eugenicists in the two countries, forged and furthered by correspondence, publications, travel, and honorary degrees.[3]

The second facet of a more open and ample evaluation of how transhumanism relates to earlier eugenics is my focus here: scrutiny of the ideas and arguments of Anglo-American eugenicists shows that granting the distance of transhumanism from "the worst transgressions of the eugenics movement" (Bostrom 2003a, 499) under the Nazis is not equivalent to—and in no way supports—transhumanists' rejection of substantive ties between their views and prior eugenics as such.[4] In 1935, American eugenicist Hermann Muller stated that "our ideas of what sort of progress is possible or desirable for man must depend . . . upon our views of his nature" (1935 [1984], 15). Transhumanist Gregory Stock makes essentially the same point: fundamentally, the debate over bioenhancement "is about . . . what it means to be human [and thus] our vision of the human future" (2013, 303). I argue that transhumanists and earlier eugenicists construe this shared point in similar ways (henceforth, in contrast to transhumanists' looser rubric, "earlier" and the like, used to modify "eugenics" in defense of my own position, refer to the Anglo-American tradition, specifically). My aim, it should be stressed, is not to show that only parallels exist but to document the fact that—contra transhumanists—they *do* exist and are substantial.[5]

This chapter documents six shared ideas. First is the notion that, for human development to continue robustly, our agency must supplant Darwinian evolution, henceforth steering what transpires (Section 3).[6] Since transhumanists and prior eugenicists are deeply concerned with the capacities of future persons, they single out procreative decision-making as a key arena in which this direction should occur. As previously discussed, according to the Principle of Procreative Beneficence, parents are morally obliged "to create children with the best chance of the best life" (Savulescu and Kahane 2009). Or, on Muller's formulation, "When we consider what the recognition of [his favored procreative] principle would mean for . . . children . . . our obligation becomes clear and compelling" (1935 [1984], 112).

As to the traits that science and technology would address, both reason and prosociality are singled out for augmentation (Section 4). Correspondingly, our capacity for "negative," or "antisocial," emotion would be tamped down, even eliminated (Section 5). Turning to social, political, and ethical rationales, one finds argumentative recourse to the sphere of public health, where measures' justification is always utilitarian (Section 6). Further, the broader ethical grounding of proposals for dramatic human improvement is often itself utilitarian. This is avowedly so for Anglo-American eugenicists (Section 7), but, as we have seen, transhumanists also depend on utilitarian rationales, their insistent vaunting of autonomy notwithstanding. Not only does this reliance shape measures' choice and justification, but—then, as now—a utilitarian lens on fundamental human improvement has sociopolitical implications that would jeopardize our ongoing commitment to liberal democracy (Section 8).

This last point is crucial both in its own right and because the bulwark of transhumanists' defense against the contention that substantive links exist between their thought and prior eugenics is the claim that the latter was state managed, while their thought regarding bioenhancement features personal discretion (cf. Paul 2007, 8; Rubin 2014, 127–28). Absent this barrier between state steerage and individual judgment, transhumanists' ultimate line of defense against the charge of substantive ties to prior eugenics—that decisions to (or not to) enhance would be our own—evaporates.

3. Human Agency Creates, Then Becomes, the Divine

Per transhumanists, human agency, or "rational evolution" (Savulescu 2005, 38), should replace the Darwinian variety as the controller of our development, with species-changing results (see also Harris 2010, 3–4). Natural selection is blind and painfully slow (Naam 2005, 232; Broderick 2013, 436; Chislenko 2013, 143; Stock 2003, 184; Blackford 2010). These features of it, conjoined with our increasing scientific knowledge and technological adeptness, have rendered natural selection "largely irrelevant to the larger trajectory of [our] evolution," which, going forward, should instead be governed by "conscious design" (Stock 1993, 227–28).

This scientific-technological steerage "will grant us awesome powers . . . to . . . proactively remake Humanity. . . . We can transcend our original biological nature, and become *as if* divine; we'll be as far ahead of current human capabilities as current humans exceed the prowess of our ape forebears" (Wood 2013). Embracing "the imperative to progress" will lead to our producing "demi-gods," for "it is not God that creates a man-god but we humans create god-like beings" (More 2013c, 267; Harris 2003, 95; Walker 2002). Indeed, a vastly augmented existence "is the birthright of every creature, a right no less sacred for having been trampled upon since the beginning of time" (Bostrom 2019, 5); that said, precisely because "the transformation is profound," posthuman experience is currently inconceivable and unimaginable—"no closer than the word 'sun' written in yellow ink is to the actual sun" (3, 2).

This extolling of human agency applied to science and technology is far from new: Galton proclaimed that "what nature does blindly, slowly, and ruthlessly, man may do providently, quickly, and kindly" (1904, 5; see further Brewer 1935, 124; Muller [1935] 1984, 45; Osborn 1968, 117). The key is subjecting our development to "rational control" versus leaving it to chance (Huxley 1936, 28; Muller [1935] 1984, 24, 100). Reflecting this mission, work at the impactful Eugenics Record Office, established in 1910, was governed by a vision of eugenics as "the scientific management of human evolution" (Allen 1986, 264). Per Karl Pearson in "The Ethic of Freethought," to the extent that human reason grasps the infinite and translates that apprehension into practice, "The apparently finite mind of man . . . rules the infinite. . . . [As the] master of his own reason [man is] lord of the world" (1901, 20; cf. Haldane 1932, 147). In other words, eugenics "is no longer solely an aspiration," and, for prior eugenicists—as for transhumanists—our newfound control means that possible upgrades to well-being need reach "no final stage," being instead "unlimited" (Osborn 1940, 293; Crew et al. 1939, 372–73).

For earlier eugenicists, like transhumanists, scientific-technological advance is not valuable intrinsically but because it will enable us to create "the superman of the future" (Haldane [1932] 1966, 164). Fittingly, J. B. S. Haldane named his prior work laying out this vision *Daedalus* after the ancient sculptor whose creations were said to have powers fundamentally surpassing their original, given natures (1923 [1995], 36–37; Plato, *Meno* 97d–e [1903]). Haldane's optimism about the future stems from his conviction that "not one of the practical advances which I have predicted is not already fore-shadowed by recent scientific work" (1923 [1995], 46)—a confidence lavishly evinced by transhumanists now.

Further, like transhumanist Bostrom (2019, 5), prior eugenicists employ language of rights, as when signatories to the "Geneticists' Manifesto" aver that "within a comparatively small number of generations . . . everyone might look upon 'genius' . . . as his birthright" (Crew et al. 1939, 373). Similarly, according to Frederick Osborn, "Greater physical and mental perfection . . . should be the birthright of every human being" (1968, 111). Earlier eugenicists, too, use religious terminology: "If mankind comes to realize its imperative mission to create out of itself something infinitely nobler and better . . . then eutelegenesis [i.e., eugenically steered procreation] will become a new evangel" (Brewer 1935, 126). Muller, in turn, exults that "miracles of transfiguration" await (1935 [1984], 77). Unsurprisingly, transhumanists address the possibility that our successors will free themselves from earth altogether (Stock 1993, 236; Kurzweil 2005; Moravec 1988; 1999). Muller, however, envisions that prospect, too (1935 [1984], 62–64), and in "The Last Judgment," Haldane presents space exploration as required for the avoidance of human extinction (1927, 287–312; see further 1932, 146–47; Esposito 2011, 42). Finally, for prior eugenicist Osborn, as per Bostrom (2019, 2), because the divide between present and future is steep, the content and modes of future existence are "beyond [our] imagination . . . today" (1968, 116). The foregoing thematic and linguistic parallels are striking, indeed.

4. Our Elevation with Respect to "Non-Disease" Conditions

According to the Principle of Procreative Beneficence, "As . . . our ability to . . . select non-disease characteristics increases . . . [this principle] will require most reproducers to select the most advantaged child" (Savulescu and Kahane 2009, 281). Harris's insistence on "possible functioning" as the evaluative standard for decision-making concerning enhancement (2010, 53) points to a similar decisional requirement. Gene-editing techniques such as CRISPR-Cas9—"clustered regularly interspaced short palindromic repeats" and "CRISPR-associated protein 9"—would be central to PB's fine-grained implementation. The aim: "to bypass natural selection in totality" (Sahu 2017). Per one encomium, "It's only slightly hyperbolic to say that if scientists can dream of a genetic manipulation, CRISPR can now make it happen. . . . For better or worse, we all now live in CRISPR's world" (Travis 2015). This view of CRISPR is suspect even where disease alone is the focus (Wei and Nielsen 2019; Sanders 2019). Nonetheless, as we have seen, the oversimplified picture of our genetic endowment and its prospects for manipulation illustrated by the above encomium of CRISPR is transhumanists' own.

As to what our agency should act *upon*, a key concern of transhumanists and past eugenicists is to dramatically heighten qualities viewed as beneficial and presumed to be such all the more once augmented. Then and now, the paramount features to be elevated are rationality/intelligence and prosociality.

As we have seen, transhumanists depict their thought as anchored in the Enlightenment (Bostrom 2003b; 2005a, 202; 2005b; Pence 2012, 18; Bailey 2013, 338; More 2013b, 4, 10). In addition, transhumanists display an allegiance to extreme rational essentialism and single out reason/cognition for radical augmentation (Stock 1993, 56–60; Savulescu et al. 2004, 667; Savulescu 2005, 38; de Grey 2013, 218; More 2013a, 450; 2013b, 6). Per Bostrom, "If what is good for us is to develop and exercise our rational nature, this implies that it would be good for us to become posthumans with appropriately enhanced cognitive capacities" (2008, 130). Once this occurs, even "today's greatest geniuses [will] seem like simpletons" (Stock 1993, 167). In the meantime, cognitive enhancement is needed to propel the scientific discoveries and technological innovations that, per transhumanists, *will* lead to the emergence of posthumans.

In addition, transhumanists offer dramatic comparisons across ontological planes. Though right now, "we're just dressed-up chimpanzees," posthumans' capacity to think "will exceed human ability . . . by the same order of magnitude that human ability exceeds" that of chimps (Minsky 2013, 168; Walker 2002). Beyond this, Stock foresees the emergence of "forms that transcend . . . human beings . . . by even more than we transcend the primitive worms and skeletons of the past," and Moravec anticipates that "disembodied superminds [will be] engaged in affairs of the future that are to human concerns as ours are to those of bacteria" (1993, 52; 2013, 181).

For prior eugenicists, too, reason is our paramount faculty. Pearson channels Kant, a preeminent Enlightenment figure, when claiming that what matters most is "uniform obedience to rational law" (1901, 121). Because reason "is the only lawgiver . . . the only practical method of making society as a whole approach the freethinker's ideal of morality is to . . . teach it to use its reason in guiding race instincts and social impulses" (114). In keeping with this view—and like transhumanists (e.g., Harris and Holm 2002, 357, 366; Bostrom and Ord 2006; Savulescu 2013a, 54)—Pearson's Enlightenment-style adulation of reason and science prompts him to dismiss opposition to his vision as irrational (430–31). Haldane, too, is concerned that "irrational" beliefs of nonexperts will stymie scientific discoveries (1923 [1995], 38).

In the 1930s, when "positive" eugenics came to the fore, increased emphasis was placed on using reason to augment rationality itself,[7] for, compared with the heightening made possible by eugenics, existing humans are "an extremely primitive and imperfect type of rational being" (Kevles 1995, 178; Haldane [1932] 1966, 153–54). Further, like transhumanists, past eugenicists offer comparisons across planes of creaturely existence. Thus, Haldane observes that "the change from monkey to man might well seem a change for the worse to a monkey. But it might also seem so to an angel" (1932 [1966], 153).[8] Similarly, Herbert Brewer suggests that we are "the forerunners of beings as superior to ourselves as we are to the apes"—which possibility "gives to eugenics its most powerful inspiration" (1935, 121). Beyond this, if Muller is to be believed, we will eventually surpass mankind more dramatically than we now surpass amoebae, and, per Haldane, "Our descendants may . . . excel us a great deal more than we excel worms or jellyfish" (1935 [1984], 124; 1932, 142). What's more, as in transhumanism, it is suggested that cognitive enhancement is itself required to fuel the pertinent scientific and technological developments (Bayertz 1994, 291).

Regarding prosociality, Persson and Savulescu claim that the "dispositions" of altruism and justice are the core of morality proper and peg our prospects for avoiding existential catastrophe to their technological intensification. Earlier eugenicists, too, target prosociality. Huxley deems it urgent that we harness eugenics to the improvement of "social virtues" (1936, 28). Muller agrees: apart from heightened rationality, mankind's "adjustment to the ever more complicated situations to which he may attain in his progress will require . . . genetic advance . . . in the temperamental characteristics that make for coöperative behavior," namely, "sympathy," "benevolence," and "altruism" (1935 [1984], 37, 102, 36, 49, 118; cf. Osborn 1968, 88; McMillan 2016, 106). In addition, Savulescu's embrace of a genetically instilled "sunny temperament" is matched by Muller's claim that the very mission of biology is "to make us all . . . happy in 'natural' temperament" (2005, 37; 1935 [1984], 69).

5. In Tandem, Eliminate the Allegedly Deleterious

Further, both transhumanists and prior eugenicists adopt a hostile lens on emotions that they view as individually and socially destructive.[9] Transhumanists target our very capacity for "negative affect," failing, however, to support what they deem its built-in harmfulness. A like situation obtains in prior eugenics.

According to Haldane, science properly seeks "the subjugation of the dark and evil elements in [man's] own soul" (1923 [1995], 46); he is optimistic that "as our [biological] knowledge . . . increases we may be able . . . to control our passions by some more direct method than fasting and flagellation . . . to deal with perverted instincts by physiology rather than prison" (43). Muller concurs: once knowledge of the brain suffices, interventions will eliminate what is deemed deleterious from "temperaments, moods, and characters" (1935 [1984], 72–73). Eugenicists are especially concerned to minimize, or eradicate, "antisocial" traits. Central here is "criminality"—a term of which earlier eugenicists were particularly fond, to which, however, Savulescu's "a life in prison" (2005, 37) is comparable (on this theme in earlier eugenics, see Haldane [1923] 1995, 43; Davenport

1936; Mehler and Allen 1977; Allen 1986, 233, 260; Kevles 1995, 71–73, 101, 103; Comfort 2012, 101).

Beyond this, Haldane presages transhumanist assertions that moral bioenhancement, once available, would be mandatory to stave off existential catastrophe: "Moral progress is so difficult that I think any developments are to be welcomed which present it as the naked alternative to destruction [i.e., human extinction], no matter how horrible may be the stimulus which is necessary before man will take the moral step in question" (1923 [1995], 47; see further Esposito 2011). Looking ahead post-World War I, Haldane resolves "the old paradox of freedom" in favor of doing whatever is needed for human survival (1923 [1995], 48). Eighty-five years later, Persson and Savulescu assert that, to prevent ultimate harm stemming from antisociality, "If safe moral enhancements are ever developed, there are strong reasons to believe that their use should be obligatory, like education or fluoride in the water. . . . That is, safe, effective moral enhancement would be compulsory" (2008, 174). Similarly, for Allen Buchanan, who supports enhancement, albeit not the radical variety, "Given the current human propensity for violence . . . the human race might come to need [moral bioenhancement] interventions as part of a more complex strategy for [avoiding] catastrophic violence" (2008, 17).

Already in 1924, Bertrand Russell saw a program of pronounced emotional dampening as highly dangerous: either emotional capacities would be narrowly calibrated to people's societal roles, or, more bluntly still, the physiology of all save authorities would be modified to foster docility (53–55). Russell's point about emotional muting is well taken now. An illustration is transhumanists' collapsing of the distinction between aggressiveness and anger, which can be both legitimate and strong. Should we adopt transhumanists' vision of our emotional "advancement," our very capacity for anger—a powerful psychic impetus to individual and interpersonal enrichment, not to mention the amelioration of social injustice—may eventually fall away. But whether or not one shares his concern regarding emotion, Russell rightly directs our attention to social, ethical, and political frames and justifications for bioenhancement measures.

6. The Great Wingspan of Public Health

Regarding these broader frames and warrants, I observe, first, that both transhumanists and prior eugenicists draw examples and justifications from public health, where measures' ethical warrant is the welfare of society at large, that is to say, utilitarian. As previously discussed, transhumanist advocacy of bioenhancement likens it to existing public-health measures, such as fluoridated water, vaccinations, and seatbelt laws.

Nontranshumanist supporters of cognitive enhancement, too, promote this tie. Thus, Buchanan references herd immunity and underappreciated economic boons of immunization to buttress his advocacy of cognitive augmentation (2008, 9–10, 29n7). His counterpart to Bostrom's and Nam's "positive externalities" is "network effects," such that "where network effect *thresholds* are present . . . the state may see its role as that of priming the pump, by providing subsidies, tax credits, or other incentives to encourage people to have the enhancement" (Bostrom 2003a, 502; Nam 2015, 128; Buchanan 2008, 11). Levy, in turn, leverages fluoridation and vaccines when arguing that cognitive enhancement could be required for its simultaneous benefit to individuals, above all, children, and society at large (2013, 38).

In the era of prior eugenics, the realm of public health was featured in Oliver Wendell Holmes's declaration in *Buck v. Bell* (1927) that "it is better for all the world, if instead of waiting to execute degenerate offspring for crime, or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind. The principle that sustains compulsory vaccination is broad enough to cover cutting the Fallopian tubes." Another institutional reference point was the American Public Health Association (APHA), whose annual meeting in 1934 included a eugenics-themed exhibition (Kühl 1994, 44–45). Further, William Peter, secretary of the APHA, spent six months in Germany during 1933–1934; he was the first American eugenicist who visited that country to gather "information and evidence with which [eugenicists in the United States] could counter criticism" of Germany's eugenic measures (Kühl 1994, 53–54). The linkage of eugenics and public health in earlier eugenics was no coincidence, for "genetic improvement . . . was [seen as] the ultimate in preventive medicine," and "notions of purity and perfection conditioned the minds of those interested in heredity and health" (Comfort 2012, 64, 66). Because the linkage of prior eugenics to public health has already been well researched, I do not address it further here (beyond historical and contemporary works cited elsewhere in this chapter, see Pernick 1997).

Though references to public health are more prominent in prior American eugenics than in transhumanism, the tie is significant there as well. And, to the extent that transhumanists use public-health parallels and reasoning to justify vigorous enhancement, they avail themselves of a utilitarian lens that is out of sync with their overall focus on autonomy.

7. Shared Utilitarian Commitments

Regarding ethical foundations, prima facie, there is a fundamental difference between transhumanism and Anglo-American eugenics: prior eugenicists directly embrace a utilitarian imperative to pursue humanity's genetic improvement, while transhumanists typically insist that what they propose is not just compatible with autonomy but would "maximiz[e]" it (Sandberg 2013, 57). Max More proclaims that transhumanists "all support personal choice in the use of self-directed technological transformations" (2013b, 13; see also Vita-More 2015). And, when it comes to procreation, "Modern eugenics . . . gives couples a choice over what kind of child to have and enables them to have a child with the greatest opportunity for a good life" (Savulescu 2005, 38). Cognitive augmentation, in particular, "has the effect of enhancing autonomy" (Schaefer et al. 2014, 130).

Today's advocates of radical enhancement must feature individual and familial discretion: otherwise, their defense against the charge of substantive ties to historical eugenics—that decisions to enhance (or not), as suitable technologies came to exist, would be our own—evaporates. That their repudiation of all such links centers on this point of contrast shows transhumanists' awareness of its central role (see, e.g., Savulescu 2013a, 41–43; Silver 2007, 254–55, 261; Bostrom 2003a, 499). Once subject to critical scrutiny, this alleged bulwark gives way.

Transhumanists' use of rationales from the arena of public health itself already shows their willingness to invoke a utilitarian frame. Far from being an outlier, this argumentative reliance on utilitarian reasoning is also evident elsewhere. Not only are personal druthers moot when we consider the need for moral bioenhancement to forestall ultimate harm, whatever the implications for our freedom, but transhumanists' handling of well-being and harm-avoidance anchors a moral requirement to enhance beyond that realm. Transhumanists reject the treatment-enhancement distinction because, in their view, the term "enhancement" is properly applied to any measure that elevates well-being, whatever its level of technological sophistication (Levin 2014b, 3). Correspondingly, harm is construed in encompassing terms such that whatever reduces well-being, compared with existing "technological options" at a given juncture (Bayertz 1994, 275), qualifies as such. According to PB, "Once technology affords us . . . the power to enhance our and our children's lives, to fail to do so will be to be responsible for the consequences. . . . To fail to improve their physical, musical, psychological and other capacities is to harm them, just as it would be to harm them if we gave them a toxic substance that stunted or reduced these capacities" (Savulescu 2005, 38). By this logic, it is "irrational to sub-maximise" (Savulescu 2013a, 54; cf. Vita-More 2013b, 76). In other words, the sole rational course is optimization, with available technologies setting the benchmark for what that involves at a given time.[10] As we saw in Chapter 4, transhumanist arguments fit with an ideal utilitarian lens featuring certain objective goods, above all, cognitive ability. The moral imperative to forestall harm, alongside the view that rationality must henceforth guide our development, is ultimately incompatible with our leaving enhancement-related decisions to individual and familial discretion.

Savulescu says that we are obliged "to try to manipulate [featured] characteristics to give *an individual* the best opportunity of the best life" and that "the critical question to ask in considering whether to alter some gene related to complex behaviour is: would the change be better for *the individual*?" (2005, 38; emphasis added). Regardless of who is choosing and on whose behalf, rational, morally required decisions will be largely or entirely the same (see also Sparrow 2011b, 35). In other words, "an/the individual" here is synonymous with "each and every individual." Though Savulescu does not address the query as posed, his answer to the question, "Should we decide what breed of humans to create?" (2005, 37) is clearly "yes"—as signaled by the article's title, "New Breeds of Humans: The Moral Obligation to Enhance." Contra Wikler, the operative perspective on well-being does not express benign aggregation of individuals (1999, 190).

This tendency to think in blanket terms about what is best is also evident in the currently shifting focus from "personalized" to "precision" medicine, which (via, e.g., its statistical bent) "represent[s] a significant departure from the individualistic ethos that initially facilitated public and political support for the genomic medicine movement" (Juengst et al. 2016, 22–23). Far from promoting autonomy, this "rebranding" has been accompanied by "a renewed insistence on professional gatekeeping in the clinical application of genomic medicine and an increased interest in the public health uses of population-level conceptualizations of genomic variation" (25). Juengst et al. suggest that a convergence of factors and parties could foster a race- and ethnicity-focused occupation with "collective expectations for the common good" from which we have been pointedly moving away since World War II (29–30). Apart from a passing mention of earlier eugenics (27), however, they do not forge a connection thereto. Although discussion of movement from personalized to precision medicine currently occurs on a track that is somewhat distinct from the enhancement debate, in terms of ideals, priorities, and social climate, there is possible convergence in rationales for what we value and pursue, and perhaps also in specific conclusions.

Prior eugenicists openly give primacy to overall well-being. According to Muller, "Through all our visionings of progress [spearheaded by science] we must again and again remind ourselves that the object of all [our] human efforts must be to increase the sum total of the happiness of humanity" (1935 [1984], 68). Huxley commends him for seeing that "social salvation" must supplant "individual salvation," with "the social system remodelled so that individual success does not conflict with communal welfare" (1936, 29); a key entailment of this stance is that "any sacrifice involved in parenthood" will be made with said welfare in view (29). Pearson, in turn, avows that he embraces "a truer expression of the basis of utilitarian morality" (1901, 9); Haldane expresses a similar view (1932, 110–11).

Earlier figures stress the entwining of ethical and political frames. Thus, for Pearson, socialism is at once "a . . . scheme of political change" and "a new morality . . . denot[ing] the subjection of all individual action to the welfare of society" (1901, 413). In particular, "The birth of children is a responsibility, the moral gravity of which is far from being properly weighed" (419); because he saw it as conducive to a higher birth rate among those deemed more genetically fit, Pearson supported women's emancipation (418–28).

Pearson endorses socialism because he believes that solely from its vantage point can scientifically based prescriptions for human improvement be issued with the force of morality behind them (345, 323–24). Thus, when transhumanist Stock contends that the nature and trajectory of scientific and technological advance should drive both our moral obligations and the form that society takes (1993, 199–211), he is broadly echoing a view expressed by Pearson almost a century earlier. Spurred by the foregoing, which underscores that ethical and sociopolitical commitments are interlinked, let us now concentrate directly on the latter.

8. Sociopolitical Commitments and Implications

The problem here for Stock and other transhumanists is that the scientific direction of what transpires is inseparable from a moral obligation to fund and use enhancements for the sake of human betterment,[11] which lends itself to sociopolitical requirements that clash with a firm allegiance to liberal democracy. Prominent earlier eugenicists welcomed this result. Per Muller, scientific steerage of humanity's development is required for "happiness," centrally including that of subsequent generations (1935 [1984], 44–45). Because "mankind has a right to the best genes attainable . . . withholding . . . these gifts . . . would in itself be a decision, a course of action . . . directed against the well-being of humanity" (113). Muller makes no bones about the fact that making real headway on his scientifically steered agenda requires social reconstitution (viii, 83, 102, 108; see also Osborn 1940, 291).[12] Muller and Pearson endorse socialism, while Haldane and Huxley foresee supplanting national sovereignty, which permits legally sanctioned, variable practices, with a more encompassing sociopolitical frame (Haldane [1923] 1995, 47; Huxley 1936, 24, 27).[13]

In contrast, as we have seen, transhumanists routinely insist that personal freedom, the crux of liberal democracy, would be not simply preserved but enriched through one's chosen augmentations. As previously observed, the opportunity for radical enhancement is even deemed "the birthright of every creature" (Bostrom 2019, 5). To those who worry about movement toward state control, Savulescu responds: "The best defence against a slide towards the abuse of any powerful technology is ethics," above all, "a robust respect for freedom" (2013a, 43). Allegedly, criticism of transhumanism and "current regulations" are harmfully "eugenic" because they are "based on a certain vision of how the population should be . . . and indeed people are coerced into having children this way because they're denied the freedom to use technology and denied the knowledge that's available" (41; see also Naam 2005, 166; Green 2007, 207).

One finds confidence that liberal democracy will remain intact across the broad spectrum of stances on bioenhancement. Representing devotees of vigorous enhancement, Silver assures us that "it is individuals and couples . . . *not governments* . . . who will seize control of these new technologies" (2007, 10); thus, recourse to reproductive technologies such as embryo selection "would not be associated with any restrictions on reproductive liberty" (261). Others, receptive to bioenhancement but not the radical variety, sever the voluntaristic focus of procreative choices today from past usage of force and coercion (Caplan et al. 1999, 1284; Wikler 1999, 191). Among critics of bioenhancement, McKibben (2003) and Kevles (2015) are sanguine. It is especially surprising that Kevles, well known for his classic history of earlier eugenics (1995), fails to see the aforementioned sociopolitical danger. What concerns him instead is that "eugenics . . . could come back, only in a new, private form shaped by the dynamics of democratic consumer culture. What could happen now is likely to be far more bottom-up than top-down . . . individuals and families choosing to edit their genes . . . and finding themselves encouraged to do so by what was absent in the era of eugenics: the biotechnology industry" (2015).

As one might expect, critics of radical enhancement include those who voice worries about the continuance of liberal democracy, assuming, in so doing, that it should endure. Strikingly, however, the credibility of transhumanist assurances that democracy as we know it will remain intact—which presumes they agree that it should—is increasingly challenged from within the discourse of enhancement supporters themselves. There are two camps here. The first comprises transhumanists who recognize that pursuing vigorous enhancement would involve movement away from liberal democracy as we know it, often welcoming this trajectory. The second, including transhumanist and nontranshumanist supporters of bioenhancement, presents state implementation as an engine of democracy's own preservation.

Like prior eugenicists Haldane and Huxley, Persson and Savulescu would like to see the framework of nation-states yield primacy to "a *global(ly* responsible) liberalism," while Stock lauds supranational "Metaman" as nation-states' civilizational successor (2012, 102; 1993, 22–23, 96; cf. Ascott 2013, 444). According to David Wood, "We'll need to accelerate a reformation of the political and economic environment, so that the outcomes that are rationally best are pursued" (2013; see also Transhumanist Declaration 2009). James Hughes submits that "radical longevity and cognitive enhancement will push liberal democratic society to adopt post-liberal individualist moral, legal, and political frameworks that do not assume personal identity. . . . The erosion [of personal identity] *may* come about without any coercion" (2013, 231; emphasis added). Sociopolitically, "Global governance is the next step" (2004, 264). Harris, in turn, foresees legal requirements on those who pursue immortality, possibly including not merely taxation but sterilization and "generational cleansing" if generational succession "prove[s] too slow for regeneration of youth and ideas" (2003, 75, 77).

Given the above, Russell's *Icarus, or the Future of Science* (1924) may be seen as especially prescient, for it challenges eugenicists' construction of science "not only as a potentially non-controversial means to realize shared goals but also as the very basis for the formation of values and ethical consensus" (Ezrahi 1995, 68). The impetus for Russell's reaction is Haldane's insistence in *Daedalus* (1923) that science direct ethics (Ezrahi 1995, 66)—which view Haldane reaffirms in *The Inequality of Man*: "The scientific point of view is lofty enough to satisfy any of the aspirations of the human spirit. I believe that the future of Western civilization depends upon whether or not it can assimilate that scientific point of view" (1932, 141; see also 1, 11, 109–10, 143). Because they do not see that what they offer is irreducibly perspective-dependent—an interpretation, not absolute truth—eugenicists such as Haldane deem "illegitimate" priorities, reflected in morality, law, policy, and so on, that do not mesh with their own (Ezrahi 1995, 71–73; on the moral aspect, see also Bayertz 1994, 190–91). Earlier eugenicists target philosophical authority, specifically: if Muller had his way, philosophy would be displaced from its traditional role as a, if not the, pivot of inquiry into our humanness (1935 [1984], 30–31); its future justification, if any, would be extrinsic, deriving from science.

Muller's view is echoed today by Bostrom, who urges a moratorium on vintage philosophical inquiry as a fruitless distraction (2014, 58–59, 256); philosophy's role, if any, would be to subserve the technical aim of addressing "the value-loading problem" concerning artificial "superintelligence" (208). Channeling sociopolitical concerns given voice by Russell (1924, 18–19, 26–29, 37, 52–58), Yaron Ezrahi warns that scientific authoritarianism and a democratic milieu cannot coexist because in the latter, science and technology, while important, are but a subset of competing priorities (1995, 70). Heeding Russell's concerns, which were already relevant in 1924, is all the more pressing now.

Representing the second camp, nontranshumanist Buchanan (2008) sees danger to liberal democracy but defends the use of bioenhancement to help preserve it via boons from elevated productivity, a social good. We should not "restrict ethical deliberations to the problems of a market for enhancements" (12): because the maintenance of democracy is tied to productivity, the state must "take an interest . . . in ensuring that all have access to [enhancements]"

(14). In turn, Jefferson et al.—whose coauthors include Savulescu and Kahane—assert that "we should . . . *re-frame* the debate about biomedical enhancement by giving serious consideration to the social benefits that enhancement might have" (2014, 503). They advocate using bioenhancement to "improve the functioning of our political communities" (502). In particular, reinvigorating liberal democracy for the sake of its long-term endurance requires a heightening of civic virtue (503). Note the similarity here to prior eugenicist Osborn's view that eugenics and democracy "are significantly interrelated" such that "a eugenic form of society . . . seems essential to the perpetuation of democracy [itself]" (1940, 297, 299).

For Jefferson et al., on utilitarian grounds, individuals have reason to "engage in (or provide to their children) . . . enhancements . . . that . . . contribute to civic virtue" (2014, 525). As civic virtue is above all a function of cognitive ability, opting against cognitive enhancement would be not only irrational but subject to moral critique (521, 523–24n72). What's more, the fact that "increased civic virtue is a social good . . . that is needed in modern liberal democracies" can "alter the moral status of undertaking [pertinent] enhancements . . . from being merely permissible to obligatory" (526, 525). In further keeping with utilitarian thought, Jefferson et al. give prominence to science as the arbiter of what specific measures may be morally required and thus mandated by the state (525).

Their notion that the state may override autonomy, even where individuals pose no danger that, under liberal democracy, warrants intervention (e.g., not voting or attending city-council meetings), calls to mind Persson and Savulescu's warrant for requiring moral bioenhancement of everyone to avoid ultimate harm—due, in part, to climate change—including those whose "crime" may be nothing more than, say, refusing to carpool or declining to install solar panels. Implementing mandatory enhancement programs per Jefferson et al. and Persson and Savulescu would necessitate a suspension of freedom. The justification offered by Jefferson et al. is the maintenance of democracy itself, while Persson and Savulescu would set aside what Jaspers characterized as existential and political freedom, *perhaps* with a view toward restoring a form of the latter down the line (2016, 267).[14] We are rightly alarmed, not sanguine, in the face of these antidemocratic prospects, notwithstanding the fact that, for Jefferson at al., the warrant is democracy's own preservation.

Although only the former camp of enhancement supporters treated above departs overtly from liberal democracy, the two groups are united by a direct recognition that pronounced sociopolitical impacts are built into the implementation of their visions. Further, the approach of the latter camp, especially Jefferson et al., may be more damaging for the temptation it represents to act on the visceral appeal of a no-holds-barred commitment to the long-term preservation of liberal democracy without proper attention to the fact that a supposed moratorium on hard-won freedoms is likely never to be just that.

Thus, although the improbability of one's both giving top priority to a scientific vision of the good and steadfastly embracing liberal democracy was more starkly evident in Anglo-American eugenics, it is also manifest in transhumanist thought. Having stressed the link between Haldane's and Huxley's scientific utopianism and their antidemocratic thinking, Maurizio Esposito concludes that "what remains today of [their] evolutionary synthetic work . . . is only the scientific foundation of a very tall edifice, the higher [i.e., utopian] floors of which have been almost forgotten" (2011, 48). On the part of transhumanists, a close connection to the history of eugenics has indeed been "forgotten" or is, in any case, denied. As I have shown, however, on the plane of substance, a link between scientific utopianism and the undermining of liberal democracy is alive and well.[15]

9. Conclusion

Nathaniel Comfort argues that "the eugenic impulse . . . is timeless," not historically localizable in our American past (2012, xi). In particular, this impulse "arises whenever the humanitarian desire for happiness and social improvement combines with an emphasis on heredity as the essence of human nature. It is the dream of control, of engineering ourselves, of not leaving our future up to cruel fate" (246). Because it foregrounds commonality and continuity, Comfort's formulation is preferable to that of Kevles, for whom "the human race today stands at a threshold unlike any in the past: It now possesses tools to reshape its own hereditary capacities, perhaps even to realize the dream of eugenicists that human beings might take charge of their own evolution. . . . It's not overly alarmist to say eugenics, or whatever we call it this time, could come back . . . in a new, private form shaped by the dynamics of democratic consumer culture" (2015).

Though I concur with Comfort that, seen through the lens of a shared "eugenic impulse," current eugenics is "less benign than the public relations campaigns would have us believe," I cannot agree that, due to this common terrain, earlier American eugenics (Comfort's own focus) should come off less badly than it otherwise would (2012, xii). The fact that we find a number of important parallels is concerning, whichever direction we approach them from. By featuring this common ground, the present inquiry underscores the endurance of contentious and problematic views about human nature, aspiration, and our flourishing that many parties in today's debate over bioenhancement—whatever their stance on the radical variety—assume we have left behind. What's more, knowing these links casts new, unsettling light on transhumanists' yearning to realize what they declare to be perennial human ideals. Not only do the shared commitments of transhumanism and earlier eugenics converge in Savulescu and Kahane's Principle of Procreative Beneficence, but its powerful implications for decision-making and resource allocation in the reproductive sphere are glimpsed most clearly when one views PB as the product of a shared "eugenic impulse" reaching back to Francis Galton.

The utilitarian ethical frame associated with transhumanist argumentation, together with its sociopolitical implications and the relation of transhumanism to earlier eugenics, not only can but should be assessed in its own right. Chapters 4 and 5 have offered that assessment. Further, and quite importantly, ethical imperatives are only as strong as their epistemological and ontological underpinnings. In Chapter 6, I identify and critique those that steer transhumanist advocacy.

6
Transhumanists' Informational View of Being and Knowledge

1. Introduction

Chapters 1 to 5 uncovered central weaknesses in transhumanists' handling of the psychological, scientific, ethical, and sociopolitical realms. In so doing, they dealt, to some degree, with transhumanists' ontological and epistemological commitments. Here, I critique directly their equation of the real and knowable with information.

Transhumanism and prior Anglo-American eugenics are totalizing visions: scientific views of what is and can be known, humans included, are supposed to reflect the unfiltered findings of reason and seen to qualify thereby as the rightful guideposts for ethical decision-making. In crucial respects, what transhumanists take to be context-independent truths that will be fully fleshed out with continued research by biologists, neuroscientists, and computer scientists are actually holdovers from a particular historical and cultural setting, World War II and its aftermath, prior to which the informational vantage point that came to appear self-evidently true was nowhere to be found.

In the 1940s and 1950s, the rise of electronic computing, information theory, and cybernetics "fundamentally altered the representations of animate and inanimate phenomena" (Kay 2000, 5). Though the link between genes and information rapidly came to the fore, historically, "the cognitive shift to information thinking in life science was an aspect of a more pervasive process" (1995, 612). As the mathematical concept of information and a cryptological frame were extended to living things, they came to be seen as animate machines that decoded information. James Watson and Francis Crick's discovery of the double-helix structure of DNA in 1953 occurred against this backdrop, as did scientists' "deciphering" of the genetic "code" in the 1960s. Key to this tectonic shift in perspective on inanimate and animate entities is the emergence of "statements (and tropes) that . . . come to be consistently configured together, such as gene . . . information transfer, message, text, program, and so on. Always embedded in material, disciplinary, and social practices, discourse, in this sense . . . opens up conditions of possibility for the emergence of new objects and

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new representations of nature. . . . There were no genetic messages in the 1930s; genes did not transfer information before the 1950s" (Kay 2000, 18).

Though it was suggested, at the time, that molecular biologists' stance on life was problematic (Hayles 1999, 132; Waddington 1969; 1972), this position was embedded in metaphors that persist to the present day. As George Lakoff and Mark Johnson have argued, our conceptual systems are "fundamentally metaphorical in nature," making metaphor "primarily a matter of thought and action and only derivatively a matter of language" (2003, 3, 153). Fresh metaphors can "create a new reality" such that henceforth, we think and act as befits their conceptualizations (145, 156–57). This occurs because "acceptance of the metaphor, which forces us to focus *only* on those aspects of our experience that it highlights, leads us to view the entailments of the metaphor as being *true*. Such 'truths' may be true, of course, only relative to the reality defined by the metaphor" (157–58). The scientific metaphors discussed in this chapter are not mere heuristics or literary flourishes, but themselves help to constitute scientists'—and now, transhumanists'—informational ontology and epistemology.

To be clear: the problem here is not with the fact that metaphors are used. Unavoidably, scientific language is replete with them because "virtually the entire body of modern science is an attempt to explain phenomena that cannot be experienced directly by human beings" (Lewontin 2000b, 3). In this situation, "There is a great risk of confusing the metaphor with the thing of real interest" (4); thus, we no longer see the brain "*as if* it were *like* a machine and take it to *be* a machine" (4). Further, the notion of the genome as "constituting rules, instructions, or a program," along with the idea that "the 'cell machinery . . . reads' the DNA" as organisms develop, long ago relinquished its status as metaphor (Oyama 2000b, 59; Lewontin 2000a, xv).

Scientists whose theories hinge on metaphors, from code, program, and puzzle to the "book of life," seem to forget that metaphors work only against a backdrop of difference (Lakoff and Johnson 2003, 53–54, 152; Richards 1936, 87–138). Each one foregrounds what its user views as a notable link between the items being compared, which she supposes to shed light on her immediate focus of interest. At the same time, for the image to work well *as* an image, the user must clearly recognize key differences between those items, whether or not they are noted expressly when the metaphor itself is provided.

The concept of information emerged unscathed by the failure of attempts to apply information theory to biology over the decade following its appearance, firmly attaching to DNA as the "master molecule" (Kay 2000, 126–27). What's more, visions of our biological manipulability were quickly layered onto scientists' informational view of knowledge and reality. The year 1963 "marked the beginning of the American debates on the future implications of biological engineering. . . . With the elucidation of the genetic code and even before the advent of the recombinant DNA technologies of the 1970s, a new era in biology had dawned. Molecular biology became a kind of information science aimed at rewriting the Book of Life" (Kay 2000, 279, 293).

Since then, the sway of an informational vantage point on being and knowing has broadened and intensified: "In an increasingly technological, computerized world, information is a prime commodity. . . . As the linked technologies of molecular biology and computer science have expanded, infospeak has become even more widespread and deeply embedded in the culture" (Oyama 2000b, 1, 194). At this point, as the study of commerce, governmental operations, and sociality makes clear, the informational lens that first saw light in the 1940s threatens to become encompassing (Levin 2017b).

Some worry that "the new technologies of the twenty-first century may . . . reverse the humanist revolution, stripping humans of their authority, and empowering non-human algorithms instead" (Harari 2017, 349). Yuval Harari observes that if humanism is sharply attenuated or falls away, with the attendant implications for liberal democracy, we should not

> blame the computer geeks. The responsibility actually lies with the biologists. . . . It is the life sciences that concluded that organisms are algorithms. If this is not the case . . . then computers . . . will not be able to understand us and direct our life, and they will certainly be incapable of merging with us. . . . Once biologists concluded that organisms are algorithms, they dismantled the wall between the organic and inorganic [and] turned the computer revolution from a purely mechanical affair into a biological cataclysm. (349–50)

Appreciating why information is increasingly the pivot of current trends and associated values, such that transhumanism *could* arise as an extreme manifestation thereof, necessitates our exploring the early history of this shift. Sections 2 and 3, therefore, address the roots of transhumanists' informational lens on reality and knowing, and the unquestioned commitment to scientific realism on which it rests. As before, my scientific discussions are lengthy, for the details are needed to help us combat transhumanists' misconceptions and overreaching. Here, they are also required to illuminate key conceptual threads in the emergence of our current informational frame and how entwined these quickly became.

Beyond their problematic informational frame, in urging us to engineer humanity's self-transcendence into divinity, transhumanists fail utterly to appreciate what it means for us to think, experience, and imagine anything at all as human beings (cf. Levin 2014b, 6). Transhumanists cite Kant as a backdrop for the pursuit of humanity's self-transcendence. As we will see in Section 4, however, his *Critique of Pure Reason* sharply undercuts their confident presumption about human reason, showing instead the irrationality of their insistence that it *will* spearhead a project requiring fundamentally more of it than our rational capacity can shoulder.

2. A Historical Foray

The very availability of transhumanism as a totalizing stance rests to a large extent on the advent of computing, information theory, cybernetics, and molecular biology in the 1940s and 1950s. Exploring these developments will help us appreciate the extent to which transhumanists' lens on being and knowledge is a legacy of this earlier era. Questions that will occupy us in this section include: "How *does* one get from communication engineering systems to biological systems?" and "*How and why* did scientists employ the semiotics of information to represent organisms and to write biology in the language of machine communication?" (Kay 2000, 101).

2.1 McCulloch and Pitts on Nervous Activity

In the 1940s and '50s, the concept of information anchored opposition to a firm divide between living things and machines. On one level, the thinking was that "if anything deserves to be called an information processing device, the brain does. Sophisticated behavior requires a device that can track and process an enormous amount of data. How does the brain manage it? . . . Neurons, it seems reasonable to infer, must themselves be simple information processing devices" (Rathkopf 2020, 95).

Warren McCulloch and Walter Pitts "were the first to suggest that neural networks have something to do with computation" (Maley and Piccinini 2015, 88). In an influential article, "A Logical Calculus of the Ideas Immanent in Nervous Activity," they maintain that neural activity obeys logical principles. Individual neurons operate in a binary, or digital, fashion that they call "the 'all-or-none' law of nervous activity" (1943, 117). According to McCulloch and Pitts, the activity of brains and computers is fundamentally alike in comprising logical propositions and their connections: "To each reaction of any neuron there is a corresponding assertion of a simple proposition," and "physiological relations existing among nervous activities correspond . . . to relations among the propositions" (117). This "formal equivalence" of the activity of neurons and computers means that "the alterations actually underlying facilitation, extinction and learning in no way affect the conclusions which follow from the formal treatment of the activity of nervous nets" (117).

McCulloch and Pitts reject Kant's stance in the *Critique of Pure Reason* that we cannot grasp "things in themselves" (*Dinge an sich selbst*), albeit without mentioning him by name: as nervous nets can be determined empirically, "The unknowable object of knowledge, the 'thing in itself,' ceases to be unknowable" (131). Equipped with the information contained in the logical propositions represented by these nets, " 'Mind' no longer 'goes more ghostly than a ghost' " (132). On some level, McCulloch recognized that his and Pitts's neuron was "a simplified schematic of an actual neuron's complexity, not to mention the brain's complexity" (Hayles 1999, 59); nonetheless, he "pushed toward connecting the operations of a neural net directly with human thought" via the notion that brains "compute thought the way electronic computers calculate numbers" (59; McCulloch 2004, 352). McCulloch and Pitts projected that their theory would offer "mathematical biophysics . . . a tool for rigorous symbolic treatment of known nets and an easy method of constructing hypothetical nets of required properties" (1943, 132).

Historically, "Transforming the body into a flow of binary code pulsing through neurons was an essential step in seeing [the] human being as an informational pattern" (Hayles 1999, 61). Boons that might have come from linking thought and computer code metaphorically, for a limited heuristic purpose, were swamped by the fact that McCulloch and Pitts—and others their theory influenced—reached "the unwarranted conclusion that there is no essential difference between thought and code" (61).

2.2 Shannon and Information Theory

Studies of telegraphic transmission at Bell Laboratories in the late 1920s sparked a crucial development, whereby "the concept of information began to be decoupled from its meaning as 'intelligence' and to signify purely syntactic arrangements of symbols . . . suited for electronic communications, a development culminating during World War II," when the computer also emerged (Kay 2000, 20; Keller 1995, 82). Bell Labs sought to "maximize the efficiency and reliability of transmission, hence the quantification of information and the emergence of information theory, with *information* defined as the mathematical converse of entropy" (Keller 1995, 82).

This mathematical concept of information is sometimes called "Shannon information," after its formal originator, Claude Shannon. Shannon's work in cryptology influenced the theory that he developed (Kay 2000, 92–93). As he saw it, "The fundamental problem of communication is that of reproducing at one point . . . a message selected at another point. Frequently the messages have *meaning*. . . . These semantic aspects of communication are irrelevant to the engineering problem" (Shannon 1948, 379). Thus, Shannon's concept of information features quantification, context-independence, efficiency, and the minimization of ambiguity, associated with "noise" (1948; 1952, 24; Weaver 1949, 99, 107). From an engineering standpoint, "noise" covers adjustments to a signal during transmission that "were not intended by the information source. These unwanted additions may be distortions of sound (in telephony, for example) or static (in radio), or distortions in shape or shading of picture (television), or errors in transmission (telegraphy or facsimile)" (Weaver 1949, 99). As channel noise is a source of "undesirable uncertainty . . . to get the useful information in the received signal we must subtract out this . . . portion" (109).

In ordinary human communication, meaning is central and context dependent (Shannon 1948, 379, 414; 1952, 22). In contrast, the system Shannon envisioned "must be designed to operate for each possible selection, not just the one which will actually be chosen since this is unknown at the time of design" (1948, 379). Here, the very concept of meaning is superfluous because information "is a pattern, not a presence. . . . Abstracting information from a material base meant that information could become free-floating, unaffected by changes in context" (Hayles 1999, 18–19). In cybernetic terms, Shannon's information is "allie[d] . . . with homeostasis, for so defined, it can be transported into any medium and maintain a stable quantitative value" (56).

In "A Mathematical Theory of Communication," his influential article of 1948, Shannon divides communication systems into five components (380–81):

(1) "an *information source* which produces a message or sequence of messages to be communicated to the receiving terminal" (e.g., "a sequence of letters as in a telegraph or teletype system");
(2) "a *transmitter* which operates on the message in some way to produce a signal suitable for transmission over the channel" (e.g., "In telegraphy we have an encoding operation which produces a sequence of dots, dashes and spaces on the channel corresponding to the message");
(3) "the *channel*," that is to say, "the medium used to transmit the signal from transmitter to receiver";
(4) "the *receiver*," which "ordinarily performs the inverse operation of that done by the transmitter, reconstructing the message from the signal"; and
(5) "the *destination*," namely, "the person (or thing) for whom the message is intended."

Before one can tackle "general problems involving communication systems," one must "represent the various elements involved as mathematical entities, suitably idealized from their physical counterparts" (381). The transmission of messages was framed as "encoding" and their reception as "decoding," with noise producing errors that cannot be corrected "by any operation on the received signal" (Weaver 1949, 107; Shannon 1948, 407). Based on geometrical representations, Shannon specified features of a system closest to "ideal" as far as noise was concerned, including formulae for calculating the maximal rate at which binary digits should be transmitted to a receiver (1949).

Shannon demarcates his specialized concept of information from the familiar, semantic one, which he states to lie outside his purview (1948, 379; 1952, 22, 24; Kay 1995, 622).[1] That said, Shannon treats his mathematical concept as objectively superior, using it as a yardstick to measure how far, in everyday life, people make rational use of supplementary information that becomes available to them (1952, 38). The technical concept of information is deemed categorically preferable to the imprecision and unpredictability that "psychological factors" introduce, the irrational way in which people handle information, semantically construed (Shannon 1952, 24, 38). Though Shannon's theory does not tackle semantics, Warren Weaver maintains that extending the theory to address it would require only "minor additions" (1949, 115). If this occurred, semantics would, effectively, be subsumed by a mathematical theory of information that united humans' cognitive activity with the operation of computers.

2.3 von Neumann and Cellular Automata

The transfer of machine concepts to living things was facilitated by what seemed "the enormous promise to the study and construction of automata" (Kay 2000, 101). Mathematical constructions, cellular automata "came to serve as heuristics for analyzing biological and social processes; they began to generate a new (hyper)reality, where simulations became models for understanding life, death, and human experience" (102). John von Neumann, who launched this line of inquiry, was "unrivaled in [the] promotion of logical automata (including computers) at the hub of power that linked military control systems to Cold-War strategies" (102).

Von Neumann sought to uncover how the constitutive elements of a living thing "are organized into a whole, and how the functioning of the whole is expressed in terms of these elements" (1951, 2). Viewing "biological phenomena as information systems," he wanted to design automata that would illuminate those phenomena (Kay 2000, 105–106).

According to von Neumann, in the nervous system, "Elements of both [computing] procedures, digital and analogy, are discernible" (1951, 9). Bracketing the analogical dimension, he treated "living organisms as if they were purely digital automata" (10). Von Neumann agrees with McCulloch and Pitts that "the nerve impulse seems in the main to be an all-or-none affair, comparable to a binary digit" (9). Employing the concepts "source," "stimulus," and "response," he classifies both neuron and vacuum tube under the genus of " 'switching organ' or 'relay organ' " (12).

McCulloch and Pitts "used [neural] units to build up . . . 'formal neural networks,' " believing that any function of the nervous system that can be thoroughly described in a logical form can "ipso facto" be enacted in a mechanical neural network (von Neumann 1951, 22–23). For von Neumann, while their account fits the level of individual neurons, it does not help us grasp "high-complication automata" (24), in particular, living things' capacity of self-reproduction.

When he considered how to develop self-reproducing automata, the human nervous system was off limits, being too complex a template and not well understood (Kay 2000, 108). Instead, von Neumann looked to contemporary biological research on "organisms so rudimentary . . . as to be immune from the mystifying and recalcitrant chaos of higher complex organisms. This strategy . . . led molecular biologists to the study of life in test tubes and petri dishes populated by bacterial cultures of *E. coli* and their viral parasites known as *bacteriophage*—forms of life that seemed simple enough to preserve the linearity of simple codes and telegraphlike messages" (Keller 1995, 81–82). Because he thought that prokaryotes—single-celled organisms (e.g., bacteria) that lack defined nuclei—"possessed the decisive traits of any living organism, especially self-reproduction," von Neumann was confident that their further study in light of information theory would be availing (Kay 2000, 108). Like early molecular biologists, he "conceptualized reproduction within the protein view of heredity, in which autocatalytic mechanisms of some enzymes served as explanations of gene action and virus replication" (1995, 619). Within his model of living things as self-reproducing machines, genes were "copiers" (620).

In von Neumann's framework, "Epistemology and technology defined and folded into each other" (Kay 1995, 619). He believed that viruses processed information and speculated that genes did so as well (2000, 108). Since von Neumann was a functionalist (112), a biological substrate for self-replication was inessential: as "copiers," genes were "essentially an 'information tape' " (111). If complexity was reduced to simplicity and the substrate-independence of information fully absorbed, scientists would be able to "construct automata which can reproduce themselves and, in addition, construct others" (von Neumann 1951, 31).

2.4 Wiener and Cybernetics

The initial phase of cybernetics (1945–1960), which coincided with the establishment of molecular biology, saw the "creation of a conceptual framework that constituted humans, animals, and machines as information-processing devices receiving and transmitting signals to effect goal-directed behavior" (Hayles 1999, 7, 37). The account of Norbert Wiener "collaps[ed] differences between categories: animate and inanimate, organism and machine, the natural and the artificial. The cybernetic writing was a process of erasure of meaning" (Kay 1995, 623).

Before discussing the theory itself, I make three preliminary points. First, prior to the 1940s, feedback loops were not expressly seen as flows of information (Hayles 1999, 8). Second, for the most part, cyberneticists "followed traditional scientific protocols in considering observers to be outside the system they observe" (9); scientific objectivism, manifest here, "sees information flowing from the system to the observers" (9). Third, Wiener's cybernetics, given a technical defense in his eponymous book of 1948,[2] remained "within the protein paradigm of the gene" (Kay 2000, 78).

"Cybernetics" reflects a convergence of the theories of McCulloch and Pitts, Shannon, and von Neumann with that of Wiener,[3] who coined this term for the study of communication and control, whether in organisms or in machines (1961, 11). In cybernetics, "a message" is defined as "a pattern distributed in time," and "control" refers to "the sending of messages which effectively change the behavior of the recipient" (1950, 21, 8). Wiener argued that "the operation of the living individual and the operation of some of the newer communication machines are precisely parallel" (15).

Theoretically, therefore, "A machine could function like a man" (Hayles 1999, 7). Wiener's book *Cybernetics* fostered an impression of him as "a visionary who could articulate the larger implications of the cybernetic paradigm and make clear its cosmic significance. . . . Henceforth, humans were to be seen primarily as information-processing entities who are *essentially* similar to intelligent machines" (7). To many at the time, Wiener appeared to have shown that information theory was "applicable, in principle, to any system, physical or biological, in which information can be properly coded, quantified, and manipulated through time and space" (Kay 2000, 87, 96).

A 1943 article by Rosenblueth et al., which Wiener coauthored, helped to anchor his thinking in later publications (Wiener 1961, 8; Kay 2000, 81). Rosenblueth et al. deem structural differences between animals and machines theoretically inessential and focus instead on "behavior," defined in context-neutral terms: "Given any object . . . abstracted from its surroundings for study, the behavioristic approach consists in the examination of the output of the object and of the relations of this output to the input. . . . The above statement . . . omits the specific structure and the intrinsic organization of the object. This omission is fundamental" (18). For the authors, "A uniform behavioristic analysis is applicable to both machines and living organisms, regardless of the complexity of the behavior" (22). Having divided "active behavior" into purposive and nonpurposive varieties, they maintain that humans and machines are alike in displaying both (18–19); as an example of an "intrinsically purposeful" machine, they offer "a torpedo with a target-seeking mechanism," which belongs to a broader class of machines termed "servomechanisms" (19).[4]

Richard Taylor contests the broad notion of purposiveness reflected in this illustration: "The torpedo is guided, *not* by the target itself, but by the sound waves impinging upon the sonic mechanism; it does not literally 'seek' the target, for its behavior would be the same even if no target were there, provided only that sound waves, or certain other immediate causes, obtained. The expression 'target-seeking missile' is, in fact, metaphorical" (1950, 316). All in all, Rosenblueth et al. "utilize criteria which render purposeful behavior a ubiquitous phenomenon, and . . . thereby endow the word 'purpose' with a meaning having no similarity to any meaning it has customarily been taken to possess" (317).

In response, Arturo Rosenblueth and Wiener make a startling concession—denying it real import even as they provide it:

> We believe . . . that the notion of purpose is not absolute, but relative; it admits degrees. We further believe that it involves a human element, namely the attitude and objectives of the observer. Different observers may well differ in their evaluation of the degree of purposefulness of a given behavior. And the same observer may study a given behavior as purposeful or as purposeless, with different objectives. But these limitations of the notion of purpose . . . do not detract from [its] validity and usefulness. (1950, 322)

Interpretive disagreement would not undermine their handling of purpose, which "must be recognizable from the nature of the act, not from the study of or from any speculation on the structure and nature of the acting object. This remark . . . eliminates any incongruity in the application of the notion to non-living machines. In other words, if the notion of purpose is applicable to living organisms, it is also applicable to non-living entities when they show the same observable traits of behavior" (323). In conclusion, "The only fruitful methods for the study of human and animal behavior are the methods applicable to the behavior of mechanical objects as well. . . . As objects of scientific enquiry, humans do not differ from machines" (326). Similarly, in *The Human Use of Human Beings*, Wiener observes that "I have spoken of machines, but not only of machines having brains of brass and thews [i.e., muscles and tendons] of iron. When human atoms are knit into an organization in which they are used . . . as cogs and levers and rods, it matters little that their raw material is flesh and blood. *What is used as an element in a machine, is an element in the machine*" (1950, 212–13).

Rosenblueth and Wiener largely beg the question that drives Taylor's objection: whether, as they presume, humans and machines are essentially alike. "What tends to drop from sight is the fact that the equation between organism and machine works because it is seen from a position formulated precisely so that it will work" (Hayles 1999, 94). As Rosenblueth and Wiener themselves suggest, available *methods* of study strongly impact what they take as theoretical bedrock (1950, 326).

The comments of N. Katherine Hayles, directed to early theories, such as Wiener's, remain apropos:

> By suggesting certain kinds of experiments, the analogs between intelligent machines and humans *construct the human in terms of the machine*. . . . Ranging human intelligence alongside an intelligent machine puts the two into a relay system that constitutes the human as a special kind of information machine and the information machine as a special kind of human. Although some characteristics of the analogy may be explicitly denied, the basic linkages it embodies cannot be denied, for they are intrinsic to being able to think [about] the model. (1999, 64–65)

Thus, "All communication systems terminate in machines, but the ordinary communication systems of language terminate in the rather special sort of machine known as a human being" (Wiener 1950, 88). Further, according to Wiener, control "is nothing but the sending of messages that effectively change the behavior of the recipient. Within this servomechanistic world all operations that were quantifiable could be expressed as messages, and thus affect behavior" (Kay 1995, 621). As the computer and brain are "logical machine[s]" (Wiener 1961, 124), quantifiable operations define both; here, the mathematical concept of information is key (132). Viewed quantitatively, "Control mechanisms of information transmission and reception in the body . . . [become] codable" (Kay 1995, 624). Communication *is* "the transmission of messages, and . . . the bodily transmission of matter and messages is only one conceivable way of attaining that end" (Wiener 1950, 111); hence, "the fact that we cannot telegraph the pattern of a man from one place to another" represents a "technical" challenge, not "any impossibility of the idea" (110).

In *The Human Use of Human Beings*, Wiener's informational account becomes encompassing: "Contemporary society [can] be understood only through a study of messages and communication facilities; the human individual and the living organism must be recast in terms of information" (Kay 2000, 88). Not only did *Cybernetics* and *The Human Use of Human Beings* have a strong popular impact, but "by the early 1950s, a number of geneticists and molecular biologists had begun to redefine organisms as cybernetic systems and to rewrite their accounts in terms of information" (1995, 625). Indeed, Wiener anticipated a "cybernetics of heredity by invoking the then-dominant view of the primacy of proteins" (2000, 86). In Watson and Crick's formulation of their discovery of the double helix and Crick's Central Dogma, the impact of information theory and cybernetics was clear.

2.5 Watson and Crick's Discovery of the Double Helix

The field of molecular biology arose "at the dawn of the computer era when few concepts were as fashionable as that of information" (Sarkar 2004, 263). In Subsections 5 to 8, I address, respectively, Watson and Crick's discovery of the structure of DNA, Crick's Central Dogma, the "deciphering" of the genetic code, and attempts to classify biology itself as an information science.

"In the mid-1940s most life scientists adhered to the view that proteins were the primary biological determinants: that biological specificity—including gene action—was determined by proteins, and that proteins acted as templates for the synthesis of other proteins. DNA was thought to have an important but secondary role" (Kay 1996, 94).[5] That said, "The commitment to biological representations in terms of information storage and transfer . . . occurred well before 1953—i.e., before DNA replaced proteins as the source of hereditary information" (1995, 627).

Watson and Crick were not biochemists (Judson 1996, 11).[6] Watson's dissertation addressed functional questions involving phage (46). Having completed his PhD at Indiana University in 1950, Watson went to England to familiarize himself with structural approaches to the cell, which Crick had been pursuing (51). They were a good match scientifically, for at the time, Crick, originally a physicist, was turning to the study of function (92; Pollack 1994, 150).

In their article "Genetical Implications of the Structure of Deoxyribonucleic Acid," Watson and Crick were the first to provide evidence of how DNA executes "the essential operation required of a genetic material, that of exact self-duplication" (1953a, 965). Structurally, DNA is composed of "two helical chains each coiled round the same axis" (1953b, 737). These chains are "held together . . . by hydrogen bonds between the bases," and

> the precise sequence of the bases is the code which carries the genetical information. . . . One chain is, as it were, the complement of the other, and it is this feature which suggests how the deoxyribonucleic acid molecule might duplicate itself. . . . Prior to duplication the hydrogen bonds are broken, and the two chains unwind and separate. Each chain then acts as a template for the formation on to itself of a new companion chain, so that eventually we shall have *two*

> pairs of chains, where we only had one before. Moreover, the sequence of the pairs of bases will have been duplicated exactly. (1953a, 965–66)

Watson and Crick conclude that "[their] proposed structure for deoxyribonucleic acid may help to solve one of the fundamental biological problems—the molecular basis of the template needed for genetic replication" (966).

Between 1948, when Shannon debuted the mathematical concept of information, and the early 1950s, that concept became "a hot subject in the world of communications systems. . . . Because DNA seemed to function as a linear code, using this notion of information for genetics appeared to be a natural" (Keller 1995, 18–19). Here, Watson and Crick's announcement in 1953 was a watershed. For, in the autumn of 1951, "Almost all biologists still thought that the hereditary message, the gene, was almost certainly made of protein. . . . The structure of DNA, once known, made its function as a blueprint comprehensible and therefore incontrovertible. . . . The marvellous unity of structure and function in DNA, once discovered, proved to be the master concept of . . . biological investigation" (Judson 1996, 6–7).

Although "productive as analogies, 'information,' 'language,' 'code,' 'message,' and 'text' have been taken as ontologies. The consequences are far-reaching" (Kay 2000, 3). Already in the early 1950s, it did not altogether escape the notice of geneticists that the mathematical concept of information was biologically inapposite; for one thing, the amount of information in the DNA of "a functioning organism" is the same as that in "a mutant form, however disabling [the] mutation" (Keller 1995, 19).

On the merits, Watson and Crick's "notion of genetical information . . . was not literal but metaphoric" (19). This is not to say that molecular biologists absorbed the purely metaphorical status of "information" and "code," applied to DNA. Quite the opposite, as Watson and Crick's perspective caught on like wildfire: "Though problematic, this view of the genome as an information system, a linguistic text written in DNA code, has been guiding theories and practices of molecular biologists since the 1950s" (Kay 2000, xv).

The notion of a "code" was attached to textual metaphors, such as writing and reading,[7] to which "the image of a genomic 'Book of Life'—laden with biblical references" was added in the 1960s (xv); further, the terms "translation" and "transcription" themselves have scriptural resonances (3). Together, "The information discourse and the scriptural representations of life were . . . exceptionally potent due to the richness of their symbolisms, their synchronic and diachronic linkages, and their scientific and cultural valences" (3).

The pressing into service of "information," "code," "program," and the like well beyond what *metaphorical* usage could offer continues (Sarkar 2004, 266). In 2000, Watson dismissed "widespread concerns that we, as humans, may not have the wisdom to modify the most precious of all human treasures—our chromosomal 'instruction books' " (228). Per Sterelny et al., "The informational role of the gene is to carry information about the parental phenotype to the developing phenotype" (1996, 401n3). William Gelbart looks to "datasets serving as test beds for the deciphering of the many different codes embedded in genomic DNA" (1998, 660).

According to John Maynard Smith, "The analogy between the genetic code and human-designed codes such as Morse code or the ASCII code is too close to require justification" (2000, 183). He expressly endorses the "major insight of information theory . . . that the same information can be transmitted by different physical carriers"—meaning that a message can be "carried" equally well "by a sound wave, an electromagnetic wave . . . a fluctuating current in a wire . . . [and] a set of chemical molecules" (179). Maynard Smith's "engineering analogy . . . justifies biologists in saying that DNA contains information that has been programmed by natural selection; that this information codes for the amino acid sequence of proteins; [and] that . . . the DNA and proteins carry instructions, or a program, for the development of the organism. . . . Fluctuations in the environment are a source of noise in the system, not of information" (190, 192).

In "A Vision of the Holy Grail," Walter Gilbert illustrates the extravagant hopes that many pinned on the Human Genome Project. For molecular biologists, "The species [is] . . . sharply defined by a set of genes and a set of functions that makes up that entity. . . . The molecular biologist's view is that this organism is defined by its DNA" (1992, 84). The Human Genome Project "is an application of scientific technology to produce . . . the information content of the genome" (92). Not only will "the possession of a genetic map and the DNA sequence of a human being . . . transform medicine," but completion of the project will propel "a change in our philosophical understanding of ourselves. . . . To recognize that we are determined, in a certain sense, by a finite collection of information that is knowable will change our view of ourselves. It is the closing of an intellectual frontier, with which we will have to come to terms. Over the next ten years . . . we will understand *deeply* how we are assembled, dictated by our genetic information" (94, 96).

Hans-Jörg Rheinberger, in turn, foresees "the deliberate 'rewriting' of life" (2000, 25). "Within a timespan of less than twenty years, molecular geneticists have learned not only to understand the language of the genes in principle, but to spell it. In other words, they have learned to read, to write, to copy and to edit that language in a goal-directed manner. . . . Today, there exist precise and powerful functional equivalents to each of these analogies of language and of writing. . . . With that, the organism as a whole advances to the status of a locus technicus" (24–25). Evincing his zeal for our biological manipulation, Rheinberger claims that "we now gain access to the texture, and hence the calculation, instruction and legislation of the human individual's organic existence, that is, to a script which until now it has been the privilege of evolution to write, to rewrite and to alter. . . . Molecular biology will arrive at inventing the biological future" (28).

That molecular biology is "expansionist" (Judson 1996, 177) has importantly to do with Watson and Crick. Molecular biology is, at once, "a discipline, a level of analysis, a kit of tools—which is to say, [as] unified by style as much as by content. . . . The style is bold; it is simplifying; it is unsparing. . . . The style has been set by very few people. A list would have to include . . . James Watson . . . and preeminently Francis Crick. . . . Beyond all that, simply, molecular biology is an expectation. Molecular biologists take it for granted that a certain kind of explanation can be reached" (177–78). Its crux, information, is seen as "an ontological entity, even a cosmological principle" (Kay 2000, xvii).

2.6 Crick's Central Dogma

Crick was convinced that DNA was "the origin and universal agent of all life," with protein synthesis largely "uniform throughout Nature" (Kay 2000, 30; Crick 1958, 143). Though "many molecular biologists deployed the idiom of information in the mid-1950s," he "formalized the information discourse as a way of imposing thematic order and rhetorical imperatives on the central problem of protein synthesis, reproduction, and the disciplinary turf of molecular biology" (Kay 2000, 29). For Crick, influenced by Wiener, "The essence of protein synthesis was . . . flow . . . principally the unidirectional flow of information . . . from DNA to proteins" (29–30).

The question of how "the sequence of four bases [adenine, guanine, cytosine, and thymine] 'codes' the sequence of the twenty amino acids is . . . the coding problem. It . . . deals only with the transfer of information" (Crick 1958, 158). Crick's "Central Dogma" encapsulates his spare, unidirectional view of how this transfer occurs:

> Once "information" has passed into protein *it cannot get out* again. . . . The transfer of information from nucleic acid to nucleic acid, or from nucleic acid to protein may be possible, but transfer from protein to protein, or from protein to nucleic acid is impossible. Information means here the *precise* determination of sequence, either of bases in the nucleic acid or of amino acid residues in the protein. . . . Granted our hypotheses, the information must be carried by DNA. (153)

Crick's Central Dogma "promised a linear structure of causal influence, from the central office of DNA to the outlying subsidiaries of the protein factory"

(Keller 1995, 93). Within its formulation, "information" seems to reflect, and thus gains "legitimacy" from, Shannon's construction (93n7). Indeed, "It was all but inevitable that its use in the biological context would concurrently endow the DNA with some of the special powers that had accrued to the term from its currency in the new science of communication" (2002, 140).

Historians of biology widely agree that the Central Dogma "has pervaded all of contemporary biophysics, biochemistry, cell biology and genetics" (Rheinberger 2000, 22). The picture encapsulated therein—paraphrased by Crick as "DNA makes RNA, RNA makes protein, and proteins make us"—has "reigned supreme ever since, among scientists . . . and lay readers alike, and it has spawned a plethora of associated images. We think of the cell's DNA as the genetic program . . . or . . . the book of life" (Keller 2000, 54). In 1992, Richard Lewontin stated that "molecular biology is now a religion." As early as 1964, however, Van Rensselaer Potter had observed that molecular biologists "have a religion all their own in which . . . Crick is the prophet and the DNA molecular model is the icon. [They] have a 'trinity' of three kinds of molecules—DNA, RNA, and the protein molecules—which correspond to each other on a unit-for-unit informational basis. They have a 'dogma' . . . which says that 'information'—that is, molecular pattern—passes from DNA to RNA to protein but does not pass in the reverse direction" (1020).

François Jacob and Jacques Monod debuted the allied concept of a genetic program, which "caught on rapidly" (1961; Keller 2000, 80). In their view, "The genome contains not only a series of blue-prints, but a co-ordinated program of protein synthesis and the means of controlling its execution" (Jacob and Monod 1961, 354).[8] This concept of a program "equates the genetic material of an egg with the magnetic tape of a computer" (Jacob 1970 [1993], 9).

Though Jacob and Monod dealt only with bacteria and phage, they were confident that their conclusions also applied to embryology (1961, 354). Given genes' "newly acquired efficacy as information and program . . . the role of genes in development could now be distinguished (set both above and apart) from that of other factors in the cell by the 'information' they encoded" (Keller 2002, 139). According to Monod, molecular biology had "prove[d] beyond any doubt" the truth encapsulated in Crick's Central Dogma (Judson 1996, 192).

Once DNA was seen in terms of encoded information, the question arose: How might the "code" be "deciphered"?

2.7 Deciphering the Genetic Code

The code's "deciphering" in the 1960s occurred in two phases (Nirenberg 2004). When Marshall Nirenberg and J. Heinrich Matthaei were able to match a particular coding unit to one of twenty identified amino acids, the code was considered "broken," or "cracked" (Cobb 2015, R531).[9] In the second phase, scientists worked to perform the same feat for the other sixty-three coding units.

"The announcement of the discovery of messenger RNA (mRNA) and the cracking of the genetic code took place within weeks of each other in a climax of scientific excitement" (Cobb 2015, R526). On May 13, 1961, two research teams announced that they had isolated mRNA, to which "the information in DNA is transferred" via a process termed "transcription" (Cobb 2015, R526; Kay 2000, 196; Clancy and Brown 2008). Then, mRNA is " 'read' according to the genetic code, which relates the DNA sequence to the amino acid sequence in proteins"— a step called "translation" (Clancy and Brown 2008). Henceforth, the status of information was "bestowed" on both DNA and mRNA (Kay 2000, 230).

Messenger RNA has four nucleotides: adenine (A), uracil (U), guanine (G), and cytosine (C). In 1961, Nirenberg and Matthaei announced that synthetic uracil "contain[s] the code for the synthesis of a 'protein' containing only one" of an identified twenty amino acids (1589, 1595); in particular, "One or more uridylic acid residues in poly U appeared to be the coding unit corresponding to [the amino acid] phenylalanine" (Matthaei et al. 1962, 666). "The genetic code had been cracked," and Nirenberg and Matthaei's "revolutionary discovery utterly transformed how protein synthesis and the genetic code were investigated" (Cobb 2015, R531).

From genetic and biochemical standpoints, Crick et al. (1961) and Matthaei et al. (1962), respectively, showed that a coding unit consists of three bases, which triplet forms a "codon." "The sequence of the bases is read from a fixed starting point. . . . There are no special 'commas' to show how to select the right triplets" (Crick et al. 1961, 1227). A given codon can map onto only one amino acid (Sterelny and Griffiths 1999, 128). Since there are sixty-four codons and just twenty amino acids,[10] multiple codons correspond to the same amino acid, making DNA what's called a "degenerate" code (Matthaei et al. 1962, 674); an example is leucine, whose "coding unit . . . can contain either U and C or U and G" (674). Though certain triplets are "nonsense words" in the sense that they do not code for amino acids, these codons may "carry other instructions" (674; Beadle and Beadle 1966, 206). Such is the case with "stop-codons," including *UAG* and *UGA*, which typically specify that "the ribosome should stop translation" (Beadle and Beadle 1966, 206; Atkins and Gesteland 2000, 463).

The confidence of Nirenberg and Matthaei that the methodology used to discover that poly-U codes for phenylalanine would bear additional fruit (1961, 1601) was warranted. Philip Leder and Nirenberg found the nucleotide sequence for the triplet that corresponds to the amino acid valine (1964). By the time that Trupin et al.'s article (1965), coauthored by Nirenberg, appeared, nucleotide sequences for ten other pairs of codons and amino acids had been discovered;

Trupin et al. reported seven more, bringing the total to nineteen. By year's end, the group of paired codons and amino acids had risen to fifty-six (Brimacombe et al. 1965). In 1966, the remaining eight matches were discovered (Nirenberg 2004, 52–53).

Molecular biologists had enjoyed success "in outline," with procaryotes and accompanying viruses (Judson 1996, 592). Though "confirmation" would have to await the 1970s, many scientists were already confident that not only was DNA "the hereditary material" for them, as shown in the 1960s, but that the same would prove true for multicellular organisms (Cobb 2014, R58). Monod and Jacob famously claimed that "anything found to be true of *E. coli* must also be true of Elephants" (1961, 393). As Crick put the point, "the basic biological mechanisms" are, "with minor variations . . . the same throughout Nature" (1965, 184). Similarly, George Beadle proclaimed that nucleic acids, "the master molecules of life," are "the same in all living things" (1966, 6, 30). By the close of the second phase of the code's deciphering, the genome was "widely perceived as an information system, an authorless Book of Life written in a speechless language of DNA" (Kay 2000, 14). With this "book" envisioned as covering life per se, and "information," "code," and the like doing very heavy lifting, several prominent scientists concluded that biology itself was an information science.

2.8 Biology as an Information Science?

"From information theorists to life scientists, nearly everyone agreed that the ideas and terminology of information theory became pervasive in the 1950s and 1960s" (Kay 2000, 15). Confidence in the universality of the genetic "code" undergirds the claim that biology is properly viewed as an information science—a view defended by several scientists between 1966 and 1970. Jacob was one: "The aim of modern biology is to interpret the properties of the organism by the structure of its constituent molecules. In this sense, modern biology belongs to the new age of mechanism. The programme is a model borrowed from electronic computers. It equates the genetic material of an egg with the magnetic tape of a computer. It evokes a series of operations to be carried out, the rigidity of their sequence and their underlying purpose" (1970 [1993], 9). Though differences exist, they do not jeopardize the overall fitness of this unifying conceptual frame (9–10, 253).

In the mid-twentieth century, which saw "the development of electronics and the appearance of cybernetics, organization as such became an object for study by physics and technology. The requirements of war and industry led to the construction of automatic machines in which complexity increased through successive integrations. In a television set, an anti-aircraft rocket or a computer, units are integrated which already result themselves from integration at a lower level" (247). Unsurprisingly given this milieu, the quest for a comparable level of familiarity with living things was framed in mechanistic terms: as Jacob put the point, molecular biologists "still examined the black box from the outside, in order to observe its properties; but at the same time they opened the box in order to detect the cogwheels, to dismantle them and to try to reconstruct the mechanism from the separate parts" (249).

Information theory and cybernetics anchor Jacob's account: "In an organized system, whether living or not, the exchanges . . . of information . . . unite the components. Information . . . is at one and the same time what is measured, what is transmitted and what is transformed. . . . Any material structure can . . . be compared to a message, since the nature and position of its components . . . are the result of a choice made from a series of possible combinations" (251). Closely channeling Wiener, Jacob asserts that "every interaction between the members of an organization can . . . be considered as a problem of communication. This applies just as much to a human society as to a living organism or an automatic device" (251).

So fundamental is the common ground between animals and machines that "each system . . . becomes a model for the other" (253). Thus,

> The machine can be described in terms of anatomy and physiology. It has executive organs . . . [and] a whole series of sense organs. . . . It contains . . . a memory in which the details of the actions to be carried out are prescribed and data of past experience are written down. All this is connected by a nervous system that, on the one hand, carries the impressions from the senses to the brain and, on the other, transmits the commands to the limbs. At any time, the machine that executes its programme is capable of directing its action . . . in accordance with the message received. (253)

On the flip side,

> Organs, cells and molecules are . . . united by a communication network. They constantly exchange signals and messages in the form of specific interactions between constituents. The flexibility of behaviour depends on feedback loops; the rigidity of structures on the execution of a programme rigorously laid down. Heredity becomes the transfer of a message repeated from one generation to the next.[11] The programmes of the structures to be produced are recorded in the nucleus of the egg. (254)

In sum, for Jacob, "Biology is concerned with the algorithms of the living world. . . . The power of assembling, of producing increasingly complex structures, even of reproducing, belongs to the elements that constitute matter. From particles to man . . . there is no breach either in the composition of the objects or in the reactions that take place in them; no change in 'essence' " (300, 306). Not to classify biology as an information science is to misunderstand reality, pure and simple.

Robert Sinsheimer agrees. Having displayed a picture of a Mayan codex, he speaks of "another book—or perhaps more accurately an encyclopedia.[12] It is a set of human chromosomes, the book of human life. In this book are instructions, in a curious and wonderful code, for making a human being. . . . We have begun to understand the content of these books and the language in which they are written" (1967, 5–6). Sinsheimer believes that he is describing "a central process in every living creature" (18). Per Beadle, in turn, the findings of Watson and Crick "enabled science to discover how genetic directions are 'written,' how they are translated into orders which the cells obey, and how they are modified by mutation. Finally, they enabled chemists, physicists, and biologists to discuss the structure and behavior of living organisms—for the first time in the history of science—in a common language, the language of molecular structure" (Beadle and Beadle 1966, 166).

Channeling information theory, Beadle likens the way in which "the DNA code is read," its message "unscrambled," to the operation of two machines, "one of which is supposed to transmit [a given] message. . . . The receiving machine is capable of recognizing whether a certain sequence of letters makes sense. If the message comes through correctly, the machine will accept it, break it into triplets, punctuate it, and hand it over like this" (196). Those who protest that "the great mystery of life couldn't, at its base, be that simple" operate unscientifically (174). Biologists have already discovered "the way in which DNA directs our creation, growth, and functioning. What is to come is only an understanding of the details. . . . What has happened in genetics during the past decade has been the discovery of a Rosetta stone. . . . The deciphering of the DNA code has revealed our possession of a language much older than hieroglyphics, a language as old as life itself" (206–207).

If one aims to lodge disciplines that study "life" and "non-life" under a single, broader head, one must undercut the notion that a fundamental barrier divides living from nonliving material and processes. Crucial for Beadle here was Nirenberg's finding that laboratory synthesis of hereditary material could occur "without a bit of natural DNA as the model," for this discovery "knocked the final prop from under the comfortable assumption of mankind that 'life' is inherently different from 'non-life' " (180).

In terms of our placing transhumanism in a larger context, it is striking that the scientists who saw biology as an information science in this prior era were thereby convinced that human biology was highly manipulable. As Beadle sees the situation, though we have long been able to direct "the evolution of crops and livestock, breeding them to suit our purposes . . . within recent years, we have accumulated enough knowledge so that we can now do the same thing with humans" (1966, 220).[13] In other words, "Man, alone among species, now possesses the ability to control his *own* evolution" (2). For his part, Nirenberg is confident that further scientific and technical discoveries will invest man with "the power to shape his own biologic destiny" (1967). Jacob, in turn, announces that "with the accumulation of knowledge, man has become the first product of evolution capable of controlling evolution," his own included (1970 [1993], 322); notably, he supports what is called today the genetic bioenhancement of complex phenotypic traits, such as originality, once we know "the genetic factors involved" (322).

Though he is optimistic that these endeavors will be feasible technologically, when it comes to actually proceeding, Jacob offers the caveat that "agreement has to be reached about the criteria for the choice. But that is no longer the concern of biology alone" (322–23). Per Beadle, that "a man is a brilliant research scientist . . . does not necessarily make him more competent than any other intelligent man to resolve problems outside his area of expertise" (1966, 237). According to Nirenberg, the rightful locus of decisions about the application of scientific knowledge is not science itself but a thoughtful society (1967).

Sinsheimer, in contrast, is simply euphoric about the "remarkable discoveries" already made and the manifold certain to follow (1967, 21). His elaboration of this point calls transhumanists to mind: His generation of scientists is "the first to read the book of life. And of this creature, of man, we are the first generation to have this knowledge. The ultimate significance of this understanding of the very basis of heredity . . . will change all the eons to come. The role of man on earth is changing. . . . Man is now acquiring the knowledge and the power to create his own environment and, literally, to direct his own future. Ours is the age of transition" (22).

3. Persistence, Problems, Pitfalls

As the foregoing makes clear, scientists expressed confidence in our genetic manipulability before the mid-1970s, when "the infusion of new techniques of recombinant DNA . . . opened up a range of investigative opportunities" (Keller 2002, 174). Such developments fed into what would become transhumanists' radical bioenhancement fantasy, premised on the truth of the informational view of being and knowing that the postwar era produced. Since the textual metaphors of "copying," "reading," and "writing" were already widespread in molecular biology, the addition of "editing" in the 1970s seemed not to introduce something wholly new but merely to name an operation that was implicit in the framework all along.

The Human Genome Project, undertaken between 1990 and 2003, was "the practical outcome of the belief that what we want to know about human beings is contained in the sequence of their DNA" (Lewontin 1992). It was taken for granted that the project would document in greater depth the view that genes were "the primary agents of life . . . the fundamental units of biological analysis [that] cause the development of biological traits" (Keller 1995, 3).

As the twentieth century drew to a close, with the Human Genome Project well underway, it seemed that "the molecular vision of biology had in essence been realized; what it could see of the master plan of the living world had been seen, leaving only the details to be filled in. How else could one rationalize the strange claim by some of the world's leading molecular biologists (among others) that the human genome . . . is the 'Holy Grail' of biology?" (Woese 2004, 173).

If anything, this exuberance increased as the project drew to a close. In 2003, Eric Lander, then-director of the Whitehead-MIT Center for Genome Research, announced that "its culmination . . . signals the beginning of a new era. . . . Biology is being transformed into an information science, able to take comprehensive global views of biological systems. With knowledge of all the components of the cells, we will be able to tackle biological problems at their most fundamental level" (Whitehead Institute 2003).

An informational ontology and epistemology also remains dominant in theory and research involving the brain. Richard Dawkins, for instance, proclaims: "Brains are evolved data processing devices, and we shall misunderstand their works if we forget this fundamental fact" (1996, x–xi). Markus Meister and Michael Berry credit McCulloch and Pitts with ascertaining that "the essential substance transmitted by neurons is . . . information. In analyzing a neural system, it is essential to measure and track the flow of this substance, just as in studies of the vascular system one might want to measure blood flow.[14] Fortunately, there exists a well established formalism by which to measure information and analyze its processing," namely, Shannon's theory (1999, 447). Per Edmund Rolls, each neuron is a "computational element," and we are well launched "towards an understanding of how [the human brain] works computationally" (2012, 10, 17).

I agree with Nikolas Rose that "life itself . . . resists its reframing in terms of information" (2007, 48), but his statement that "life as information" has not supplanted " 'life as organic unity' as the new biological epistemology" (45) fails to distinguish between what scientists (and others) should take fully to heart and what they have actually done. Parenthetical hedging is merely "cosmetic" (Oyama 2000a, 56). Because "dichotomies are unpopular these days . . . it is important to realize that . . . fuzzing of distinctions does not alter the conceptual framework. It allows people to dodge charges of simplistic determinism without having to change their ways of thinking" (22). Regarding the notion—which endures in biology and neuroscience—that "what is" and can be known is information, "What we need . . . is the stake-in-the-heart move. . . . Compromises don't help because they don't alter this basic assumption" (2000b, 31).

My own concern is transhumanists' embrace—hook, line, and sinker—of an informational frame. Illustrating this devotion against the backdrop of our historical exploration makes the continuity strikingly clear. Per "The Transhumanist FAQ,"

> The completion of the Human Genome Project . . . was a scientific milestone by anyone's standards. Research is now shifting to decoding the functions and interactions of all these different genes and to developing applications based on this information. . . . Messenger RNA is . . . determined by our DNA, which can be viewed . . . as an instruction tape for protein synthesis. . . . The study of the functional roles of our genes . . . is proceeding rapidly. Techniques for using this genetic information to modify adult organisms or the germ-line are being developed. (Bostrom 2003b, 7, 10, 48)

Regarding the supremacy of information more generally, Bostrom exults that "the World Wide Web is beginning to link the world's people, adding a new global layer to human society where information is supreme" (48).

Like scientists in the 1940s and '50s, transhumanists avow that the transmission and processing of information are what computers, genes, and brains do and that this activity is, in essence, the same irrespective of material medium (Sandberg and Bostrom 2006, 215). As a result, computers will be able to do "the whole brain's job" (Moravec 1988, 59). Transhumanists' conviction that whatever matters in human brains could be "transferred" or "translated" into computer software reflects not merely an outsized faith in computers but a framing of the mind/brain itself in terms of information theory.[15] Beyond the historical backdrop on which I concentrate, transhumanists' informational focus relates to cognitive science, which is also rooted in information theory (Gardner 1987, 21–22).

That the dividing line between living things and computers is viewed as "becoming ever more porous" prompts adjustments to "our criteria for explanation, in ways that progressively blur the boundary between the sciences of organisms and computers" (Keller 2002, 202–203). We witnessed the roots of this perspective in McCulloch and Pitts's informational concept of the neuron, whereby brains "compute thought the way electronic computers calculate numbers" (McCulloch 2004, 352). Its foundation also includes von Neumann's automata and Wiener's cybernetics, according to which "the fact that we cannot telegraph the pattern of a man from one place to another" represents a "technical" challenge, not "any impossibility of the idea" (Wiener 1950, 111).

The above orientation is evident, today, in projects such as "whole brain emulation" (WBE), one purported route to computers' supplanting of the human brain. WBE would involve "taking an individual human's brain, scanning its entire neural (and perhaps neurochemical) structure into a computer, and running an algorithm to emulate that brain's behaviour, using either virtual reality systems coupled to an emulated body, or to robot bodies, for sensory input and output" (Eckersley and Sandberg 2013, 172). Toward that end, scientists might, for example, "creat[e] . . . biologically realistic models, where information about the biological details of neurons . . . [is] included. . . . This approach can be seen as a quantitative understanding of the brain, aiming for a complete list of the biological parts. . . . Given this information increasingly large and complex simulations of neural systems can be created. WBE represents the logical conclusion of this kind of quantitative model: a 1-to-1 model of brain function" (Sandberg and Bostrom 2008, 9).

Echoing a decades-old position that biology is properly viewed as an information science, Ray Kurzweil channels the "widely accepted" stance that it "has become an information technology" (Griffiths 2001, 407; Kurzweil 2006). His framing of biology includes the theoretical and manipulative facets that typified its advocacy as an information science between 1966 and 1970: "We have the knowledge to reprogram our biochemistry. . . . In ten or fifteen years we foresee a fundamentally transformed landscape. . . . We're really now entering an era where we can reprogram biology. . . . We're understanding . . . how [genes] express themselves in proteins, and how these proteins then play roles in sequences of biochemical steps that lead to . . . orderly processes . . . and we are gaining the means to reprogram those processes" (2006). Kurzweil prophecies that "the golden era will be in about twenty years," for by that point, "we'll have reverse-engineered biology" (2006).

Our final example here comes from "Letter from Utopia," where Bostrom employs the literary device of a fictional letter from a posthuman to unenhanced humanity. Since humans "are not built for lasting bliss . . . you must seize control of the biochemical processes in your body. . . . In time, you will discover ways to move your mind to more durable media. . . . Any death prior to the heat death of the universe is premature if your life is good" (2019, 2–3). Bostrom is confident that every problem encountered during "paradise-engineering . . . has a solution. My existence breaks no law of nature. The materials are all there. Your people must become master builders" (7–8).

Such conviction presumes that science has verified the context-independent rightness of an informational ontology and epistemology—versus its being the product of a certain historical and cultural setting, whose fingerprints are all over it. As previously observed, in crucial respects, what transhumanists see as context-independent truths that will be fully fleshed out with continued research by biologists, neuroscientists, and computer scientists are holdovers from World War II and its aftermath: before that time, the informational vantage point whose truth came to seem self-evident did not exist.

Not coincidentally, in transhumanist writing, we witness a reification of metaphors long ago made into theoretical linchpins. Again, the worry is not that metaphor is used but the form that usage takes. To galvanize financial and public support, transhumanists must convey that the theoretical and experimental backing for their vision is unvarnished, even as they use metaphors to help fill gaps in their extravagant claims for information and its manipulability that science itself increasingly undercuts. This untenable situation is all the more troubling given transhumanists' aim to disrupt, at its roots, the human itself.

Metaphors, including those used above by Bostrom and Kurzweil, can be harnessed to the claim that we should avidly pursue posthuman intelligence only if their figurative nature has been set aside. To illustrate: Transhumanists envision that "a specific, intact mind [could] be 'transferred' (moved) from one embodiment to another. . . . Metaphorically treating the mind as a locatable, movable substance is attractive . . . because it seems to solve . . . the identity preservation problem. . . . In fact, the very hope for immortality actually requires these spatial and motion properties of minds not to be metaphors at all, but to be literally true" (Hopkins 2012, 232–33). Literalizing such metaphors, however, weds one to the commitments that they embody when stripped of their imagistic nature.

Transhumanists' allegiance to an informational vision is pivotal: without it, they would have to jettison their contention that human biology was fundamentally manipulable and, thereby, their promise of humanity's self-transcendence. At that point, of course, they would cease to be transhumanists.

Whether "transhumanism" picks out a legitimate subject matter—the desirability of which as a human pursuit could then be discussed—is decided, not by advocates' stridency or fiat, but by the tenability of their perspective on being and knowing. Here, things do not look good. In theorizing about the brain, the mathematical concept of information is being pushed far beyond the limits of what it can reasonably do (Maley and Piccinini 2015, 81). This concept also yields a mechanistic lens on the operation of living things, whereby they and computers are assimilated on "behavioral" grounds. Historically, the launch of this notion is tied importantly to Wiener, who saw homeostasis as "[an] important physiological application of the principle of feedback" (1961, 114). Wiener, however, misrepresented metabolism and homeostasis in living things, where "behavioral dispositions are themselves grain-dependent. . . . The assumption of behavioral equivalence is supposed to make the switch between a biological and a non-biological controller appear insignificant. But this difference is significant, with respect to both internal activity and the behavior that results" (11, 114–15; Godfrey-Smith 2016, 504–505).

The failure of attempts to map information theory onto molecular biology is no accident (Sarkar 2004, 263–64; Kay 2000, 21–26, 34–36). As Evelyn Fox Keller observes, "A funny thing happened on the way to the holy grail" (1995, 22): findings from the Human Genome Project became "less and less describable within the discourse that fostered it"—to the point that discoveries involving, for instance, epigenetics have "radically subvert[ed] the doctrine of the gene as [the] sole (or even primary) agent" of development (22).

Nonetheless, we retain "the information discourse: the system of representation—*information*, *messages*, *texts*, *codes*, *cybernetic systems*, *programs*, *instructions*, *alphabets*, *words*—that first emerged" in the 1940s and '50s (Kay 2000, 26). By and large, information theorists themselves recognized the "rhetorical" dimension of this discourse when applied to biology,[16] while for molecular biologists, the informational vantage point "became constitutive of . . . reasoning and modes of signification . . . by supplying productive models, analogies, and interpretive frameworks" (26). As a result, "It now seem[s] inconceivable that genes did not always transfer information, or that the relation between DNA and protein could be something other than a code" (2).

Yet heredity does not lend itself to "conceptualization . . . as an information system" (100). The concept of Shannon information is "austere and mathematical" (Rathkopf 2020, 97). As such, it does not fit the genome, whose "information content cannot be assessed since the key parameters (e.g., signal, noise, message channel) cannot be properly quantified" (Kay 2000, 2). If DNA "were purely a formal language, then it would possess syntax only but no semantics" (2). With the genome, however, "The materiality of the channel, context, and semantics do matter" (100). What's more, because meaning here depends on setting, broadly construed, "Even if it were possible to determine mathematically (in bits) the information content of a genomic message or a 'sentence' in the Book of Life, this would not yield any semantics, not unless its context (genomic, cellular, organismic, environmental) could be properly specified" (21).

The "metaphysical reductionism" critiqued by Helen Longino (1990, 226–29) cordons off biological causation from mere "environmental" impacts. According to Susan Oyama, the closely related nature-nurture distinction is even more insidious (2000a, 75–76; 2000b, 10; 2002). On the one side, scientists increasingly note that this partitioning of impacts is inappropriate; on the other, continued reliance on the concepts of code, program, and the like, for biology/nature but not also environment/nurture, suggests the contrary (Oyama 2000a; 2000b).

Thus, "A person's 'genetic propensity' or 'biological potential' is treated as that phenotype toward which he or she tends as long as extraneous influences do not intervene" (2000a, 82). An example is the persistent notion that aggressiveness, and thereby criminality, "can be in the nucleus, regardless of the behavior of the *organism*. Ultimate biological reality is somehow represented in the DNA" (91). The idea that genes cause complex phenotypic traits is often expressed by the historically rooted notion that they "code for" those features, which notion is highly misleading (in addition to Chapter 3, Section 3, see Judson 1996, 607–608; Oyama 2000b, 51, 138; Singh and Rose 2009, 203; de Melo-Martín 2017, 146–51). This view is evident among those who argued, decades ago, that biology should be viewed as an information science (Jacob 1970 [1993], 322).

Interaction between genes and environment, where recognized, has traditionally been viewed in "static" terms (Griffiths and Stotz 2018, 231). On display here is the misconception that one can clearly and fundamentally differentiate between what originates with DNA, one's featured cause, and other impacts. This standard position, which "developmental systems theorists" reject, includes the notion that "even what is biologically natural requires the proper conditions and materials, like food and air, in order to flourish" and that " 'nature' can sometimes be moderated, channeled, altered, even overridden, by 'nurture.' Such formulations are attractive because by embracing them, people can reject 'extreme' views without ever having to doubt that there is a preexisting genetic nature to be overridden" (Oyama 2002, 164).

According to developmental systems theory (DST), development "proceeds at several levels—for example, gene expression, the formation of tissues, and the state of the environment—and the interactions between levels are the prime focus of research, rather than one level being focal and the others being background against which the former unfolds" (Griffiths and Stotz, 2018, 231). In DST, "The process . . . defines the system" (229).

Per Oyama's "constructivist interactionism," salient "interactants" beyond the genome comprise a wealth of environmental factors, biological and nonbiological, among them (1) "cell structure, including organelles, some of which have their own distinctive DNA"; (2) "intracellular chemicals"; (3) the "extracellular environment"; (4) "parental reproductive systems, both physiological and behavioral"; (5) "self-stimulation by the organism"; (6) the "immediate physical environment"; (7) dealings with conspecifics and members of nonhuman species; and (8) "climate, food sources, [and] other aspects of the external environment that may influence the organism" (2000b, xvii; 2000a, 73–74). Within Oyama's theory,

> No interactant . . . is privileged *a priori* as the bearer of fundamental form or as the origin of ultimate causal control. . . . The organism-environment relations in a developmental system . . . are indissoluble in the following senses: that no organism can exist or even be characterized independently from a richly elaborated world on many scales of magnitude, that causal responsibility for the

> whole or for a trait cannot be partitioned among the parts of the system, and that everything that organism does and is rises out of this interactive complex, even as it affects that very complex. (2002, 164, 168–69)

Oyama's constructive interactionism is plausible, but her "deflation of information talk" stands irrespective of whether we embrace her version of DST (Griffiths 2001, 396).

On the merits, we should "relinquish the Central Dogma's one-way flow of causality [and] information . . . as our guiding metaphor for development," along with "the programming metaphors we have taken from computer technology" (Oyama 2000a, 75). Contra early molecular biologists and their contemporary successors (e.g., Maynard Smith 2000), to the extent that informational talk is appropriate, it is not a way to distinguish DNA from other developmental factors, for "one cannot consistently withhold informational status from the aspects of the environment that make the genetic information informational" (Oyama 2000b, 198; see also Godfrey-Smith 1999, 311–12; 2000b, 27–28). We must truly accept that "there are no 'informationally' or causally privileged elements to drive the entire process. . . . Disclaimers of complete genetic efficacy are becoming more common, but they tend to leave the basic message of powerful and clever macromolecules largely untouched" (Oyama 2000a, 205, 210).

In one way, Oyama's critique "simply mak[es] explicit what is everywhere implicit, and what increasing numbers of workers are saying more or less directly" (200). But "in another, more realistic, sense . . . it looks like an uphill fight all the way. . . . There is a difference between knowing in a parenthetical, 'of course it's important' way about the intimacy and reciprocality of organism-environment exchanges in development and evolution, say, and incorporating the knowledge into models and explanations, research and theory" (200–201). As Oyama sagely observes, "Perhaps it is in the nature of ghosts that they should tend to linger, but this particular one, the plan or coded instructions for living things, is an especially fascinating and tenacious one. . . . The belief in genetic form and fate seems to be rooted in our desire to derive from science the answers to very old questions about what we are meant to be and what we can be, questions that cannot ultimately be resolved by the methods of biology" (2000b, 8).

The informational "system of representation" considered in this chapter was "historically specific and culturally contingent" (Kay 2000, 26, 2); the genetic "code" itself was "a 'period piece,' a manifestation of the emergence of the information age" (2).[17] As for our informational lens on the mind/brain, Harari offers a useful comparison with the nineteenth century, when scientists' favored metaphor was the steam engine: Since "that was the leading technology of the day, which powered trains, ships and factories . . . when humans tried to explain life, they assumed it must work according to analogous principles" (2017, 118). Now, "We explain the human psyche as if it were a computer processing data rather than a steam engine regulating pressure. But this . . . analogy may turn out to be just as naïve" (118–19).

Tradition and fervent hopes notwithstanding, information

> is not some mysterious stuff, capable of being transmitted from one place to another, translated, accumulated, and stored; rather, it grows out of kinds of relations. . . . If we acknowledge that our interests, perspectives, cares, and worries are part of the complex in which information is generated, then the knowing subject can't disappear as easily as it does in conventional science. . . . "Information" . . . is not independent of us, and because this is so, we cannot disclaim a kind of ownership. . . . Our presence in our own knowledge . . . is not *contamination* . . . but the very *condition* for the generation of that knowledge. (Oyama 2000a, 147–50)

It is properly devastating to transhumanists' agenda, as they frame it, that the difficulties facing the informational lens on being and knowing cannot be resolved by tweaking the position. Nor would transhumanism be saved by its replacement with a different picture, for what needs rejecting is not only an informational ontology and epistemology but the longstanding view of science, as an endeavor, that it reflects.

"The cornerstone of the scientific method is the postulate that nature is objective. . . . Science as we understand it today . . . required the unbending stricture implicit in the postulate of objectivity—ironclad, pure, forever undemonstrable. . . . The postulate of objectivity is consubstantial with science" (Monod 1972, 21). Philosophers of science increasingly reject the axiom that science is "objective," where the term is used to validate "the truth and referential character of scientific theories" (Longino 1990, 62). Even as objectivity remains "a norm in the practice of science," the history of science "demonstrates how cultural forces and institutional needs can shape the choice of research topics, the nature of scientific theories, and the representation of research results" (Nelkin and Lindee 2004, 164).

According to proponents of scientific realism, "There is a truth of matters, and the methods described by . . . realists are adequate to the discovery of that truth. This assumes the capacity of the methods of empirical science, construed as guarantors of context independence, to fully reveal the actual character of things" (Longino 1990, 179). For scientific realists, "The entities, states and processes described by correct theories really do exist. Protons, photons, fields of force, and black holes are as real as toenails, turbines, eddies in a stream, and volcanoes. . . . Theories about the structure of molecules that carry genetic codes are either true or false, and a genuinely correct theory would be a true one" (Hacking 1983, 21).

Antirealists view scientific theories as "fictions, logical constructions, or parts of an intellectual instrument for reasoning about the world" (27). For realists, in contrast, the claims that comprise scientific theories "are to be read literally, and so read are definitively true or false. . . . Science aims at a literally true account of the physical world, and its success is to be reckoned by its progress toward achieving this aim" (Leplin 1984, 2). Talk of "literally true" has two facets: "The language is to be literally construed; and, so construed, the account is true" (van Fraassen 1984, 250–51).

The history presented in this chapter displays scientists' commitment to metaphysical realism, specifically, a correspondence theory in which the following claims figure importantly:[18] (1) the core terms employed theoretically (e.g., "information") hook up with elements of extramental reality; (2) theoretical claims about that reality are literally meant and, as such, "definitively true or false" (Leplin 1984, 2); (3) the goal of science is literally correct and exhaustive theories and thus, the success of each theory is gauged by its headway toward that end; and (4) as of the 1940s and '50s, scientists were on the right path, and subsequent findings represent progress toward a fully fleshed-out view of the subject matter of their theories. Steeped in this historical frame, transhumanism embodies the same commitments.

The imagery discussed in this chapter, pressed beyond measure by scientists and transhumanists, embeds and serves users' commitment to metaphysical realism. It also fosters the notion that visions put forth by science are encompassing or at least provide the necessary container in which all "legitimate" (i.e., rational) thought occurs. The ongoing power of old metaphors helps to paper over the fact that those making absolute claims are human interpreters whose conceptual frame renders their subject matter manageable as an object of study—without, however, yielding disclosure of that subject matter *as* it is.

Both theoretically and methodologically, scientists are "locked into a world of representations" (Hacking 1983, 273–74). Researchers "pursue precisely those problems" that their methods are equipped to handle (Lewontin 2000b, 73). As a result, "The methodological limitations of experiments are confused with the correct explanations of the phenomena" (99). Thus, although functional magnetic resonance imaging measures activity only indirectly and provides data that are merely correlational (Farah 2010b, 139–40; Poldrack 2011, 695), the results are soberly packaged as knowledge of our mental capacities and operations. Yet "what counts as knowledge and what we mean by knowing depend on the kinds of data we are able to acquire, on the ways in which those data are gathered, and on the forms in which they are represented" (Keller 2002, 199).

Though Keller's disciplinary focus is scientific, she articulates her critique of scientific realism in broader human terms:

> By what mandate is the world obliged to make sense to us? Is such an assumption even plausible? I would say no, and on a priori grounds. . . . The human mind does not encompass the world; rather, it is itself a part of that world, and no amount of self-reflection provides an escape from that limitation. . . . The mind—along with its capacity to make rational sense—is itself a biological phenomenon and hence a product of evolution. . . . An evolutionary process that could give rise to a mental apparatus with an *unlimited* capacity for making sense, however desirable such a capacity might seem, is difficult to imagine. And conceiving of a process that would produce minds capable of fully comprehending themselves is more difficult still. . . . The need for understanding, as for explanation, is a human need, and one that can be satisfied only within the constraints that human inquirers bring with them. (2002, 295–97)

Locating scientific realism in this wider human setting makes it clearer still that "the realist . . . is fooling himself. For he cannot (really!) stand outside the arena" where scientific theorizing occurs (Fine 1984, 99). This activity is quite unlike "matching a blueprint to a house being built, or a map route to a country road. For we are *in* the world, both physically and conceptually. That is, *we* are among the objects of science, and the concepts and procedures that we use to make judgments of subject matter and correct application are themselves part of that same scientific world" (99). For Bas van Fraassen, as well, realism is self-undermining: "Since science places human observers among the physical systems it means to describe, it also gives itself the task of describing anthropocentric distinctions. . . . The intrascientific distinction between the observable and the unobservable is an anthropocentric distinction; but it is reasonable that the distinction should be drawn in terms of *us*, when it is a question of *our* attitudes toward theories" (1984, 257–58).

The above challenges to scientific realism evince authors' recognition of the parameters of all human thought and experience. As such, they fit with and call to mind Kant's groundbreaking position on this matter in the *Critique of Pure Reason*. Extrapolation from his account will complete our assessment of the epistemological and ontological commitments propelling transhumanists' insistence that our rational agency *will* spearhead humanity's self-transcendence.

4. Kant versus Transhumanism

Transhumanists' failed proofs of concept for our pronounced, biological manipulability already showed marked weaknesses in their argumentation. The present chapter has built on those findings by undercutting the informational lens on science itself. At this stage, the question becomes: Are human beings even capable of arriving at an ontology and epistemology—informational or otherwise—whose context-independent rightness they could confirm? We have good reason to conclude that the answer is "no," for not only does scientific realism "[commit] one to an unverifiable correspondence with the world" (Fine 1984, 86), but—as Kant saw long ago—how humans approach anything at all stems from the way in which our minds work, indeed, must work for us to experience and understand anything at all. Science thus turns out to be one, albeit a salient, illustration of a scenario that covers all human thought and experience.

While Kant's Platonism in the *Dissertation* of 1770 (§ 9) shows him treating ontology as "logically prior to epistemology," the *Critique of Pure Reason* reflects his "effort to reverse this order of dependence" (Kant 1894; Wolff 1963, 96). Here, "The *a priori* representation does not produce the object. . . . Rather . . . the representation determines the object in the sense that *only through it is the object knowable*. . . . The *a priori* representations determine what can and cannot be known as an object, and hence what can and cannot be considered to exist. The realms of being and knowledge are coterminous, and even more significantly, the latter defines the former" (Wolff 1963, 97–98). On Robert Paul Wolff's depiction, Kant's

> epistemological turn . . . is the recognition that the knowing subject can never be ignored, or bracketed out. Since all knowledge is the knowledge by a subject, even the most general investigation of the modes and categories of being will have to begin with an analysis of the limits and preconditions of knowing. We may abstract from the perceptual peculiarities of the individual, from the particular state of scientific advance of his age, and even from the most pervasive social and cultural biases, but we can never abstract from the subject *qua* knowing human being. If there are forms of perception and cognition which are inherent in the fact of consciousness itself, then these will constitute the limits of Being, so far as it can be discussed at all. (320–21)

Transhumanism "traces its roots to [the] rational humanism" of the Enlightenment, with Kant included expressly under this head (Bostrom 2003b, 40; 2005b, 2–4). Apart from transhumanists themselves, invocations of Kant in the debate over bioenhancement have tended to focus on his account of moral agency rather than his epistemology (Bayertz 1994, 309; Fukuyama 2002, 119, 124; President's Council on Bioethics 2003, 266).[19] While that aspect of his thought is certainly relevant, if one aims to challenge transhumanism at its roots by drawing on Kant, his argument in the *Critique of Pure Reason* (abbreviated as *CPR*) that all human attempts at apprehension and extrapolation beyond objects of our actual or possible experience necessarily fail has more direct bearing. In what follows, I explore central Kantian points and their bearing on transhumanism.

For Kant, our cognitive apparatus, comprising space and time (forms of sensible intuition) and the categories (concepts of the understanding, e.g., causality and substance), is objective only in the sense that it typifies the human species (*CPR*, B 121–22, B 141–42).[20] From a macrocosmic standpoint, humans' mode of thought and experience is subjective, as all we can say with assurance is that it makes these possible for *us* (B 353–55, B 362–63, B 512, A 580/B 608, A676–77/B704–705). The phrases "objective reality" and "objective relation" (B 194–95, B233–34, B 291), in which "objective" is defined as above, thus mean something quite different for Kant than for proponents of scientific realism, transhumanists included.

Space, time, and the categories "are not derived from nature (*nicht von der Natur abgeleitet werden*) and do not follow it as their pattern" (B163). We "can extract [them] from experience only because we have put them into experience (*in die Erfahrung gelegt hatten*)" (B 241). Because "[the] receptivity of our cognitive capacity . . . remains worlds apart from the cognition of the object in itself," the being of objects "in themselves would still never be known through the most enlightened cognition of their appearance, which alone is given to us" (B 61, 60). Or, as Ralph Walker puts the point, for Kant, "The object alone does not make the representation possible; nor does the representation make the object possible, since their nature is entirely independent of our ways of thinking and experiencing the world" (2006, 243).

Appearances "are only representations of things that exist without cognition of what they might be in themselves. As mere representations . . . they stand under no law of connection at all except that which the connecting faculty prescribes (*Als bloße Vorstellungen . . . stehen sie unter gar keinem Gesetze der Verknüpfung, als demjenigen, welches das verknüpfende Vermögen vorschreibt*)" (*CPR*, B 164). For example, Kant's Second Analogy of Experience in the *Critique of Pure Reason* involves causality, a central category. When I "connect two perceptions in time," that connection is "the product of a synthetic faculty of the imagination, which determines inner sense with regard to temporal relations. . . . I am therefore only conscious that my imagination places one state before and the other after, not that the one state precedes the other in the object; or, in other words, through the mere perception the **objective relation** of the appearances that are succeeding one another remains undetermined" (B 233–34).

Here, the relevant concept belonging to our cognitive apparatus is "the **relation of cause and effect**" (B 234). To illustrate how we cognize events, or "happenings" (*Erscheinungen*), Kant distinguishes our perception of a boat in motion from that of a stationary house (B 235–38). In the case of stationary objects, there is "no determinate order" in which my perceptions must occur (B 238). But if we are to cognize events, as when "a ship [is] driven downstream," the sequence of perceptions is all important (B 237). Kant's main point in this analogy is that "our experience must be conceptualized in accordance with the category of causality if our experience is to be of objects ordered in time" (B 245; Brittan 1978, 171). The Axioms of Intuition make the same point for our conscious recognition of "extensive magnitudes," both temporal and spatial (B 202–207).

Kant divides everything into *phaenomena* and *noumena*, the latter designating what our understanding cannot reach (B 294–315). This distinction is crucial, for when humans apprehend anything at all via space, time, and the categories, "We have only to do with our representations; how things in themselves (*Dinge an sich selbst*) may be (without regard to representations through which they affect us) is entirely beyond our cognitive sphere (*gänzlich außer unserer Erkenntnissphäre*)" (B 235). Here, as elsewhere in the *Critique of Pure Reason* (B 344–45), Kant pointedly rejects correspondence theories of truth (O'Neill 1992, 283).

Attempts to deploy the forms of sensible intuition and categories beyond the parameters of our experience "have no objective validity at all (*gar keine objektive Gültigkeit*)," constituting instead "a mere play (*ein bloßes Spiel*)" (*CPR*, B 298). What "truly" obtains independently of humans' perspective and what the experience of another type of rational being might be are unanswerable questions for us. As A. W. Moore remarks, per Kant, "The emptiness of thoughts without intuitions, the thoughts that outstrip our knowledge, is . . . a very radical emptiness indeed" (2010, 324).

Kant delineates "categories/concepts of the understanding," applied to objects of our experience, from "ideas/pure concepts of reason," which "are still more remote from objective reality than categories; for no appearance can be found in which they may be represented *in concreto*" (*CPR*, A 567/B 595, B 383). Pure concepts of reason fall under three heads: the "unconditioned" nature of "the thinking subject"; worldly essences, or "cosmology"; and the existence and features of a transcendent being, or God (B 391, A 632–33/B 660–61). In all cases, reason presumes that notions whose enactment we could not encounter, such as "uncaused cause," correspond to mind-independent realities.

This presumption is erroneous, for ideas/pure concepts of reason lie outside the scope of thoughts that our cognitive apparatus permits us to entertain. Categories, such as causality and substance, severed from our actual or possible experience, become unmoored (B 282–84, A 675–79/B 703–707). "The pure categories, without formal conditions of sensibility, have merely transcendental significance, but are not of any transcendental use. . . . This is impossible in itself, for they are lacking all conditions of any use (in judgments), namely the formal conditions of the subsumption of any sort of supposed object under these concepts" (B 305). Anyone who fails to see that significance does not equate to usability "is thereby misled into taking the entirely **undetermined** concept of a being of understanding, as a something (*als einem Etwas*) . . . outside of our sensibility, for a **determinate** concept of a being that we could cognize through the understanding in some way" (B 307). Thus, our minds can give no content whatsoever to pure concepts of reason, let alone confirm the truth of any particular construction (B 383, A 515/B 543, A 675–79/B 703–707; see also Kant 1976, 361).

For a *noumenon* (e.g., an idea of God) to correspond to something real, "I must . . . have ground to **assume** another kind of intuition . . . under which such an object could be given; for otherwise my thought is empty, even though free of contradiction (*denn sonst ist mein Gedanke doch leer, obzwar ohne Widerspruch*)" (A 252). The concept of a *noumenon*

> signifies precisely the problematic concept of an object for an entirely different intuition and an entirely different understanding than our own. . . . Since we cannot apply any of our concepts of the understanding to it, this representation . . . remains empty for us, and serves for nothing but to . . . leave open a space that we can fill up neither through possible experience nor through the pure understanding. . . . The mistake . . . lies in this: that the use of the understanding, contrary to its vocation, is made transcendental. (B 343–45)

According to Kant, reason "wants to put an end to its restless search for explanations by arriving at something that . . . requires no further explanation itself, so that no further questions remain to be asked" (Rohlf 2010, 198). This notion of explanatory completeness—involving the self, the world, and/or the divine—is a tantalizing fiction. Though, if they exist, these objects are unknowable by us, once the attempt to grasp them is underway, reason "inevitably produces the illusion that we can and do have such knowledge" (Rohlf 2010, 194). By impelling us "to make judgments about transcendent objects" (193), reason itself pushes us to irrational convictions.

Kant adumbrates the human situation that Albert Camus poignantly depicts in *The Myth of Sisyphus* (1942). We cannot stop asking questions about the self, the cosmos, and the divine that we cannot answer given the bounds of what is rationally accessible to us: "All the inferences that would carry us out beyond the field of possible experience are deceptive and groundless, but . . . human reason has a natural propensity to overstep all these boundaries" (*CPR*, A 642/B 670).

To help us absorb the boundaries he has in mind, Kant distinguishes between *noumena* in "negative" and "positive" senses. A *noumenon*, negatively viewed, alerts us to something that our sensible intuition cannot access (B 307); this signal succeeds if we absorb what the phrase "things in themselves" marks off (Guyer 2014, 450–51n2). In contrast, a *noumenon*, positively construed, is an object wrongly deemed accessible to "non-sensible," or "intellectual," intuition

(*CPR*, B 307). Kant presses home the point that our legitimate notion of a *noumenon* "is entirely negative, simply the idea of something that is *not* known as it is in itself. . . . To think that we are entitled to use the concept of a *noumenon* in a positive rather than merely negative sense . . . is the general form of all metaphysical illusion" (Guyer 2014, 148–49).

With *noumena* "in a positive sense" Kant associates only "*logical* possibility, freedom from contradiction, not *real* possibility" (Adams 1997, 813). While our cognitive apparatus disallows our proving that the existence of such *noumena* is quite impossible (*CPR*, B 310–11), this fact cannot be used to support any particular theory. Per Kant in the *Critique of Pure Reason*, all it means is that "if one is beyond the circle of experience, then one is sure not to be contradicted through experience," for one has "no resistance, no support . . . to which he [can] apply his powers in order to get his understanding off the ground" (B 8–9).

Noumena in a positive sense include knowledge claims about ultimates in nature. In the "antinomies," Kant contests the viability of such assertions by juxtaposing "dogmatic metaphysical claims about the nature of reality against each other" (Al-Azm 1972, 140). To illustrate: "Every composite substance in the world consists of simple parts, and nothing exists anywhere except the simple or what is composed of simples" (Thesis); "No composite thing in the world consists of simple parts, and nowhere in it does there exist anything simple" (Antithesis; *CPR*, A 434–35/B 462–63). In all such cases, the Thesis or Antithesis could be true (their both being so is logically impossible), but both may be false (A 508–32/B 536–60). Kant's point here is that "any pure rational doctrine of the world's constitution is led inevitably, through a system of cosmological ideas or pure concepts of reason, into contradictions" (Wood 2010, 245).

In terms of our knowledge and flourishing, what matters is that the existence of *noumena* in a positive sense—whatever their content—"can never be proved merely through the non-contradictoriness of a concept of it. . . . In the end . . . we have no insight into the possibility of such *noumena*, and the domain outside of the sphere of appearances is empty (for us), i.e., we have . . . not even the concept of a possible intuition, through which objects outside of the field of sensibility could be given, and about which the understanding could be employed **assertorically**" (Kant, *CPR*, B 308, 310).

Given humans' tendency to overreach where *noumena* are concerned, the concept "in a negative sense" is useful as a reminder that "the knowledge we are in principle capable of having is *itself* of an altogether different kind from knowledge of things in themselves" and that "the way we cognize things is dependent on our form of intuition" (Moore 2010, 322; Emundts 2010, 189). In sum, "The concept of a *noumenon* is . . . merely a **boundary concept**," helping us cordon off what is rationally accessible from what is not (Kant, *CPR*, B 310–11).

From a Kantian standpoint, transhumanists' banking on the context-independent rightness of particular answers to questions about transcendence involves self-deception via fallacy (B 351–55, B 397, A 644–45/B 672–73). But self-deception is not inevitable: though we are drawn, psychologically, to speculate about transcendent existence and tempted by the illusion that our musings fit a mind-independent reality, we can discipline ourselves to avoid committing "the judgmental *errors* made on the basis of such illusions" (Grier 2001, 128).

In Kant's framework, posthumans fall under the head of *noumena* "in a positive sense." These *noumena* do not yet exist: per transhumanists, we are to be their point of genesis. Since Kant addresses our actual or possible experience—where "possible" means "viable given the conditions under which anything at all is intelligible to us"—his account can be used as a lens through which to assess the course that transhumanists urge upon us.

Transhumanists insist that our creation of posthumanity is a viable endeavor of extrapolation and extension given what is already well understood. Since, however, posthumans would not simply be a more refined version of human beings, human mentality as we know it could not be posthumans' source. What matters here is the *way* in which posthumans would lack human limits (or, in Kantian parlance, boundaries). Transhumanists embrace a correspondence view of science, on which either there is no mediation or mediators (biological and constructed) exist but do not distort the extramental reality that they grant one access to. Since Kant already rejects correspondence theory, he would shun all the more the notion of leveraging that perspective to create beings on a higher ontological plane. Further, transhumanists yearn for unconstricted rationality. In so doing, they state or imply that, in principle, extramental reality could be fully transparent, which would make Kant's "boundary concept" of the *noumenon* otiose.

As transhumanists would have us parlay an informational grip on reality and knowing into humanity's self-transcendence, their accounts feature insupportable claims in cosmology and theology, two of Kant's three areas where reason's operation becomes unmoored: transhumanists' informational view of the world falls under cosmology, while posthumanity is their counterpart to Kant's transcendent being, or God. According to most transhumanists, the "divine"—broadly construed as the locus of features deemed best unconditionally (see, e.g., Plato, *Phaedo* 80b; Aristotle, *Metaphysics* XII 7)—has yet to exist. *We* would be the source of a transcendent being, characterized by "omnipotence, omniscience and immortality" (Graham 2002, 69).

Transhumanists' dismissal of those who do not see and believe in science precisely as they do as simply irrational, "laden with emotion" (Silver 2000, 69), has roots in Shannon's tethering of rationality to his technical construction of information, by comparison with which the nontechnical, or "semantic," lens of nonexperts is irrational (Shannon 1952, 38). Yet how irrational is it that transhumanists, having made the very errors involving reason that the *Critique of Pure Reason* cautions against, place the entire burden of proof on their opponents, to show definitively that what transhumanists propose could not be done (Bostrom and Ord 2006, 671; Chan and Harris 2012, 76–77). If critics fail in the attempt—which, per Kant, is inevitable—then not proceeding with transhumanists' vision would be irrational and irresponsible, even immoral. As Nordmann observes, "Such reversals of the burden of proof are familiar from other contexts such as Creationism or Intelligent Design. . . . In other words: If we can't be sure that something is impossible, this is sufficient reason to take its possibility seriously" (2007, 39).

Transhumanists present themselves as extreme rational essentialists. Since, however, we lack rational access to context-independent truths, pursuit of transhumanists' vision would reflect an embrace of their faith that going full steam ahead in light of an informational ontology and epistemology *will* produce the divine, namely, posthumanity. Although transhumanist faith differs from the Christian variety in source, target, and justification (see, e.g., *Summa Theologiae,* I 12.1c, 12.4sc, 12.5c [Aquinas 2006]), in human-psychological terms, its role is arguably similar. Hauskeller, too, speaks of transhumanists' faith, "in the power of science and technology to heal, to make good what nature has messed up, and to finally take us where we have always meant to be. It is basically the faith that it will all be fine in the end if we just do the right thing now" (2013, 188). Agar, in turn, observes that one can believe in transhumanists' proclamations only as a matter of "faith" in the "miraculous" (2010, 69). That their accounts build in strong nonrational commitments, illustrated here, reflects the unavoidable, mutual implication of reason and affect in human thought and activity (Parens 2015, 22–23, 26–27, 75; Midgley 2000, 8).

Transhumanists misleadingly insist that we face "alternative futures . . . between which we can then select, just like we choose between items on a supermarket shelf" (Grunwald 2006, 78).[21] Thus, Bostrom's "posthuman": "I urge on you . . . a reconfigured physical situation through technology. . . . *What is Guilt in Utopia?* Guilt is our knowledge that we could have created Utopia sooner. . . . My contemporaries and I bear witness, and we . . . request your aid. . . . Whether this surpassing possibility becomes a reality" hinges on human agency (2019, 3, 6–7). But "the future is only and ever graspable linguistically. Neither experientially nor scientifically do we possess an extra-linguistic grip on future presents (*zukünftige Gegenwarten*)" (Grunwald 2006, 56). Bostrom concedes that "we need realistic pictures of what the future might bring in order to make sound decisions" (2009, 42). Since we do not and cannot have these, it is irrational and morally irresponsible of transhumanists to proclaim that posthumanity will emerge *if only* we allocate resources in the "right" direction now. Rooted in faith, not rationality, this proclamation has, inescapably, the status of prophecy (Grunwald 2006, 58–59).[22]

Kant's own view in the *Critique of Pure Reason* meshes with the above, for his point is not that we must avoid relating ourselves to the transcendent altogether but rather that, in so doing, humans can employ only nonrational faculties. He famously expresses this view in the preface to the second edition: To grasp a transcendent being, "Speculative reason would have to help itself to principles that in fact reach only to objects of possible experience. . . . Thus I had to deny **knowledge** in order to make room for **faith**" (B xxx).

In terms of our setting course for posthumanity, it matters greatly that our understanding "cannot even form for itself the least concept of" a categorically elevated understanding (B 139, 145). At times, transhumanists apparently concur, not realizing how crucial a concession this is. For example, since humans cannot anticipate "how essentially strange and different the Posthuman era will be," Vernor Vinge has "only analogies to point to" (1993). As Silver puts the point, though posthumans may "trace their ancestry back directly to *Homo sapiens*, they are as different from humans as humans are from the primitive worms with tiny brains that first crawled along the earth's surface" (2007, 292–93). Precisely because "the transformation is profound," we "lack the practical ability to form a realistic intuitive understanding of what it would be like to be posthuman" (Bostrom 2019, 3; 2003a, 494). Transhumanists simply fail to "acknowledge that their current desires and plans should be assessed . . . in terms of how they contribute toward unknown and indeed unknowable projects" (Agar 2014, 74).

From a Kantian standpoint, transhumanist argumentation "fills the gaps regarding what one does not know with paralogisms of [pure] reason, making thoughts into things and hypostatizing them; from this arises an imagined science . . . in that [one] either presumes to know something about objects about which no human being has any concept, or else makes his own representations into objects, and thus goes round and round in an eternal circle of ambiguities and contradictions" (*CPR*, A 395). These "paralogisms of pure reason," or fallacies anchored in reason itself, "bring . . . illusion," which arises when we take "a **subjective** condition of thinking for the cognition of an **object**" (A 341/B 399, A 396). Faced with transhumanists' assurance that the realization of our potential to become posthuman simply awaits further scientific-technological headway that *will* occur, Kant would observe that "the deception of substituting the logical possibility of the **concept** (since it does not contradict itself) for the transcendental possibility of **things** (where an object corresponds to the concept) can deceive and satisfy only the inexperienced (*kann nur Unversuchte hintergehen und zufrieden stellen*)" (B 302).

In Kantian terms, transhumanists conflate "merely logical" possibility and the "real" variety (B xxvi). In so doing, they vastly overplay the significance of the former, wrongly casting it as support *for* our pursuit of their agenda. Transhumanists' confusion is fostered by their literalization, or "hypostatization," of metaphors dating to the 1940s and '50s. Whatever legitimate use this imagery could once have had as a provisional aid was swamped long ago by the fact that molecular biologists took it to support the importation, largely unargued, into their domain of theoretical commitments from quite different fields, particularly information theory, in which the imagery originated.

Transhumanists' conflation is wrapped up with their failure to absorb the contrast-dependent nature of human thought and experience (Kant, *CPR*, B 149, 364–65).[23] Since human thought is intrinsically contrast dependent, and our yearning wedded to ceaseless or recurring lack (Plato, *Symposium* 203b–204b), we cannot fathom, let alone anticipate, the existence of beings that did not operate in this way (Levin 2017a, 287). Transhumanists, however, assure us that posthuman existence will exclude contrast-dependency: suffering not a whit, posthumans will "have all manner of desires" (Pearce 2007); their pleasure pervasive, they will "love life . . . every instant" (Bostrom 2019, 4, 7). Logically speaking, we cannot exclude the possibility that posthuman existence would match such projections, but this signals merely that humans are unequipped to weigh in on the matter at all. Once again, by letting their "wish-fulfilment fantasy" run roughshod over reason, transhumanists capitulate to "transcendental illusion (*Schein*)" (Hauskeller 2016, 15; Kant, *CPR*, B 355).

5. Conclusion

In *The Myth of Sisyphus,* Camus foregrounds the "absurdity" (*l'absurdité*) of human existence:

> This world in itself is not reasonable, that is all that can be said. But what is absurd is the confrontation of this irrational and the wild longing for clarity whose call resonates in the human heart. The absurd depends as much on man as on the world. . . . Man stands face to face with the irrational. He feels within him his longing for happiness and for reason. The absurd is born of this confrontation between the human plea and the unreasonable silence of the world. This must not be forgotten. (21, 28)[24]

Our prospects for flourishing hinge on how we interpret and respond to this confrontation: indeed, "the whole consequence of a life"—or, in the present case, what happens to humanity itself—hinges on it (28). On this basic position and its implications for how we view transhumanism, Kant and Camus agree: when transhumanists press us to leverage a purportedly crystal-clear lens on reality proper, which is inaccessible to us, into humanity's own supplanting by an ontological superior, they evince their colossal blindness to the parameters of human existence.

Camus's notion of absurdity, seen against the backdrop of Kant's *Critique of Pure Reason*, underscores just how irrational is transhumanist pressure to make engineering posthumanity our guiding aspiration. An inability to outstrip our human situation is "not intrinsically a deficit" (Levin 2014b, 9). Further, we stand to wreak great harm if we neglect to appreciate what it means for us to think and experience anything at all as human beings, and the implications of this failure for the framing and pursuit of *all* our projects.

What's more, accompanying the shortcomings of transhumanism treated thus far is a neglect of what Chapter 3 called big human metalevel queries. As Plato saw, "What makes something qualify as the focus of a human metalevel query is its germaneness to our flourishing. All such questions revolve around values, expansively construed as comprising not only virtues but also motivational sources in the soul and objects of human aspiration" (Levin 2017b, 164). Section 3 critiqued scientific realism, under which head the informational lens on being and knowing falls. But this is not merely one realist picture among others. For if we buy into the frame that transhumanists embrace—or even the version that, increasingly, typifies everyday life (e.g., commerce and sociality)—we will lose our capacity for metalevel questioning and for the Socratic *aporia* that is a needful spur and attendant of that questioning. In the final chapter, I address this topic by defending the contemporary pertinence of Greek ethics.

7

Living Virtuously as a Regulative Ideal

1. Introduction

The preceding chapters, taken together, strongly support the view that transhumanists' vision is misguided, on philosophical and scientific grounds. In addition to being the heart of the book, they are the backdrop for its conclusion, in which I defend a virtue-centered approach to human flourishing.

Though it may seem that transhumanists and their critics disagree across the board, there are salient points on which they concur. First, what we commit to going forward will reflect what we value most and the basis on which we do so (Levin 2014b, 4). As transhumanist Harris observes, "The crucial question . . . concerns whether or not . . . proposed changes enable the survival of what matters and permit the flourishing and further improvement of life for everyone" (2010, 12). In addition, the challenges facing humanity are immense, and concern about our ability to navigate them successfully is warranted. Further, because we are at a fork in the road, we need to think encompassingly about what is flawed and how best to proceed.

Condemning humanity, transhumanists would have creating posthumans be our governing priority. An encompassing perspective is, indeed, called for at this time, but it is our human situation that we must concentrate on bettering, not least because there is no viable alternative. Transhumanists accuse their critics of pessimism and defeatism, but transhumanism embodies these very attitudes toward humanity itself (cf. Hauskeller 2013, 176).

If dramatic, salutary change with respect to the human occurs, it will stem from our dedicated efforts to narrow the gap between reflectively affirmed human ideals and their worldly manifestations. Beyond the fact that this is the only kind of project that we, as human beings, can sign on to, it reflects a commitment to human capacities and the intrinsic worth of human flourishing that is absent from transhumanism.

Virtue ethics is often juxtaposed against utilitarian and deontological frames as a "third way—an alternative to the deontological and consequentialist approaches that dominated modern moral philosophy until very recently" (Farrelly and Solum 2008, 1).[1] This characterization is misleading, for, strictly speaking, the three approaches to ethics are not competitors for the same

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role: though acting toward an impersonal, aggregate good or as duty requires can make stringent demands on us, neither utilitarianism nor deontology is rooted in the idea of seeing and pursuing our lives holistically (Annas 2006, 534; 2011, 6, 122–23).

In contrast, virtue ethics foregrounds "the importance of the agent's life as a whole, and, relatedly, the importance of moral education and development. . . . Since the virtues are . . . ways that I am, traits of my character . . . thinking about the virtues leads to thinking of *my life as a whole*" (2006, 519–20). Thus, "The virtues make sense only within a conception of living that takes the life I live to be an overall unity, rather than a succession of more or less unconnected states" (520; see also MacIntyre 1984, 205). Virtue ethics is holistic, too, because it builds in the ethical value of commitments to other people; incorporates and integrates levels of human concern, individual up through civic; and defuses the thought that in any situation, we must choose between pursuing our own and others' good.

Existing virtuously is a regulative ideal: one to which we must always *aspire* (Annas 2006, 525). Its status as such does not offer an excuse for failures of motivation and tenacity; it reflects, above all, our fallibility in terms of intellect and character. In his final dialogue, the *Laws*, Plato was the first in Western philosophy to deeply acknowledge that "even the best among us are fallible" and the implications of this for human flourishing (Levin 2014a, 140, 158–76). Perhaps surprisingly, this insight led him to greater optimism than before about the capacity for virtue of the populace more generally, who, in the *Republic*, had suffered gravely by comparison with philosopher-rulers (142, 195–206).

Since, within virtue ethics, the civic plane is central to our flourishing, my account includes it. Chapter 5 addressed US history via Anglo-American eugenics. Here, my backdrop is liberal commitments enshrined in America's Declaration of Independence and Constitution. In my view, virtue ethics can help us frame a way forward amidst America's current struggles with illiberalism. My point is not that we should map ancient notions wholesale onto the present. Quite apart from the impossibility of our doing that, any theory we accept must incorporate liberal constructions of justice and equality. As Julia Annas observes, "Contemporary theories . . . need support from, and relevance to, contemporary concerns" (2011, 2).[2] With the reinvigoration of liberal democracy in view, a potent way to mobilize people is to tap into what many already care substantially about but whose opportunities for cultivation and expression are constricted by our increasingly illiberal milieu. Both virtue and core American ideals fit the bill, and the latter can be accommodated under the umbrella of virtue ethics. I will sketch cornerstones of an approach that is rooted in Aristotle but adapted to America today.

2. Ancient Greek Ethics

The subject matter of Greek philosophical ethics is human flourishing, centered on virtue. The pillars of this view are three, interrelated ideas:

(1) to do ethics is not to identify proper comportment in a limited sphere but to reflectively consider what living well for human beings involves (see also Nussbaum 1990, 8, 16; Vallor 2016, 6);
(2) *eudaimonia* (flourishing) is the final end of what we do; and
(3) virtue is, at minimum, the centerpiece of our flourishing.

There was controversy in antiquity over the content of this last idea: for Socrates and the Stoics, virtue exhausts *eudaimonia*, while Aristotle maintains that flourishing requires a measure of "external" goods (*Nicomachean Ethics* [hereafter, *EN*] I 8; *Politics* [*Pol.*] VII 13). I side with Aristotle, as it is highly implausible to think that lacking such goods, above all, education, would leave one's prospects for flourishing unimpaired.

Though Heraclitus and Democritus anticipated it,[3] Socrates debuted the broad construction of ethics. He was deeply concerned that, when gauging the success of people's lives, Athenians featured "competitive" goods (Adkins 1989, 10), including wealth, repute, and power, construed as authority over others. Although, legally, adult male citizens were qualified to pronounce on matters of justice in the Athenian assembly, far from seeing justice as worthwhile in its own right, people favored expediency and voiced self-serving, ill-considered views.

For decades during the fifth century BCE, Socrates challenged the Athenian status quo, exhorting his fellows to reassess their priorities in an honest and probing way. Amidst civic disunity and demoralization after Athens's loss to Sparta in the Peloponnesian War in 404, the Thirty Tyrants seized power. Democracy was restored the following year, but Athens continued to grapple with the upheaval that the war had wrought. In this time of insecurity, some, at least, were unwilling to tolerate Socrates's critical modus operandi any longer (Brickhouse and Smith 1989, 19–22), and he was condemned to death in 399.

While awaiting execution, Socrates refused an offer to spirit him away from Athens to a safer locale (Plato, *Crito* 45b–c). Paying the price for continuing to live, relinquishing his "mission" to alert people to what mattered most, would equate to losing himself. Socrates's shunning of discrepancies between word (*logos*) and deed (*ergon*) equates to what we call "integrity." To this day, for the kind of person he was and his unwillingness, in extremity, to betray his convictions, Socrates continues to inspire others and provoke debate (Lane 2007; Trapp 2007).

Plato's *Apology* offers his interpretive dramatization of Socrates's trial. Meletus, the leading accuser, demonizes Socrates by insisting that he alone corrupts the city's youth (25a). In conducting his defense, Socrates departs from typical practice in Athenian judicial proceedings, refusing to bypass reason and pander to jurors' emotions (17a–18a). His own life on the line, Socrates continues to care deeply for the character of his fellow citizens, represented here by 501 jurors. Dismissing the notion that all human motives come down to pleasure, gain, and honor, Socrates asks whether they are ashamed to favor these things over self-reflection and virtue (Isocrates, *Antidosis* 217 [1929]; Plato, *Apology* 29d–e). If not, they should be, for "the unexamined life is not worthy of a human being" (*Apology* 38a).

Apart from his trial, Socrates did not address crowds—as did rhetoricians—but conversed with individuals. He anchored these exchanges in something his interlocutor was invested in; often, this was an area in which the person was seen or saw himself as an expert (Plato, *Euthyphro* 3b–5d; *Laches* 178a–184c). Socrates's target, however, was always how people conducted their lives across the board. Exchanges with Socrates revealed ambivalence and inconsistencies in people's views of what mattered most, for instance, the kinds of fortitude that living courageously spans (*Laches* 191c–e). When these were brought to light, interlocutors' prior working assumptions—that reputation, power over others, material goods, and appetitive gratification qualified as preeminent goods—were unsettled, and they experienced intellectual perplexity (*aporia*) about what top priorities were entailed by or compatible with living well (*Meno* 79e–80b). On the best-case scenario, Socrates elicited superior leanings on this matter that people already possessed and, with these, an openness to further inquiry.

Though Socrates had epistemological and ontological commitments, they showed up indirectly, when his formal criteria for satisfactory accounts of virtues, or answers to his "What is *F*-ness?" queries, were made evident. Thus, Euthyphro's first "definition" of piety fails because it does not answer the question of what distinctive feature all things pious share, centering instead on one allegedly pious act (*Euthyphro* 5d–6d).

Starting with Plato's *Phaedo*, *Symposium*, and *Republic*, Greek-philosophical explorations of living well were accompanied by sustained attention to ontology and epistemology. For Plato here, as for Aristotle, Epicurus, and the Stoics, because ethics concerns living well across the board, even where the immediate focus is epistemological or ontological, this theorizing matters for its bearing on the question, What is the best life? (*Republic* 352d).[4] In the aforementioned dialogues, central Platonic questions include the following:[5]

(1) What are one's current priorities? (*Phaedo* [*Phd.*] 64d–65a; *Symposium* [*Symp.*] 208e–209e; *Republic* [*Rep.*] 344a–347c)
(2) What spurs one's guiding construction of what matters? (*Phd.* 81b–82a; *Symp.* 206c–209e; *Rep.* 475d–476b, 514a–517a)

(3) What dimension, or faculty, of human beings grants us relational access to genuine sources of value from the standpoint of human flourishing? (*Phd*. 72e–77a; *Symp*. 210e–211d; *Rep*. 441e, 477d–480a)
(4) What shifts must occur in the status quo for that connection to develop? (*Phd*. 98a–100e; *Symp*. 210a–211d; *Rep*. 443c–444e, 514a–521c)
(5) How, in substantive terms, do these changes reshape people's perspective on their own and communal flourishing? (*Phd*. 79a–81a; *Symp*. 211d–212a; *Rep*. 514a–521b, 532b–540e)

Let us turn now to the second pillar of Greek ethics, that human activity has a final end. What we practice is not only value infused (Plato, *Rep*. 551a) but embedded in a nexus of aims of which we may be only partially aware. Framing our lives holistically necessitates conducting them consciously in the light of a governing telos (Annas 2006, 520–21). But whether or not this framing occurs, there is always some "highest good attainable by action" that we construe as *eudaimonia*, equated with "living well" (Aristotle, *EN* I 4).

This idea of a final end should not be especially controversial for us. First, "I cannot escape the fact that at any given point, my actions reflect and express . . . the nature of my ends and priorities" (Annas 2006, 520). Beyond this, the "nest[ing]" of our pursuits is evident "whenever we ask *why* we are doing something, for the answer will typically make reference to some broader concern, and this in turn to one even broader. Given that I have only one life to lead, I will eventually come up with some very broad conception of my life as a whole, as what makes sense of all my actions at any given point" (520). Imagine a young woman, Sally, who has just passed the bar exam and yearns to land a job at a prestigious firm. This priority so dominates her life that, as during law school, she tolerates only the most superficial ties to other people. Whenever she has an interview, Sally's immediate goal is arriving on time and well prepared. By helping her to get a job, the above serves her aim of launching her legal career with a splash. This end, in turn, is a valuable means to Sally's larger goal of becoming a promising candidate for judicial positions. But why does she seek *that*? This question, too, will have an answer, and Sally's other aims are ultimately significant in relation to it.

The point of reflective entry into our own nexus of ends can be a subsidiary aim whose achievement has not offered the fulfillment that we had expected. This opening may also come when, experiencing dissatisfaction that is not quieted by more of the same, we question whether that good is fittingly taken as our ultimate goal. Whether or not we choose to examine it, our own nesting of ends presupposes answers to big human metalevel queries. Unpacking this nexus requires identifying the questions to which the present conduct of one's life displays responses. What are the "goods" (i.e., what is taken to be good, not tangible items, specifically) that one's life evinces a strong commitment to? In their merit, are these goods commensurable or incommensurable?[6] What else of import must remain backstage given one's current priorities? As we identify the questions, we are increasingly poised to see the answers embodied in our current lives. Ultimately, if one follows the process through, she will become consciously aware of what she was counting on to make the rest worthwhile, her ultimate "that for the sake of which" (*hou heneka*).

Descriptively, the identity of one's final end—wealth, honor, power, contemplation, or Hellenistic philosophers' answer, freedom from disturbance (*ataraxia*)—depends on the person and perhaps also the conditions of her life at a given time (Aristotle, *EN* I 4–5; Annas 2006, 520). Most of what gets taken as final cannot, however, properly qualify, for if we "make all our choices for the sake of something else . . . the process will go on infinitely" (*EN* I 2, 1094a20; Annas 2006, 521). Not only does our having goods like wealth, prestige, and power often hinge on what others do or refrain from, but these goals are purely instrumental (*EN* I 5; Annas 2006, 521). But if goods like wealth, reputation, and power over others do not fit the bill as final, what does?

In Greek ethics, the answer is, "living virtuously." Though other goods (e.g., health) have noninstrumental, or intrinsic (Kraut 2007, 6n6), worth, virtue is the sole such good that qualifies as human beings' final telos; thus, "The good of man [i.e., *eudaimonia*] is an activity of the soul in conformity with virtue" (Aristotle, *EN* 1098a16–17). For Aristotle, as for Plato (*Laws* 661a–c [1907]), virtue rightfully guides our use of other goods.

Though the ethical views of Socrates and Plato feature virtue, Aristotle debuted the "theoretical structure" of virtue ethics, which became "the default form of ethical theory" (Annas 2006, 515). This changed for a century or so with the emergence of utilitarianism and deontology, but virtue ethics has returned to prominence (2011, 176). Its "revival," spurred by G. E. M. Anscombe's (1958) "programmatic call for a return to the notion of virtue in moral philosophy," has picked up steam in recent decades (Peters 2013, 1). Aristotle is the prime inspiration for contemporary virtue ethics.

I agree with Shannon Vallor that our most important questions today "invite answers that address the nature of human flourishing, character, and excellence—*precisely the subject matter of virtue ethics*" (2016, 28). Further, virtue ethics "is best approached by looking at the central features of . . . the classical version of the tradition" (Annas 2006, 515). In what follows, I attend to facets of Aristotle's approach that make it especially fruitful now (what I say supplements Chapter 2, Section 5, and is tailored to the concerns of the present chapter).

Since our attitudes and activities mold the kind of person we become, the nature of these "will be reflected in our characteristics" (*EN* 1103b22–23). Because goodness is rooted in character, people must be "brought up from childhood to feel pleasure and pain at the proper things, for this is correct education" (1104b11–13). This statement reflects Aristotle's concern not merely with right action but, more fundamentally, with our motivation; after all, even vicious people will perform virtuous acts if it suits their agenda on specific occasions.

Being a virtuous person requires knowing the quality (e.g., brave, just) of the acts one performs; performing them because they have that quality; and acting thus from a corresponding, stable character (*EN* II 4, 1105a31–33). Meeting these criteria in particular situations is far from rote and often requires nuanced contextualization, including attention to timing and proportionality.

We, like some of Aristotle's own contemporaries, may well ask: Is a concern with agents' motivation really necessary? Perhaps we should care only whether suitable acts are performed. In a one-off scenario, one may be content if the other party simply does the act, though it is questionable whether one should be sanguine even here; after all, if the other party is unscrupulous, she could follow up later with pressing, unjust demands. More importantly, since we do not construe living well in terms of discrete episodes and exchanges—for such a life would, among other things, "lack the basis for many characteristically human institutions" (MacIntyre 1984, 103)—an act-centered view is unsatisfactory.

Nor do laws, even if good, substitute for virtue. Where violations are discovered, laws do not enforce or interpret themselves. In addition, unscrupulous agents can often find workarounds, as the ancients well knew. Athens's amnesty law of 403, "designed to prevent attacks on people who had made enemies" during the reign of the Thirty Tyrants, prevented Socrates's accusers from leveling a political charge against him (Irwin 1989, 186–87). Beyond corrupting the youth, Socrates was charged with not believing in Athens's favored gods and goddesses but rather "in other, new divine things" (Plato, *Apology* 24b–c). This is a veiled reference to his *daimonion*, an inner (and thus, private) source of guidance that steered Socrates away from activities that might bring him unnecessary trouble (31c–d).

Further, laws can actively address wrongdoing only if its perpetrators are discovered. To help explain why virtue is needed, Plato offers the example of Gyges, a shepherd who refrains from wrongdoing up to the moment he discovers a ring that makes him invisible: realizing that he can now enact nefarious inner promptings without being held to account, he kills the king and marries his widow (*Rep*. 359c–360b). Laws simply cannot substitute for the stability and reliability of an inner compass directed to the good that guides us across the spectrum of our endeavors whether or not we are observed. The tale of Gyges packs even greater punch today, when online anonymity and cybercrime make it harder than ever to identify wrongdoers and hold them accountable.

Because the crux of virtue ethics is who we are as people (Annas 2006, 516–18), Aristotle's standards for being virtuous apply not to limited arenas but across all domains of our engagement. One who fails to meet the criteria established in *Nicomachean Ethics* II 4 is simply not a virtuous agent.

As both Plato and Aristotle saw, given children's impressionability, we must foster the roots of virtue from the outset. Early education (*paideia*) is the anchoring phase of our path to virtue, "when the feelings of pleasure and affection, pain and hatred . . . are channeled in the right courses" (Plato, *Laws* 653b).[7] Corresponding habits must be forged as well (Aristotle, *EN* II 1–3). Since the connotations of "habit" today are often negative, it is important to stress that virtue

> is not a habit in the sense in which habits can be mindless, sources of action in the agent that bypass her practical reasoning. A virtue is . . . my disposition to act in certain ways and not others. A virtue, unlike a mere habit . . . is built up by making choices and exercised in the making of further choices. When an honest person decides not to take something to which he is not entitled, this is . . . a *decision*, a choice that endorses his disposition to be honest. (Annas 2006, 516)

Further, while it may seem that virtue is ultimately all about the self, *pace* Thomas Hurka (2013, 15–16), virtue ethics cuts across the well-worn distinction between "egoism" and "altruism":

> Living in a flourishing way is . . . the ongoing activity of a life, and living in a brave, generous, and so on way is a specification of what that is. . . . There is no implication that [another person] is furthering her own interests at the expense of mine. It would be odd to do this by acting fairly, being generous, courageously standing up for others! Still less is it plausible to think that the agent who thinks that living virtuously is the best specification of a flourishing life will be acting for egoistic reasons. This objection simply misconstrues what a virtue is. (Annas 2006, 522; see also MacIntyre 1984, 229)

One whose lodestar is virtue is disposed to comport herself in a way that benefits herself and others at once (Aristotle, *Pol.* VII 14). Virtues (e.g., justice, courage, generosity) are psychic dispositions (*hexeis*; *EN* II 5) that we develop and routinely express in relation to our fellows.[8] Utilitarianism and deontology, in contrast, assume that "the central concern of ethics is action in isolation from agents. The resurgence of virtue ethics . . . has challenged this underlying assumption" (Annas 2006, 533).

Aristotle's claim, in the *Politics*, that "a human being is . . . a political animal" (1253a2–3)[9] means not that we should be smooth, savvy navigators of the civic realm but rather that we can flourish only in communities of a suitable type.

Fittingly, since virtue is the crux of flourishing, Aristotle also makes this point when launching his investigation of virtue in the *Nicomachean Ethics* (I 2, 7).

Family ties and friendships bind those who are acquainted, but civic life across the board should evince solidarity. First, in a well-constituted milieu, citizens are linked by *homonoia* (concord), or "civic friendship" (*EN* 1155a22–31, 1167b2–3, 1171a17–19; Cooper 1977, 645).[10] In addition, they identify sympathetically with their fellows when bad fortune befalls them, recalling a similar experience of their own or recognizing that the same thing could happen to them (Aristotle, *Rhetoric* II 8). "Pity" (*eleos*) for characters in tragedy reflects this capacity for sympathetic identification (*Poetics* 13 [1965a]).[11] For *eleos* to be appropriate, the character's suffering cannot stem from vice or culpable ignorance (cf. Konstan 2001, 132–33). Further, since people experience *eleos* "when they themselves are vulnerable to a comparable misfortune," it differs from "an instinctive reaction to suffering, irrespective of desert" (130, 129).[12] Importantly, *eleos*, which Martha Nussbaum renders as "compassion" (1992, 237), lacks the air of condescension that the term "pity" connotes today.

3. We Need Not Be *Made* to Care about Virtue

Enmity, contempt, and demonization are highly visible in America today (Elshtain 1995; Purdy 2017; Brooks 2019). Less visible, perhaps, is that a concern with virtue—not to be confused with a theory of such—already figures in our lives (Annas 2006, 522). That we not only mistrust but disesteem those who embody what the ancients called "vices" (e.g., hubris) is a tip-off that virtue matters (cf. Cooper 2005, 73). More directly, who our fellow-citizens are as people counts, in the sense that we "want to think of them as good, upstanding people, and definitely do not want them to be small-minded, self-absorbed, sleazy" (74). Closer to home, a concern with virtue is signaled when we care who our children become, as people, not merely about their success vis-à-vis competitive goods (Annas 2011, 109). As the foregoing illustrates, "We think of people all the time in terms of virtues and vices—cruelty, stinginess, patience, open-mindedness and so on—even if we seldom reflect about them *as* virtues and vices" (2015, 2).

The kinds of people we surround ourselves with makes a great difference to our lives. Though this statement certainly covers the day-to-day, its truth may come to the fore in high-stakes situations, when we count on receiving support from those who care about and wish to aid us for our own sake. If we were not already conscious of prizing this type of connection, that we do can be brought home in such situations when our expectations are *not* met.[13] The failure can be dramatic, as in wholesale abdication. But the spirit in which help is provided also matters: "As recipients, we may judge that [a pertinent action] lacks what is important for our well-being: namely, that others be engaged with us here and now, and that they view that kind of attention and engagement as itself important. . . . The point of helping in many of these cases is to reassure another that we care: to show patience, availability, considerateness, empathy" (Sherman 1999, 41). In the aftermath of dashed expectations, we may resolve to prioritize virtue in those we would count on with greater consciousness and care.

A pointed concern with virtue can also be sparked by tensions within our own motivations. While this awareness may emerge without external triggers or aids, "Most of us will need to be spurred into action by some experience—perhaps an occasion when our unclarity leads us to do something we then recognize as wrong, perhaps meeting someone like Socrates who examines the defects in our understanding of bravery and honesty and the like" (Annas 2011, 38).

Optimally, Socrates's interlocutors discovered within themselves a preexisting, if tacit, commitment to virtue that clashed with an overt premium on competitive goods. A contemporary analogue might be a corporate CEO, Jane, who hatches a plan to repurpose employees' pension fund so as to make the company appear more profitable to its shareholders and board. Per her rationalization, the move is justified because it will save the company and thereby employees' jobs. Sporadic, diffuse discomfort with the plan does not lead our CEO to reject it. Conversation with an old friend, however, helps Jane to identify this uneasiness as pangs of conscience. She sees her rationalization for what it is, and, not wanting to be the kind of person who treats others unjustly, she abandons the plan.

4. What Now?

I concur with Annas that "the future belongs to theories that do in modern terms what the classical theories did in theirs" (2006, 533). Aristotle's vision of who could be fully virtuous was much too narrow, covering only adult, male citizens. Alasdair MacIntyre observes that rejecting important limitations of Aristotle's approach does not jeopardize "his general scheme for understanding the place of the virtues in human life, let alone deform his multitude of more particular insights" (1984, 160). I agree: Aristotle's central insights involving the mind/soul and virtue have great, enduring merit. What's more, in my view, his lens on virtue can be adapted to our situation in light of America's founding, liberal commitments.

We may agree that a world where virtue was central would be far better than our own but worry that virtue ethics offers no roadmap for how to actualize the wish for such a world. There is, indeed, no stepwise recipe for us to follow, but virtue ethics fares no worse here than utilitarianism and deontology (Annas 2011, 32–36). What's more, it does better in a salient respect: because it covers who we are across all arenas—individual, interpersonal, communal, and institutional—there are many more points of entry from which greater attentiveness to virtue can emanate.

Before offering my thoughts on how to proceed if we would foster a virtuous milieu, I briefly consider what would not work. There is no procedural shortcut to this setting, for laws gain their legitimacy from their ethical rationales and are ultimately only as good as those. At most, laws "can compel outward behavior, not internal acts of the will. . . . They cannot, in any direct sense, 'make men moral.' Their contribution . . . must be indirect" (George 2008, 45). Also, once they exist, laws do not implement themselves. Moreover, shifting circumstances (e.g., economic or demographic) may necessitate those laws' thoughtful adjustment so that they better reflect their ethical warrant, and virtuous people are best prepared to glean what needs alteration. Further, those motivated to do wrong, in private and public roles, will be undeterred by law if they calculate that they can evade or minimize accountability.

Beyond this, bettering our situation is not simply a matter of electing better leaders, for we cannot rely on government to make things right. This is always true, but the trust and confidence in elected leaders and institutions that are essential to our liberal democracy are at a low ebb today. More than 80% of respondents to a recent survey by the Pew Research Center are worried by the manner in which the federal government currently functions, with 49% quite concerned (2019, 5). The figures are similar when respondents are asked about political leaders' capacity to handle the country's largest challenges (5). Further, a majority believe that the federal government will do more harm than good in addressing subsequent difficulties, with just 7% believing that it "will have a very positive impact on solving the nation's problems in the future" (5, 32). The lack of trust and confidence illustrated by this survey leaves the country susceptible to populist appeals and demagoguery (Carter 1996, 206–208, 211).

Though it could not save us, having virtuous leaders would certainly help. We will seek them out, however, only if we, the electors, already esteem virtue ourselves. Further, needful changes will be most substantive and stable if they radiate from us. We stand to accomplish much through daily efforts, individually and alongside others, which we can inaugurate at any time.

Existentialism has something to offer here. As Camus suggests in *The Myth of Sisyphus*, ostensibly small acts of acknowledgment toward others can be significant—quite without our awareness, as the situations of those with whom our paths intersect are frequently unknown to us (1942, 17). While Camus focuses on acts consciously directed to other individuals on particular occasions, in "The Humanism of Existentialism," Jean-Paul Sartre makes a broader point: whether we wish to do so or are even aware of this fact, through our acts (and omissions), we send a message about the sort of person it is best to be (1970, 31–36, 73–75).[14] Further, these conveyances need not be consciously received to have an impact.

Much of what we do does, indeed, send a message. Though virtue in no way reduces to acts, inevitably, "My actions reflect and express the kind of person I am. . . . This is a very ordinary way of thinking" (Annas 2006, 520). Included here are routine acts and omissions that we may not even register. For example: Do we stop as pedestrians move to enter crosswalks or blast on through, signaling thereby that what matters to us is not "wasting" the few seconds it would take to enable the passage, without trepidation, of fellow human beings? Do we see clerks and waitstaff as subordinate doers of our bidding or as people no less deserving of acknowledgment and kindness than ourselves? Ostensibly, these are self-contained acts; inevitably, however, we simultaneously communicate to involved parties and bystanders what we deem important.

The idea behind the statement, "Be the change you wish to see in the world," falsely attributed to Mahatma Gandhi (Morton 2011), has much to be said for it.[15] We should esteem virtues, along with supporting nonvirtues, more consciously, showing in practice that we value them. What I term "supporting nonvirtues," Annas calls "neutral dispositions" (2011, 103). The underlying distinction is, however, the same: to count as a virtue, a quality must "express or indicate a commitment to goodness," but characteristics such as tenacity and orderliness can support both worthy and nefarious ends (105).[16] In terms of human flourishing, these qualities show their mettle in the support they offer to our living virtuous lives.

In addition to the salutary impact on ourselves and those with whom we interact, the political impact of our prioritizing virtue is not limited to how we vote: by so doing, we model for political candidates "the kind of leadership we wish to see from our country's public figures" (Brooks 2019, 85). Further, giving precedence to virtue would affect large-scale resource allocation. When we, as a society, "commit resources to [one] project rather than to others," we signal our answers to questions "not just about what we will do but about who we will be, what sort of lives we will lead and will allow those around us to lead, and what those lives will mean" (McWhorter 2009, 432). From a virtue-centered standpoint, we should enact a strong allegiance to projects of demonstrated human worth that are *infrastructural*.

The term "infrastructure" is most often used of tangible items comprising a system, whose condition is "deteriorating" (American Society of Civil Engineers 2016, 3). A prime example is "surface transportation," namely, "the critical highways, bridges, commuter rail, and transit systems that enable people and goods to access markets, services, and inputs of production essential to America's economic vitality" (12). Crumbling infrastructure also affects public health, as when flawed "water/wastewater infrastructure" causes illness (24–25).

Further, because infrastructural systems are mutually dependent, harm from failures across multiple areas is not additive but compounded (28).[17] We tend to recognize our reliance on infrastructure when things go dramatically awry (e.g., bridges collapse), though the vulnerability that such occasions unmask has not sufficed, thus far, to motivate systemic repair. This infrastructural neglect is a perceptible emblem of where our resourcing priorities do *not* currently lie.

In this chapter, I construe "infrastructure" more broadly, as also covering both public education and the state of American democracy, arenas in which, I submit, virtue should be more directly, consciously, and centrally involved. I adopt this term to underscore that the domains requiring most urgent work are the frames within which all else—from sociality and sport to policymaking—occurs.

Per Bostrom, education is "now probably subject to diminishing returns" (2014, 66). People at large, however, do not share this view. According to the aforementioned survey by the Pew Research Center, while many worry about the quality of education as things stand, both Democrats and Republicans believe in its civic potential (2019, 5): education is among respondents' "top priorities," with "large majorities . . . look[ing] to . . . the education system," both K-12 (77%) and colleges/universities (74%), "to solve future problems" (7, 5). The infrastructural role of education across the board, preschool through graduate, warrants consideration. Given the centrality of early impacts from the standpoint of virtue ethics, I concentrate on primary education, pre-K (not kindergarten, as is usual) through 6th grade.

Pedagogically, that we already care about virtue is manifest in the commitment of many teachers to students' character development (Arthur 2014, 53). Educators who deem character central frequently "trace their ideas . . . back to Aristotle" (Nucci et al. 2014, 2). Whether or not he is mentioned expressly, Aristotle is the point of origin for much promising thought and practice today, including recognition of how critical early impacts are.

Historically, character education "has deep roots in the American public school system. Virtually every school in the US in the eighteenth and nineteenth centuries was responding in some implicit way to the educational goal of developing character" (Arthur 2014, 48). Through the first half of the twentieth century, "Classroom instruction . . . focused on civic and moral virtues as well as academic competencies" (Watson 2014, 159). Though emphasis then shifted to efficiency and behavioral control as teachers faced "increased pressure for higher levels of academic learning," the 1980s saw "a resurgence of interest in the school's role in moral or character education" (159, 161). Today, there is "widespread agreement that schools should contribute to students' moral development and character formation" (Nucci et al. 2014, 1).

Although character is sometimes pegged as a focus of political "conservatives," especially when "tradition" is invoked, the ideas of concern to me here are not good because they are traditional, nor do they persist because they are old (as evidenced, in ethical theory, by the strong resurgence of virtue ethics). First, regardless of political affiliation, we grant importance to virtues not only in thinking about our own lives but in assessing elected officials and institutions. In addition, a concern with the people our children become is widespread and irreducible to party allegiance (Bennett 1991, 137–38; Wynne and Ryan 1997, 3; Sanderse 2012, 201; Arthur 2014, 52). Further, there is substantial agreement on personal qualities that children should acquire (e.g., justice, courage, self-control, and kindness), and there is less divergence in America on what being, for example, just and courageous involves than one might think (Hawkins et al. 2018, 70).[18]

The approach that I will sketch is not utopian in the self-defeating sense that to succeed, we must reach a telos whose achievement is beyond the capacities of a clear majority. The bar that virtue ethics sets is high, but human capabilities here are greater than meets the eye, and existing virtuously is a regulative ideal. Thus construed, it is not beyond us (Benninga 1991), though it may surpass our will.

We also need not start from scratch in our primary schools. Not only is a concern with virtue already manifest there, but pedagogical successes testify to a "simple [truth] well known to educators . . . the power of high expectations. Students generally will rise to meet expectations if they have a clear grasp of what the expectations are and they are supported in their efforts" (Sparks 1991, 193–94). Further, "strategies" that foster good character are already "accessible to most teachers," and "administrative leadership" can support its cultivation in effective and systematic ways (Lickona 1991, 82).[19]

Where schools would like to do more with character development but cannot, as things stand, commit sufficient resources to the endeavor, private organizations can help. An example is Roots of Empathy, an international organization whose eponymous program fosters children's emotional attunement and -understanding (Lätsch et al. 2017, 10–11). This program features collaboration among schools, parents, and community members (Roots of Empathy 2019). Though they can be valuable aids, independent programs cannot compensate for significant lacunae in early education itself.

Since an interest in character education was renewed in the 1980s, a number of promising ideas have become part of the mix. These offer a touchstone for systemic adjustments to early education within the parameters of liberal democracy. Here, I bring together eleven ideas, all of which are represented in Aristotle's virtue ethics more generally and have counterparts today.

Before turning to these ideas, I offer a couple of preliminary notes. Though my focus is primary school, and I concur with those who think highly of children's capabilities, the close of that educational phase is not a fixed, arbitrary point by which children should have solidly mastered all eleven ideas. The course that is set and its dedicated pursuit matter more than the pacing. Also, the qualities I have in view are virtues including justice, courage, self-control, practical wisdom (which as Aristotle saw, is the intellectual excellence required for moral virtue),[20] kindness, and generosity; what I call supporting nonvirtues (e.g., reliability, determination); and moral attitudes and emotions, for instance, good will, sympathy, and empathy. Though differences exist in the terminology and favored qualities of contemporary theorists, what matters here is the broad, common ground.

The first of our eleven ideas is that character formation is a developmental process, involving "movement from a less desirable state to a better one" (Wren 2014, 11). This fits with Aristotle's general conception of organisms' development as the fulfillment of potential distinctive of their species, which idea he applies to human flourishing in the *Nicomachean Ethics*. From this standpoint, contra the view that children will typically respond only to behavioral control, educators' lens on the capacity of most to develop good character is optimistic (Watson 2014, 170, 175).

Second, children must be discouraged from viewing "moral betterment . . . as an alien demand, imposed from without, constraining an agent to be and do that in which they have otherwise no investment" (Dent 1999, 29). Teachers should avoid fostering the impression that one performs virtuous actions "to avoid punishment" or due to "the promise of rewards," for this "deprives students of the opportunity to behave in positive ways because they understand that those ways are [for instance] more considerate or fair" (Watson 2014, 162, 169). By the fourth grade, students can learn to be guided by internal cues, such that they gravitate toward virtuous acts and away from vicious ones (Zubay and Soltis 2005, 16).

There is evidence that children can learn to perform virtuous (e.g., kind or generous) acts because they have that quality (Dent 1999, 26–29). In his work with children, Gareth Matthews found that not a few "act with some kind of understanding that what they are doing is a good thing to do because . . . it will help someone out, or comfort someone, and not just that it might be a way to avoid being punished or a way to get rewarded" (1994, 58). The idea of habituating children to perform virtuous acts *due to* their being virtuous is vintage Aristotle, as is our third point of emphasis: the developmental importance of children's learning to take pleasure in their performance of virtuous acts (Dent 1999, 26–27), with the same principle applying to pain and vicious ones. Fourth, if they appreciate the noninstrumental merit of performing virtuous acts and that character education targets the sort of person they become, then older primary-school students may go some way toward grasping the more abstract idea that virtue itself is intrinsically worthwhile (Lickona 1991; Sherman 1999, 42).

Our fifth and sixth points involve habituation. For better or worse, the traits each child eventually forms will reflect the substance of her behavioral patterns and motivation. To make the transition from performing acts with a certain (e.g., just or brave) quality in an ad hoc, infrequent way to the habitual performance of these, children require many, suitable practical opportunities (Lickona 1991, 68; Wynne and Ryan 1997, 161, 169). Not only is it possible to offer such occasions (e.g., to perform generous acts) within the setting of primary school, but children can develop "observable patterns" of kind, honest, and generous behavior toward other persons (Lickona 1991, 68). Thereby, they are well launched toward developing the corresponding traits, especially if, over time, they become motivated to seek out pertinent occasions themselves.

Sixth, if children are to be suitably acclimated and motivated toward virtue from within, their habituation should include "reasoned explanations," lest they be at the mercy of mysterious criteria imposed from without (Wren 2014, 17; see also Ryan 1986, 232).[21] "Within an integrated approach to character development," fitting goals for primary school include students' forming "habits of moral thinking . . . so that [they] come to judge what is right" (Lickona 1991, 68). As Matthews puts the point, children are not "merely proto-people" but instead, to a degree, "partners in inquiry" (1994, 122, 14). This is an advance on Aristotle, who sees reason as key to virtue's cultivation but not as directly engaged at this early stage (*Pol.* 1334b20–25, 1338b4–5).

Seventh, as Aristotle saw, one preserves the mean, where virtue lies (*EN* II 6), by acting as particular contexts require. Since being virtuous is not a top-down, ruled-based endeavor, children should be helped to learn that details and context matter and that the need for situational attunement is quite different from proceeding in a compartmentalized, relativistic way from one decision to another (Sherman 1999, 38–39).

Learning to navigate context-dependency requires the cultivation of virtue and supporting nonvirtues, such as tenacity. This leads to our eighth point, that virtues and relevant nonvirtues codevelop and are mutually reinforcing (Davidson et al. 2014, 297).[22] The inseparability of virtue and supporting nonvirtues is routinely manifest in how exemplary teachers proceed (Watson 2014, 167). In the "new paradigm" of Davidson et al., the two groups of qualities "are *needed for* and *developed from* every area of academic work. . . . [They are] wrapped around every element of the formal and informal curriculum" (2014, 297). Aristotle's own handling of this terrain was comparatively loose, as when endurance, wit, and tact are classified as virtues (*Pol.* VII 15; *EN* IV 8).[23] Nonetheless, the importance of habituation to character development and the decades-long process by which someone becomes a "person of practical wisdom" (*phronimos*) testify to Aristotle's view that what I consider supporting nonvirtues are essential to a virtuous life.

Ninth, because moral virtues are excellences of nonrational faculties (Aristotle, *EN* I 13, II 6), "Virtue education is, in no small part, education of the emotions. To teach virtue requires that we take seriously the idea that we can become (to a greater degree than we often imagine) 'agents' of our emotional lives" (Sherman 1999, 36). Commenting on what they see as young adults' increased self-absorption, Konrath et al. observe that "social affiliation and supportive social networks involve high levels of reciprocity and emotional concern and require the sharing of . . . communal emotions such as sympathy, appreciation, and affection" (2011, 183). These emotions are unlikely to take root—helping to reverse the current trend—unless a recognition of their merit and an ability to forge them are cultivated early on.

Our tenth, related idea is that since flourishing requires a supportive milieu, and virtue itself is in crucial respects a "cooperative" good, teachers should restrict competition and encourage collaboration that does not usurp children's budding agency (Adkins 1989, 11; Watson 2014, 165). This idea is anticipated by Aristotle, whose handling of virtue-based friendship suggests that collaboration "is something that can be learned, and that this learning process [is] an integral component of moral education" (Wren 2014, 17). Though the friendships of young children tend to be rooted in pleasure (Aristotle, *EN* 1158a18–20), they may take joint pleasure in virtue-related activity, and friendships based on pleasure can certainly mature into virtue-centered ones.

Our final point is the importance of role modeling: "The familiar idea of an exemplar or role model [is] implicit in Aristotle's appeal to the person of practical wisdom. . . . The rudiments of our personality are shaped, in no small way, through identificatory mechanisms" (Sherman 1999, 36–37). Indisputably, children "watch their teachers to find out how grown-ups act. Therefore, teachers need to be constantly aware of the powerful influence that their actions in the classroom have on students" (Ryan 1986, 232). Per Elizabeth Campbell, "Character education is dependent entirely on the role of the teacher as a moral agent and exemplar" (2014, 109). Campbell's own statement goes too far, neglecting parents' formative role, but her and Kevin Ryan's basic point—that teachers' impact on children's character is substantial—stands.

"Grand gestures" by remarkable figures from the past, such as Socrates, can have an enduring impact, but the character of teachers who serve as exemplars "is revealed through all kinds of small decisions and emotional reactions" (Wynne and Ryan 1997, 123; Sanderse 2012, 16). Consistency between word and deed matters greatly, for children can sniff out hypocrisy (Bennett 1991, 134; Carter 1996, 241). What Sartre said of us all is true, in spades, of teachers: whether they know it or not, they always send messages about how it is best to be.

That said, we should not underestimate the value of role models from history and literature. When children study history, "They are exposed to the heroes, the weaklings, and the villains of the culture; they see the consequences of human courage and cowardice, and they are inspired or repelled thereby" (Ryan 1986, 232). As Plato and Aristotle saw, children are prone to imitate and internalize the characters in stories to which they are introduced, putting a premium on their ethical caliber (Plato, *Rep*. 376d–398b); music, too—its melodies, rhythms, and modes—has an ethical impact (*Rep*. 398c–402a; Aristotle, *Pol*. VIII 5–7). The ethical influence of stories is often stressed today (Lickona 1991, 74; Wynne and Ryan 1997, 156; Annas 2011, 12; Watson 2014, 165). Also noted is that children can be helped to approach materials in popular culture—the closest contemporary analogue to poetry in fourth-century Athens—"from a character perspective. Who are heroes, and villains? Why? What virtues are praised, or ignored?" (Nehamas 1988; Wynne and Ryan 1997, 261).

Character development should definitely be important in early education, but I would go further: the cultivation of virtues, moral emotions and attitudes, and supporting nonvirtues should be the avowed umbrella under which primary education across the board occurs, which is quite different from saying that these should be the exclusive topics of study or that these are the sole things that matter when children are learning, say, arithmetic.

Lest this notion seem unduly radical, we should recognize that character has a pervasive role of sorts in early education as things stand. Teachers are "already involved in the formation of character of their students simply by being part of the school community" (Arthur 2014, 57). Further, "Many aspects of moral education are part of the hidden curriculum. . . . A central factor in a classroom environment is the moral climate. Are the classroom rules fair and fairly exercised? Does good balance exist between competition and cooperation? Are individuality and community responsibility both nurtured? . . . Are ethical questions and issues of 'what ought to be' part of the classroom dialogue?" (Ryan 1986, 228, 232). As Marilyn Watson points out, "Even disciplinary encounters around non-moral matters—paying attention, walking in the halls—convey moral information" (2014, 172); that is to say, they have ethical significance in the broad Greek sense. For better or worse, children's character is shaped "both formally and informally" (Campbell 2014, 109) by conveyances of teachers and administrators—across the spectrum of their activities—about who they are as people and what they care most about.

Bringing this to light makes the content of a given frame available for reflection and possible adjustment. Broadly speaking, the question becomes: How might teachers and administrators "conduct their work in schools virtuously?" (Campbell 2014, 103).[24]

In our constitutional system, states preside over education. Even if, magically, we could levy federal requirements, we should not do so. Once again, of themselves, laws do not improve who people are or who our children become. As Aristotle puts the point, "The most beneficial laws . . . are of no use if people are not habituated and educated in accord with the constitution—democratically if the laws are democratic" (*Pol.* 1310a14–17). In addition, federal insistence that early education follow a uniform model would undercut the liberty of states and communities in a fashion that our Constitution rightly sought to protect against.

Today, most states "mandate or encourage character education" in some fashion (Seligman et al. 2009, 295). States are certainly places to have vigorous discussions, not limited to school personnel and elected officials, of what is currently being required or encouraged, what districts and schools are actually doing, and how far this captures *why* we actually care what sorts of people our children become. But our single-best prospect for spurring systemic adjustments to children's education may be a groundswell, and eventually a critical mass, of enacted support on the level of communities (see also Wynne and Ryan 1997, 47; MacIntyre 2002). This groundswell would include making positions on early education count when we assess candidates for elective office, from local school boards to the presidency.

The question, How can we substantially improve our educational situation, given that we cannot start from scratch? will likely arise but should not prompt despair. As we have seen, many of us esteem virtue in some fashion already. In addition, because virtue is about who we are as people, there are many points of entry toward its promotion. Further, dedication to children's education, which shapes *generations*, stands to be especially fruitful both for them and for wider society.[25]

Within the frame suggested here, early education can, for instance, be a place from which to push back against a cultural prioritizing of *akolasia* (self-indulgence) and the "negative" conception of freedom (Berlin 1969, 122–23) that fits it hand in glove.[26] Once again, transhumanists embrace a widespread feature of contemporary life in the extreme, as they envision and glorify the absence of constraints on posthumans' pursuit of whatever they wished in the mental, physical, and even cosmic realms (cf. Hauskeller 2016, 77; Vallor 2016, 241).

In antiquity, "self-indulgence," a serious vice within virtue ethics, was glorified by some as the height of freedom. Pushing back against this view, Plato critiques rhetoric—an ancient analogue to corporate marketing, which contributes to our distended consumer culture. Rhetoric would be ineffective, however, if it did not target for swelling a psychic capacity. Thus, Plato's explanation of what spurs a climate of *akolasia* focuses on the soul: its appetitive dimension, left undisciplined, becomes insatiable (*Rep.* 442a); in this condition, it is like a sieve or a leaky jar that one cannot fill (*Gorgias* 493b–c). Under appetitive desire, Plato lodges the yearning for its objects, centrally including consumables, and for wealth as the means to appetites' unstinting gratification (*Rep.* 436a–440a, 580e–581a). In the *Gorgias*, Callicles proclaims that one living rightly "should allow his own appetites to get as large as possible and not restrain them" (491e8–9); indeed, "Wantonness, lack of discipline, and freedom, if available in abundance, are excellence and happiness" (492c4–6).[27]

Disputing this view is so important to Plato that it bookends the *Republic*'s argument. Per Thrasymachus in Book I, the tyrant represents the pinnacle of living well because he alone is utterly unblocked in the fulfillment of his appetites (343e–344c). Having investigated the soul and virtue at length, Plato reconceives the figure of the tyrant as internally chaotic and enslaved (578b–579e). Far from flourishing, one besieged by and in thrall to recalcitrant, never-requited, and ever-swelling appetites is the most miserable of all (587d–e). Plato's focus on extremity might seem irrelevant to most people, but this very focus is part of his point: tyranny is fundamentally a psychological condition, and, given the native strength of appetitive desire, many of us, in theory, could reach this extremity.

Aristotle's intermediate states between the virtue of self-control and the vice of self-indulgence are "moral strength" and "moral weakness." Morally strong and -weak persons are prone to struggle with appetitive desire, routinely winning and losing out against it, respectively (*EN* VII 7). Aristotle's account of moral weakness (*akrasia*) includes a broader construction that spans the desire for other externals (e.g., possessions, reputation) to which people may have great difficulty setting limits (VII 4). Contemporary discussions have widened the range of pertinent phenomena still further to cover, for instance, gaps between students' awareness of what they should do, on the one side, and a lack of follow-through stemming from failed self-discipline, on the other (Wynne and Ryan 1997, 69; Steutel 1999).[28] Though also a character defect, *akrasia* is superior to *akolasia* because the akratic person recognizes that there is something significant to struggle *about* (Aristotle, *EN* VII 8).

Quite undisciplined children typically develop into akratic or self-indulgent adults (III 12, VII 3). As *akrasia* and *akolasia* are widespread today, substantive pushback against them requires generational change. In no small part, this shift must be rooted in children's education.

The pedagogical lens that I support presumes children's general capacity to cultivate virtue and related features. In the *Republic*, though not the *Laws*, Plato overestimates what nature (*phusis*), of itself, contributes to the people that children become. The contemporary correlate is genes, whose role in complex phenotypic traits is vastly oversold. A pertinent example is Mischel, who, as we saw (Chapter 1, Section 3.2), places undue weight on natural endowment in terms of children's ability to develop the characteristic of self-control. Alongside adjustments to early education, this widespread overestimation of genes' contribution to complex phenotypic traits—among which virtues number—would have to be addressed.

5. What Now? Part Two: Our Civic Scene

If adjusted in the holistic, virtue-centered direction that I propose, early education can help motivate children toward civic concern. Since, however, liberalism emerged some two millennia after Aristotle, one might wonder whether a virtue ethics with roots in his time can accommodate our civic frame. I believe that it can and that adopting a virtue-ethical approach with those roots might help to improve it.

For purposes of illustration, I discuss the approach of Martin Luther King Jr. to civil rights in the 1960s. I have already defended a virtue-centered approach to the contemporary scene by discussing assets of virtue ethics, an existing concern with virtue, and how we could strengthen primary education. Here, I suggest that heeding the four features of King's appeal considered below could help us combat today's increasingly illiberal climate—in which agreement is often merely "tribal," and injustices tied to race and gender are prominent while "productive national dialogue about these and other critical issues has reached an impasse" (Hawkins et al. 2018, 4, 15).

The great progress made thus far in realizing America's founding idea(l)s is not self-expanding. Further, the endurance of prior headway is not as assured as we might have presumed. As Jill Lepore points out, it is naïve ever to conclude that liberalism has triumphed for good and that refinements alone are needed (2019). Today, liberalism itself is under threat, with many concerned that intergroup enmity "rules out even an imperfect common understanding or a partial overlap of common principles that might breed progress" (Purdy 2017). Liberalism is "still in there. The trick is getting it out. There's only one way to do that. It requires grabbing and holding onto a very good idea: that all people are equal and endowed from birth with inalienable rights and entitled to equal treatment. . . . This requires making the case for the nation" (Lepore 2019, 20).

Our finest leaders, many not professional politicians, have shown that liberalism entails loving America with a generous yet critical attitude. These leaders, including King, "challenge the nation to live up to its ideals. . . . The nation is often wrong. But so long as protest is possible, it can always be righted" (Lepore 2019, 50, 52).

As things stand today, being able even to disagree within dialogue would be a tremendous improvement (Elshtain 1995, xi–xii; Brooks 2019, 210). This phenomenon is part and parcel of what it means to live in a well-functioning liberal democracy. Like that democracy itself, this kind of dialogue is not a self-sustaining phenomenon but rather a human capacity that we must esteem and nurture. Robert George and Cornel West call on us to do just that:

> None of us is infallible. Whether you are a person of the left, the right, or the center, there are reasonable people of goodwill who do not share your fundamental convictions. . . . All of us should be willing—even eager—to engage with anyone who is prepared to do business in the currency of truth-seeking discourse by offering reasons, marshaling evidence, and making arguments. The

> more important the subject under discussion, the more willing we should be to listen and engage. . . . Our willingness to listen to and respectfully engage those with whom we disagree (especially about matters of profound importance) contributes vitally to the maintenance of a milieu in which people feel free to speak their minds, consider unpopular positions, and explore lines of argument that may undercut established ways of thinking. (2017)

Proceeding thus both shows liberal democracy in action and helps to preserve it.

The concern of virtue ethics with who we are as people and with living well across the board is manifest in the accounts of past American leaders and in critiques of current illiberal tendencies. Whether or not the term "virtues" appears, cases made for what needs improving often feature those excellences: this is particularly true of justice and courage, which are virtues "in the light of which we have to characterize ourselves and others, whatever our private moral standpoint or our society's particular codes may be" (MacIntyre 1984, 192). Modifying the frame of virtue ethics to accommodate liberal commitments, with corresponding adjustments to our views of particular virtues, above all, justice and courage, might help us address illiberalism.

It certainly has done so in the past. Let us consider four prominent features of King's approach to civil rights. First, he found fault with America while conveying his dedication to it, framing his critique in terms of our nation's not living up to its self-conception as one to which, as a matter of justice, we all equally belong. Second, King stressed that what matters is who we are as people and *a* people. Third, he saw us as fallible, yet vastly improvable, and our limitations as no excuse for not giving our all where the focal aim and pertinent human qualities are concerned. Fourth, when speaking of who we are at our best, King emphasized virtues—particularly justice and courage—supporting nonvirtues, and moral attitudes and emotions. The second and fourth features fit within Aristotle's virtue ethics, while the first is compatible with it once Aristotle's lens is adjusted in line with liberal democracy. For ancient representation of the third facet we must look outside Aristotle, to Plato's *Laws*, which suggests how virtue can feature in a community made up of the fallible beings we humans are.

Although events after ratification of the Fourteenth and Fifteenth Amendments "betrayed [their] spirit . . . liberal promises, and . . . constitutional guarantees . . . the very struggle to hold the nation to those promises would carry on a liberal tradition, one that cherished civic ideals and made claims for the nation" (Lepore 2019, 75). Key to this struggle was what is frequently termed the Second Reconstruction (1948–1968), whose main accomplishments, "full citizenship for blacks, to include voting rights . . . were merely reaffirmations of legal rights already guaranteed by the Fourteenth and Fifteenth Amendments" (Ellis 2018, 54). From a legal standpoint, "merely" is correct, but the full instantiation of those moral and legal rights was another matter: African Americans seeking to enact their legal right to vote, sit at whatever lunch counters they wished, and ride buses without restriction faced impediments ranging from so-called literacy tests to violence.

During the 1960s, King "called us to, not away from, democratic citizenship," and his unifying message mobilized people broadly (Elshtain 1995, xiv; Brooks 2019, 82–83). Echoing Frederick Douglass (1950, 255–57), King stressed that, as a matter of justice, "Anyone who lives in the United States can never be considered an outsider anywhere in this country" (1986, 290). The Declaration of Independence captures "the substance of the [American] dream," its "amazing universalism. It does not say some men, but it says all men" (208). Similarly, "When the architects of our republic wrote the magnificent words of the Constitution and the Declaration of Independence, they were signing a promissory note to which every American was to fall heir. This note was the promise that all men . . . would be guaranteed the unalienable rights of life, liberty, and the pursuit of happiness" (217). Far from viewing tradition with categorical suspicion, King maintains that what is best about us as a nation is clearly evident only if we adopt an encompassing, historical view.

The gap between word and deed concerning race remained large: "On the one hand we have proudly professed the principles of democracy, and on the other hand we have sadly practiced the very antithesis of those principles" (King 1986, 208). In "A Testament of Hope," King observes that, on the one side, the Voting Rights Act, signed into law in August 1965, "provides for federal referees to monitor the registration of voters in counties where Negroes have systematically been denied the right to vote" (320). On the other, all but 58 of some 900 eligible counties "remain essentially just as they were before the march on Selma" in March of that year (320). Further, "Not a single federal law officer capable of making arrests was sent into the South" (2010, 35). King concludes: "It is time that we stopped our blithe lip service to the guarantees of life, liberty and the pursuit of happiness. . . . The Declaration of Independence . . . was always a declaration of intent rather than of reality" (1986, 315).

That the protracted struggle against racial injustice could occur itself testified that there was hope for America, for "the greatness of America is the right to protest for right" (282). Those in the Black community who condone or resort to violence "have lost faith in America" (296). Though King was frustrated and angry about the ongoing gap between word and deed, he believed in America's capacity to enact justice, which requires that African Americans be able to fully exercise their "citizenship rights" (218).

Precisely because he cherished this hope and belief, King's favored method of protest was nonviolent resistance (212–15). As he puts the point in "Letter from Birmingham City Jail,"

> I have earnestly worked and preached against violent tension, but there is a type of constructive nonviolent tension that is necessary for growth. Just as Socrates felt that it was necessary to create a tension in the mind so that individuals could rise from the bondage of myths and half-truths to the unfettered realm of creative analysis and objective appraisal, we must see the need of having nonviolent gadflies to create the kind of tension in society that will help men to rise from the dark depths of prejudice and racism to the majestic heights of understanding and brotherhood. (291)

Since there was room for hope, nonviolent resistance, the path of "creative protest" (215), could bear fruit. And, because he had faith in this method, King would not have the struggle for justice and its aim morally compromised by immoral means of its attainment: "Nonviolence demands that the means we use must be as pure as the ends we seek" (301). Further, nonviolence "will help us to enter the new age with the proper attitude" (215). In addition to being "concerned that Negroes achieve full status as citizens and as human beings here in the United States . . . I am . . . concerned about our moral uprightness and the health of our souls. . . . Hate is just as injurious to the hater as it is to the hated" (2010, 66). Beyond his self-presentation as a gadfly (1986, 291), a term that Socrates applied to himself, King's emphasis on psychic health and immoral attitudes that impair it calls Platonic tenets to mind (*Apology* 30e; *Rep*. 444d–445b; *Gorgias* 479b–d).

Accepting the Nobel Peace Prize in 1964, King expressed his belief in our capacity to grow, as people and a people, in the ways that justice requires (1986, 225–26). In "A Testament of Hope," he calls himself "an optimist" and voices a strong belief in the nation's capacity for moral improvement (314; cf. Douglass 1950, 414). Though we are fallible, we have much unrealized potential to be better as individuals and a country.

Given his oft-referenced and -critiqued valorization of philosopher-rulers in the *Republic*, one may be surprised to learn that, in Western philosophy, it was Plato who debuted an emphasis on human fallibility conjoined with optimism about our potential to cultivate virtue. Though Plato himself was no democrat, he gleaned in the *Laws* that even the best among us are morally and intellectually fallible. This insight brought an elevated appreciation of the personal and civic capacities of ordinary people, which replaced the sharp severances among groups that defined society in Kallipolis, the *Republic*'s ideal city (Levin 2014a). Plato's profound gleaning of humans' native fallibility in the *Laws* points us toward liberal democracy if combined with America's founding commitment to moral equality and with the view that there is more of a continuum among us in the capacity for virtue and openness to civic engagement than appears to be the case today, when enmity—whose lightning rods include race and gender—is prominent in civic life.

Though King often focused on acts and events, he recognized that what had to improve, above all, was character. Without using the term "virtue," King calls to mind Aristotle's point that virtuous people do the correct (e.g., just or brave) thing because it is such: "I have heard numerous religious leaders of the South call upon their worshippers to comply with a desegregation decision because it is the *law*, but I have longed to hear white ministers say, 'Follow this decree because integration is morally *right* and the Negro is your brother' " (1986, 299).[29] As both King and Aristotle saw, doing the right thing does not make one a good human being unless one is motivated to do it for that reason.

According to King, America's prospects hang ultimately on the attitudes and qualities we cultivate and evince in dealing with others. From this standpoint, though desegregation

> will not change attitudes . . . it will provide the contact and confrontation necessary by which integration is made possible and attainable. . . . The demands of desegregation are enforceable demands while the demands of integration fall within the scope of unenforceable demands. . . . Unenforceable obligations are beyond the reach of the laws of society. They concern inner attitudes, genuine person-to-person relations, and expressions of compassion. . . . Such obligations are met by one's commitment to an inner law, written on the heart. . . . No code of conduct ever compelled a father to love his children or a husband to show affection to his wife. . . . A good father is obedient to the unenforceable. . . . The ultimate solution to the race problem lies in the willingness of men to obey the unenforceable. (King 1986, 123–24)

Shortcomings involving the above "are the barriers to a truly integrated society" (124). King recognized, as well, that education of a high caliber was required to help us achieve the necessary attitudinal shifts (213).

Integration is ethically required "[in] recognition of the solidarity of the human family"[30] and because—as Aristotle recognized (*Pol.* I 2)—"man is by nature a societal creature" (King 1986, 121–22). "Solidarity" here illustrates historical usage of the term "for robust democracy—from the Polish workers' movement of the same name that helped bring down the Soviet-backed communist state in the 1980s to the social democratic governments of Europe that built, for a few decades after World War II, the most egalitarian societies the modern world has seen. It evokes being in a shared struggle, lending a hand, understanding that people can flourish only with support from one another" (Purdy 2017). This solidarity differs immensely from "a form of group homogeneity that brooks no disagreement or distinction *within* and can maintain itself only as a redoubt *against* threatening 'enemies' from without" (Elshtain 1995, xiv).

King appeals to America as a nation, for he sees a civic commitment to full equality as essential to human flourishing and believes that commitment to exist, as "a promissory note," in America's founding documents (1986, 217). Thus, his critiques of America were organically linked with calls to patriotism (see also Douglass 1950, 148, 187, 255)—absent which "the great social movements that weakened inequalities of class, gender and race in the United States . . . never would have gotten off the ground" (Kazin 2003). "Patriotism" here differs greatly from "nationalism": "Patriotism is animated by love, nationalism by hatred. To confuse the one for the other is to pretend that hate is love and fear is courage" (Lepore 2019, 24).

King foregrounded liberal-democratic constructions of justice and courage. His concern to promote justice was everywhere in evidence. King also spoke often of courage—its embodiment as well as the need for its cultivation where deficient. Actively drawing attention to injustice itself requires courage. Demonstrations are prompted by "the existence of some form of exploitation or oppression that has made it necessary for men of courage and goodwill to protest the evil" (King 2010, 57). Blacks have "united and marched. And out of the new unity and action vast monuments of dignity were shaped, courage was forged and hope took concrete form" (16). Their "initiative, courage and imagination precipitated the Birmingham and Selma confrontations and revealed the harrowing injustice of segregated life" (52). In "Letter from Birmingham City Jail," King lauds "the Negro sit-inners and demonstrators . . . for their sublime courage . . . and their amazing discipline in the midst of the most inhuman provocation" (1986, 301). All of these people were "standing up for the best in the American dream" (302). Courage is required, as well, moving forward (226). Indeed, "This refusal to be stopped, this 'courage to be,' this determination to go on 'in spite of' is the hallmark of any great movement" (2010, 48).[31]

We have already witnessed King's occupation with "inner attitudes" and moral emotions, such as compassion (1986, 123–24). Moreover, supporting nonvirtues, including determination and tenacity, are required, for "social progress never rolls in on the wheels of inevitability. It comes through the tireless effort and the persistent work of dedicated individuals" (213). Time "is neutral. It can be used either destructively or constructively" (296); hence, to foster justice, "We must help time and realize that the time is always ripe to do right" (270).

Virtues, moral attitudes and emotions, and supporting nonvirtues thus matter greatly to King and Aristotle. Expectedly, their constructions of justice and courage differ insofar as King's reflect liberal democracy. If one looks beneath the surface, however, one finds conceptual common ground. Regarding justice, though he applied the insight too narrowly, Aristotle saw that "the free self is simultaneously political subject and political sovereign. Thus to be involved in political relationships entails freedom from any position that is mere subjection.

Freedom is the presupposition of the exercise of the virtues and the achievement of the good" (*EN* 1134b13–15; MacIntyre 1984, 159). Further, in the conceptual role given justice, as distinct from how the view was unpacked and applied, Aristotle's encompassing perspective is not unlike King's: "In one sense we call those things 'just' that bring about and preserve flourishing for the social and political community. . . . This kind of justice is complete virtue or excellence . . . in relation to our fellow men. . . . The just in political matters is found among men who share a common life . . . and who are free and equal" (*EN* 1129b17–27, 1134a26–27). Further, a worthy government "is the guardian of what is just, and as such . . . also the guardian of equality and fairness" (1134b1–2).[32]

According to Aristotle, courage was paradigmatically displayed in battle, when soldiers risked their lives (*EN* 1115a24–32). For King, in contrast, while courageous people were willing to take that risk, courage was displayed across the spectrum of nonviolent resistance. Mutatis mutandis, Aristotle comes closer to King when he maintains that war should always aim at peace and rejects the Spartan view that courageous men are warlike, stating that they have instead "a gentler, lionlike character" (*Pol.* 1333b18–1334a15, 1338b16–19).[33] Further, since King cares deeply about human motivation, he can agree with Aristotle that courageous people "act the way they do because it is noble" (*EN* 1116b30–31). King's handling of justice and courage, which builds in liberal commitments while sharing conceptual ground with Aristotle, points to the flexibility of the virtue-oriented approach that this chapter supports.

As for moral attitudes and the civic realm, King and Aristotle concur that although insufficient on its own, translated into action, good will can be powerful (King 1986, 130, 275; Aristotle, *EN* IX 5). King's counterpart to Aristotle's concord/civic friendship, together with Aristotle's emphasis on our capacity for sympathetic identification with what others undergo, is solidarity.

Both would deplore the fact that good will, not to mention concord, is not highly visible today in American civic life. Far more prominent are enmity, contempt—defined as "anger mixed with disgust" (Brooks 2019, 10)—and demonization (Elshtain 1995; Purdy 2017; Brooks 2019). Opposition differs importantly from enmity: We should "operate from a stance of goodwill and an acceptance of the backdrop of democratic constitutional guarantees, as well as democratic habits and dispositions. . . . One makes war with enemies; one does politics—democratic politics—with opponents" (Elshtain 1995, 67–68). If the best in America's past is any guide, and we take to heart positive indicators in the present (see further below), then it is not unreasonable to share King's hopefulness that we can make our way to enacted good will and concord on an appropriate scale.

In terms of who we actually become as individuals and a people, King appreciated the central role of education (1986, 213). Today, we must address head-on the question: "For what type of democratic regime do we want to educate students in the United States?" (Parker 2014, 353). In brief, the answer is, a liberal one, with virtues and moral attitudes cultivated as befits this milieu. Of course, part and parcel of the endeavor is educating children to value liberal democracy itself, not to "take [it] for granted, as though it were common and easy rather than rare and difficult" (Parker 2014, 363, 354). Some primary schools and nonprofits have already prioritized this aim (Sadowsky 1991; Weintraub 1991; Letwin 1991; Pereira 1991).

The things that matter most to human flourishing require the most of us. Our liberal democracy is a priceless, challenging ideal whose own status as such is regulative: "Liberal democracies fall short of their aspirations (there are no ideal democracies), and this motivates social movements that aim to close the gap between ideals and realities" (Parker 2014, 355). Even a given state of advance requires active maintenance. It is we who must spearhead these things. How far we ultimately instantiate our liberal vision is up to "us," by which I do not mean "our elected leaders." For one thing, as previously observed, many of our country's finest leaders have not been professional politicians. Further, in electing political figures, we evince, consciously or no, what *we* favor in terms of traits and decisional priorities; the same applies to holding those figures accountable when in office.

In an extensive national survey, Hawkins et al. trace our current polarization, magnified in a digital milieu, largely to "voices that come from the furthest ends of the spectrum and who are the least interested in finding common ground" (2018, 133–34, 70). Far less visible is an "exhausted majority," who are "fatigued with all the tribalism" and "believe that Americans have more in common than that which divides them" (11, 107, 4). Hawkins et al. found "widespread agreement on matters of principle, such as rejecting racism and discrimination, recognizing that racism remains a problem in America, taking responsibility for vulnerable children and those fleeing conflict" (70). In terms of specific programs and laws, "Large majorities of the public support . . . a pathway to citizenship for DACA recipients and background checks for gun ownership" (18). A full 77% of those surveyed maintain that differences among Americans do not preclude their collaboration in addressing shared challenges (107).

Beyond mobilizing the exhausted majority, "To bring Americans back together, we need to focus first on those things that we share, and this starts with our identity as Americans," with our overwhelming unity on the question of whether "a commitment to freedom and equality is important for being American" (116, 122). Refocusing attention on these core, shared ideals may help to weaken divisiveness (116). In the attempt, as King made clear in the 1960s,

> America has one great asset unrivalled in the world: a powerful story of national identity that, at its core, is idealistic, hopeful and inclusive. *It is a story that calls the nation and its people to act with virtue and against division*. . . . America today needs a renewed sense of national identity, one that fosters a common vision for a future in which every American can feel that they belong and are respected. . . . Of course, much more is needed than just powerful words. . . . But vision and idealism have long played central roles in America's national story. (Hawkins et al. 2018, 138; emphasis added)

Revitalizing our liberal democracy "requires thousands of initiatives large and small. . . . It may well take a generation" (137). As we consider how to frame and pursue this venture, reflection that launches from Aristotle's virtue ethics has much to offer.

For MacIntyre, beyond the merits of the frame itself, Aristotle's virtue-centered approach to human flourishing has enduring value because his "fundamental moral scheme" helps to explain failures of its main competitors (1984, 270–71). In addition, rather than being fundamentally damaged by the limited scope of equality in the political community he had in mind, Aristotle's approach is adjustable in light of criticism and changed historical conditions (159–64, 196–203). According to MacIntyre, one can "be an Aristotelian and yet . . . view the city-state in an historical perspective as only one—even if a very important one—in a series of social and political forms in and through which the kind of self which can exemplify the virtues can be found and educated and in which that self can find its arena" (163). What's more, in favoring virtue, we would not be foisting on our liberal state an alien, antithetical moral role, as practices and institutions are always already in one way or another about virtues and vices (195). I concur with MacIntyre on all these points.

We part company, however, on the matter of what we can hope to accomplish on the national plane. MacIntyre believes that "our society cannot hope to achieve moral consensus," for it has no "shared moral first principles" (252–53). Notably, patriotism, which he deems a virtue, "has been displaced. Patriotism cannot be what it was because we lack in the fullest sense a *patria*" (254). Further, liberalism is "an ideological disguise for the realities of modern state power" (2002, 13). Thus, MacIntyre focuses on "the construction of local forms of community within which civility and the intellectual and moral life can be sustained through the new dark ages which are already upon us" (1984, 263).[34] I agree that local communities are quite important but also believe that, within the suitably modified frame of Aristotle's virtue ethics, there is hope for an actively affirmed patriotism, of the sort manifest in "the great social movements that weakened inequalities of class, gender and race in the United States" (Kazin 2003).

6. Perfectionism Suitable for Human Beings: Living Virtuously as a Regulative Ideal

"Virtue requires not just acting on reasons, but having the right feelings and attitudes, doing virtuous actions in an easy and unconflicted way that is characteristically enjoyed" (Annas 2011, 5). The standards of virtue ethics may seem too demanding, and some of what Aristotle views as required of a good moral agent, in terms of self-scrutiny, friendship, and citizenly conduct, we might deem to surpass what goodness requires. The standards and requirements of virtue ethics do, however, fit with perfectionism, construed in a regulative way.

The height of an aim compared with our launching point is, on its own, no decisive consideration against its adoption as a regulative ideal for human beings. Indeed, this is the only existentially legitimate sort of ideal that we can have with respect to flourishing. There is far more we can do to foster human flourishing than we have so far done. To the extent that we approach the high bar that Aristotle set, we surpass limits that, previously, we may have thought were native to us as individuals or human beings.

Endorsing Plato's view of our fallibility in the *Laws*, I believe that we should take virtue as a regulative ideal. So, too, does Annas: "Being *fully* virtuous does seem to be an ideal that we aspire towards but can never achieve" (2011, 64).[35] On her account, virtue is "an essentially developmental notion . . . not a once for all achievement but a disposition of our character that is constantly developing as it meets new challenges and enlarges the understanding it involves (this leading to self-direction and improvement)" (38; see also Kraut 2007, 136). Headway regarding virtue presumes an ongoing "drive to aspire," which can be activated in young children (Annas 2011, 16–24).

Thus construed, cultivating virtue is a ceaseless endeavor: "When an action is virtuous it may be done at any point on a range of development from the learner, who merely parrots what her teachers tell her, to the truly virtuous person, whose actions are based on understanding gained through experience and reflection, self-directed, and coming from a disposition which continually improves through active engagement with experience" (Annas 2011, 41). Beyond existing societal structures, our "failures" and "deficiencies" prevent our "being *fully* virtuous" (64–65). True enough, but the fact that, for instance, "adults' kindness or bravery . . . falls short of true or perfect kindness or bravery" in no way entails a failure to possess these exemplary qualities (65); in this respect, virtue is like the "practical skills" developed and honed by athletes and musicians (14).

This view differs from Aristotle's handling of virtuous perfection. His account is not wholly consistent, but on balance, he seems to view *eudaimonia* itself as a regulative ideal and unvarnished virtue as achievable. Virtue does not exhaust *eudaimonia* (*EN* I 8–10); thus, Aristotle's flourishing individual is "one whose activities are an expression of complete virtue, and who is sufficiently equipped with external goods, not simply at a given moment but to the end of his life" (1101a14–16). Externals include the meeting of one's basic needs, co-pursuers of virtue (i.e., "virtue friends"), and what befalls one. Pronounced shifts in fortune that we cannot foresee or control may affect our flourishing without impairing our virtue (I 10). If *eudaimonia* is "an end that is absolutely final and complete in every respect" (1101a18–19), and virtue does not exhaust *eudaimonia*, unmarred flourishing is not a reasonable target for us. Yet Aristotle elsewhere suggests that virtue suffices: *Eudaimonia* "is a certain activity of the soul in conformity with perfect virtue. . . . We define happiness as an activity of soul" (1102a5–17). Rather than capturing the place earlier given to externals, this equation of virtue and flourishing calls the Stoics to mind: if our flourishing is *all* about virtue, and ill fortune need not diminish that virtue (1100b8–11, 30–32), then perfection is attainable.

For my purposes here, Aristotle's inconsistency is irrelevant: whether or not virtue alone equates to flourishing, he evidently sees virtue itself as a perfectible disposition (see further Levin 2014a, 222–24). It takes decades of life experience to become a *phronimos*, or person of practical wisdom (*EN* VI 8). That the *phronimos* may learn something from new situations is different from saying that his virtue itself is still developing. The opposite is suggested, for example, by Aristotle's observation that "what seems good to a man of high moral standards is truly the object of wish. . . . A man whose standards are high judges correctly, and in each case what is truly good also appears to him to be so. . . . Perhaps the chief distinction of a man of high moral standards is his ability to see the truth in each moral question since he is, as it were, the standard and measure (*metron*) for such questions" (1113a23–33).

Also, per his Doctrine of the Mean, "We can experience fear, confidence, desire, anger, pity, and generally any kind of pleasure and pain either too much or too little, and in either case not properly. But to experience all this at the right time, toward the right objects, toward the right people, for the right reason, and in the right manner—that is the mean and the best course, the one that is a mark of virtue" (1106b18–23). Opposed, in each case, to excess and deficiency, the mean involved in virtue—which the *phronimos* achieves—is, normatively speaking, the extreme (1107a23; *Pol.* 1323b10–11). Moreover, that errors, if any, committed by Aristotle's truly virtuous people do not evince defective insight or character is clear from his handling of involuntary action due to ignorance of particulars that agents could not reasonably be expected to know (*EN* III 1, 5; Levin 2014a, 223–24). An example would be harm stemming from unprecedented flaws in sensitive equipment, widely used by experts in a particular field, that its users on a certain occasion could not have anticipated; these agents are not morally accountable as long as they experience genuine regret for the harmful outcome as soon as it occurs (1110b18–25).

Aristotle's idea of the *phronimos* in the *Nicomachean Ethics* is much like Plato's view of philosopher-rulers in the *Republic* (Levin 2014a, 223). The relatively weak notion of virtuous persons' fallibility that both works evince comports less well with human capabilities than does Plato's position in the *Laws*. When he gives up the *Republic*'s notion that a select few are so far beyond their fellows in intellect and character that they could almost represent a higher species, Plato sees that humanity, as such, is essentially fallible in both arenas. Having demoted his prior elite, Plato might have despaired of humanity altogether. Instead, he takes a fresh look at human capabilities: rejecting the *Republic*'s disparagement of most human beings as unduly harsh, he comes to believe that wide swaths of Magnesia, the *Laws*' optimal community, are capable with regard to virtue. Our essential fallibility does not preclude a virtuous life, for virtue is a regulative ideal. Though certain of its forms are damaging, perfectionism per se is not problematic (cf. Roduit 2016, 59).[36]

Finally, a brief word about pluralism, which one might fear that virtue ethics excludes. According to David Copp, "Most perfectionist theories are pluralistic, listing a variety of goods, including such things as knowledge, friendship, creativity, and moral virtue" (2006, 22). The virtue ethics supported here is pluralistic in this sense. Further, by no means do I maintain that what people across the nation care about and pursue, in terms of vocations and avocations, should be uniform across the board. I have spoken throughout of who we are as people. Of course, some endeavors, for instance, targeting exploitative loans to the poor, would be off limits on the same basis that emotions such as *Schadenfreude* and vengefulness were: because they embody vice. Apart from that, virtuous and vicious people may be found in most any profession or walk of life.[37]

7. Conclusion

On transhumanists' presentation, science and technology are "salvific" (Waters 2011, 168), enabling humanity's self-transcendence through the creation of our ontologically superior successors. A less dramatic, but still impactful, variant is public belief in the capacity of science and technology "to solve future problems. . . . When asked what kind of impact a range of institutions—including federal, state and local governments—will have on solving the biggest problems facing the country in the future, the public views science and technology as potentially having a greater impact than the others" (Pew Research Center 2019, 5, 31).

Science and technology can help us, to be sure, but they cannot be our saviors. Quite simply, there are no saviors to be had: we must do the hard work of considering what goods most warrant our attention and what constitute worthy ends for us as human beings. Though nothing can substitute for this work, we have emerged from and perforce belong to traditions that repay our consultation. Most especially, engagement with philosophical history helps us to see why we must not endorse transhumanism or simply let current trends—epistemological, ethical, and sociopolitical—continue to play out.

Thus, I end, as I began, by pushing back against transhumanist denigration of traditions, above all, the Western philosophical journey that began in the sixth century BCE. To this day, we have great difficulty "managing—or even understanding—ourselves," and human self-understanding is the foremost, perennial task of philosophy (Joy 2000; Levin 2017a, 300). If we care for humanity at all, we must reject transhumanists' suggestion that vintage philosophical inquiry is pointless, even harmful for its distraction of gifted minds from attending directly to practical matters (Bostrom 2014, 58–59, 256).

Far from putting a hold on this type of reflection, more than ever, we should pursue big human metalevel queries of the sort that the Greeks debuted, and whose views and approaches include much that warrants serious reflection today. If we do this, and refuse to let distended speculation about humanity's self-transcendence replace sound, holistic judgment, we will have begun to clear a path toward an improved, human existence. This holism is thoroughly human, in the best of senses. We must jettison transhumanists' fantasy, both because their arguments fail and because transhumanism fails to do us justice.

Notes

Introduction

1. Within the current debate, “enhancement” is a technical or semi-technical term for “interventions designed to improve human form or functioning beyond what is necessary to sustain or restore good health” (Juengst 1998, 29).
2. With Hauskeller (2012, 40), I consider enhancement advocates to be transhumanists, regardless of self-labeling, if they support the development of “radical . . . forms of enhancement” and believe that “ceasing to be human is in [no] way problematic” (Harris 2010, 16–18).
3. My focus is transhumanist argumentation that emphasizes our biological manipulation, construed as direct attempts to upgrade us as living beings via genes or the brain. That said, I address computing, too, and my core lines of argument apply to transhumanism across the board.
4. Cf. Poster’s distinction between “general-” and “totalizing theories” of “social phenomena” (1990, 22).

Chapter 1

1. In using “enhancement,” applied to cognition and morality, interchangeably with “bioenhancement,” I follow others’ lead (Buchanan 2009; Agar 2014; Kaebnick 2016; de Melo-Martín 2018).
2. This is one of several points where more common ground than appears—and than the two sides tend to admit—exists between transhumanists and their opponents. In my view, greater awareness of what is shared can help to improve the caliber and fruitfulness of the debate. Section 2 draws at times on Levin (2014b, 5).
3. The following critiques of Fukuyama (2002) and the President’s Council on Bioethics (2003) are my own, not transhumanists’. I provide them to illustrate why I concur with transhumanists that their critics’ attempts at specification of our essence have thus far been, by and large, unsuccessful.
4. This strategy is also unpromising, for, “according to the picture emerging from evolutionary developmental biology . . . the novel traits of a new species do not emerge from the invention of a host of new genes” (Agar 2014, 148). Because the regulation of genes’ expression is also key (148–49), retaining a particular “genetic endowment” is not equivalent to precluding gene-related shifts.
5. In his own handling of dignity, Kass shows a similar reliance on “nature”/“natural,” “worth”/“worthiness,” and “excellence” (2008, 302–304, 305n, 313–14). Further, “There is . . . *nothing* dignified in vulnerability as such or in the fact of suffering per

se. . . . To speak of dignity as predicable of all human beings . . . is to tie [it] to . . . distinctively human features . . . such as the capacities for thought . . . freedom and moral choice, a sense of beauty, love and friendship . . . family and civic life . . . and the impulse to worship. Yet . . . the universal attribution of dignity to human beings on the basis of the specific attributes of our humanity pays tribute only to human *potentiality*. . . . *Full* dignity, or dignity properly so-called, will depend on the *realization* of these possibilities" (318, 320). Omitted from this picture, as from Fukuyama's handling of Factor X, is dignity as covering cases (e.g., of those in a persistent vegetative state [PVS]) where no distinctively human capacity can be expressed. This is a problem because Kass, like Fukuyama, maintains that "respect for anything *human* requires respecting *everything* human, requires respecting human *being* as such" (2008, 325). Kass's later insistence that "the dignity of being human [is] rooted in the dignity of life itself" (329) covers PVS, but at the price of eliminating his overall focus on what is *distinctive* of human beings.

6. All numerical citations of Plato are from the Greek, Oxford Classical Texts.
7. On the philosophical merits of Socratic method (i.e., the elenchus), see further Robinson (1984, 7–19). Though I am heartened to see the elenchus mentioned toward the end of lessening fruitless contention among enhancement discussants, I diverge from Parens's reduction of the contrast between dialectical method and the elenchus to the difference "between arguing for the sake of understanding a question and arguing for the sake of refuting one's opponent" (2009, 196).
8. In the work of enhancement critics, one also finds problematic moral reliance on allegedly bedrock emotional responses. The routinely cited example is "repugnance," Kass's (1997) invocation of which transhumanists such as de Grey (2008) repudiate. That said, a hasty, wholesale denial of moral worth to visceral repulsion toward bioenhancement is unwarranted (Kaebnick 2008; Midgley 2003, 121).
9. Vallor, too, links both features to transhumanist thought (2011, 142–43). Per Hauskeller, for transhumanists, "Self-creation . . . is what defines us as human beings" (2013, 67). Transhumanists operate with a twofold lens on our nature. On the one hand, it represents constriction (2016, 50, 57). On the other, "Creative engagement with the world . . . reshaping of the given, is the true goal of the rational faculties that we possess, and it is this goal that makes us what we are" (76). Hauskeller appears to give pride of place to self-creation elsewhere, too, stating that transhumanists' "envisaged act of deliberate self-creation is what . . . marks us as human" and that they often "[reinterpret] the rational animal . . . as an essentially self-enhancing animal" (102, 86–87). Yet he also maintains that transhumanists "continue the logocentric tradition of Western philosophy. By and large, they believe that what makes us human, and what is most valuable about our humanity, is the particularity of our minds. . . . Our essence consists in our thinking" (80, see also 83). At minimum, there is a difference of emphasis between passages in Hauskeller's accounts that foreground reason and those that give primacy to self-creation. To me, this difference matters; my own view aligns with the former, not the latter.
10. My concern here is transhumanists' avowal of a close tie to the Enlightenment, not with how well it holds up; I attend to the latter, with a focus on Kant, in Chapter 6.

11. Here, as elsewhere (2019), Bostrom "conflates the view that our best moments most fully realize our human nature as rational beings—Aristotle's . . . stance in the *Nicomachean Ethics*"—with his own notion that "these moments reflect a kind of intensity or purity that we not only want but could have without interruption on a higher ontological plane" (Levin 2017a, 282). Of course, posthumans, not human beings, would have such experiences.
12. Nontranshumanists, too, put substantial weight on the impetus to self-creation. Kaebnick, who does not oppose enhancement per se but rejects the radical variety, characterizes human beings as "in a very significant way, fundamentally self-creating beings" (2014, 166; see also Glover 2006, 69–71). Of course, self-creation means something very different to them than it does to transhumanists; for Kaebnick, it necessarily includes the fact that we "live in cultures that form [our] natures" (2014, 166).
13. Bostrom, too, emphasizes creativity: while "weak superintelligence" comprises elevated informational processing as measured by quantities and speed, the strong type involves "an intellect that is not only faster than a human brain but also smarter in a qualitative sense" (2003b, 12); on this account, "scientific creativity" is related to the strong variety (12).
14. Of such a process, Bayertz writes: "The criterion by which the success of a reconstruction of humanity is to be evaluated is its chance of leading to another reconstruction, which is then capable of leading to yet another reconstruction, etc. Doubts about autoevolution are . . . concerned . . . with its desirability. Even if it should prove possible, this process is worryingly *empty*: its various stages are aimed solely at continuation" (1994, 275).
15. Interestingly, prior to his experiments at Stanford's Bing Nursery School, Mischel himself stressed environmental factors such as the impact of subjects' low versus high "generalized expectancies for success" on the studied behavior (Mischel and Staub 1965, 626; see also Mischel 1961). For emphasis on the impact of environmental factors, especially caregiver reliability and socioeconomic status, in others' studies of children's behavioral control, see Barnes and Farrell (1992); Kidd et al. (2013); Mittal and Griskevicius (2014). Kidd et al. (2013), cited also by Sparrow (2014e, 186n13), is particularly notable here, for the results of their own marshmallow experiment directly challenge the view that children's performance on Mischel's "marshmallow task" reliably indicates the relative strength or weakness of their native capacity for self-control. Per Kidd et al., rather than supporting the view that this capacity is "the primary causal mechanism implicated in children's wait-times . . . the effect [they] observed is consistent with converging evidence that young children are sensitive to uncertainty about future rewards" (113).
16. So confident is Savulescu (2014a) that Mischel's position is an established truth that he does not even mention Mischel's research, stating simply that "impulse control (or ability to delay gratification) has been strongly correlated with academic and social success, higher socio-economic status, and lower risk of imprisonment" (174). From this allegedly clear-cut verity, it follows that "if some set of genes were associated with poor (but within the normal range) impulse control, couples should select other embryos with a better impulse control profile. . . . The reason is that embryos

with genetic dispositions to better impulse control are likely to become future people who are more likely to have better lives, whatever they choose to do" (174–75).

17. Commenting on the same passage in Schaefer et al., Pömsl and Friedrich observe that the addicted individual "forms a higher-order volition to not be an addict, but nevertheless she is not able to ensure that volition is followed through. To increase autonomy in this sense does not require a greater amount of reasoning ability above a necessary threshold, but the ability to regulate emotions or passions properly. . . . If a person reaches a necessary threshold in terms of their ability to reason, other aspects affecting coherence become more important, and enhancing reasoning ability does not increase the likelihood of living a more autonomous life" (2017, 250).
18. Interestingly, Savulescu et al. (2014b), who do not invoke overlapping consensus, expressly distinguish their stance from Frankfurt's when claiming (132) that "there are other accounts of autonomy—such as the rationalist account that we outlined" in Savulescu et al. (2014a, see especially 106–107).
19. In Novaco's view, within psychopathology, "dysregulated anger," manifest, e.g., in hyper-intensity and -reactivity, is "best understood in the context of [specific] disorders," including psychotic disorders, those of personality and mood, and post-traumatic stress disorder (2010, 467, 486).
20. The opposite applies to pleasant experiences, whose possible scope and intensity should be maximally augmented. The two projects may be separated, as when Pearce (2007) assigns moral precedence to extirpating the deleterious, namely, negative affect.
21. Transhumanists' presentations of cognition are not wholly consistent (cf. Hildt 2013, 4). At times, cognition is more broadly construed, as when Bostrom deems it to include "general intellectual capacities, such as memory, deductive and analogical reasoning, and attention, as well as special faculties such as the capacity to understand and appreciate music, humor, eroticism, narration, spirituality, mathematics, etc." (2008, 108). I present here an account that routinely emerges in transhumanists' presentations.
22. The phrase "informational epistemology" is also used by Rose (2007, 44).
23. Concerning the relation of mind and brain, I reject both substance dualism, whose untenability on scientific grounds Levy aptly shows (2007, 8–17), and reductionism, both genetic and neural (for discussion, see Levy 2007, 97–98; Crawford 2010, 355–56; Kohls and Benedikter 2010, 55). As Levy observes, although "every thought has a neural correlate . . . it does not follow that for every *type* of thought there is a *distinct* neural correlate" (2007, 134–35). In addition, as he makes clear apropos of future prospects for mind reading, thoughts of what is ostensibly "the same thing" are by no means identical across individuals or for one person at different times (141).
24. Transhumanists are, of course, far from alone in making this assumption. Though Persson and Savulescu give precedence to moral over cognitive bioenhancement out of a concern for human survival (see Chapter 3), they do not doubt the efficacy of pharmacological enhancers of cognition (2008, 164–65); indeed, their worry that continued cognitive enhancement will dramatically outpace the moral variety is premised on it.

25. While an epidemic of stimulant use is widely believed to exist, this view has been called into question (Quednow 2010; Lucke et al. 2011, 39–40; Buyx 2015, 1194; Zohny 2015; Jensen et al. 2016, 148–50). My line of argument against transhumanists regarding cognitive enhancement in no way depends on current rates of stimulant usage toward that end. With cognitive enhancement in view, there has also been some off-label use of donepezil (Aricept), which raises levels of acetylcholine and is prescribed in cases of mild to moderate Alzheimer's disease (de Jongh et al. 2008, 761–62; Farah 2010a, 13).
26. Nonetheless, Gordijn and Buyx see nonpharmacological technologies, invasive ones included, as a launching point for the advent of successors aimed at elevating cognition, construed in terms of an ability "to store and retrieve larger quantities of new information" (2010, 287–89, 291); for example, "A chip could be implanted in the brain, which would function as a kind of reference book" (289). Assuming that nontherapeutic benefit from DBS is shown, Pacholczyk (2011) favors its availability to augment individuals' hedonic setpoint. Her discussion reflects a consumer-driven view that the medical profession "should . . . provide the benefit that the patient seeks, and so the burden of giving reasons against [providing individuals with DBS] rests on those who would deny this potential benefit" (1).
27. Although it does not exhaust the employment of psychostimulants, which can also be recreational, their most common use is for cognitive enhancement (Outram 2012, 175–76). There is some concern about the addictive potential of all three stimulants considered here (for discussion, see Kollins et al. 2001; Kumar 2008, 1834; Heinz et al. 2012; Mohamed 2012). Although the precise mechanism by which modafinil produces its impact remains unclear (Buyx 2015, 1194), it, like methylphenidate and amphetamine, strongly affects the dopamine system (Heinz et al. 2012, 373). Especially worrying for Heinz et al. is that this system is key both to users' hoped-for cognitive effects and to psychostimulants' addictive potential. Because the development of drugs for cognitive enhancement that do not rely on the dopamine system is currently unforeseeable, it is unlikely that addictive potential will disappear from future versions of stimulant drugs (Heinz et al., 373–74). Other dangers to health from methylphenidate and amphetamine include their possible contribution to high blood pressure, risk of stroke and myocardial infarction, and psychosis (Glannon 2015, 1255–56).
28. Due to this paucity of evidence, Racine and Forlini suggest replacing talk of "cognitive enhancement" through psychostimulants with "a more neutral [formulation] (e.g., 'non-medical use of prescription drugs')" (2009, 469).
29. As defined by Ilieva et al., working memory "involves active short-term maintenance of information and is essential for many forms of thinking and problem-solving" (2013, 499). Clatworthy et al. (2009) found that the same dose of methylphenidate yielded different effects on an individual's performance of reversal learning and spatial working memory tasks. Their findings support the view that methylphenidate "affects different cognitive tasks by modulating distinct fronto-striatal loops with distinct optimal dopamine levels and provide a neurobiological account of within-subject variability in drug effects across different cognitive tasks" (4694). The

existence of separate peak dopamine levels for the two cognitive tasks means that methylphenidate "can clearly exert detrimental as well as beneficial effects on cognition at the same dose in the same individual" (4695). The key concept here, which Clatworthy et al. (4691, 4695) invoke, is the "inverted-U" curve, the idea being that dopamine levels tied to peak performance differ across cognitive tasks and that individuals' performance on any such task declines once that optimal level is surpassed. Since the two cognitive tasks investigated here differ in their associated peak levels of dopamine, an individual's system can be overtaxed for one but not the other.

30. Beyond this, forgetting is a salient feature of certain neural networks (Rolls 2012, 54). Increasing the number of long-term memories could be detrimental if, for instance, retention of extraneous details about entities previously encountered prevented one from recognizing pertinent commonalities (Hauskeller 2013, 22–24). For Hauskeller, "This means not simply that forgetting can be as important for us (and for the ability to perform well in certain contexts) as remembering, but . . . that forgetting is *itself* an integral part of memory, at least for that kind of memory that connects the past to the present" (24). For the President's Council on Bioethics, apart from extreme cases of individual impairment, pharmacological memory-blunting is morally troubling from individual and communal standpoints (2003, 218–34).
31. Looking ahead on such a basis, Farah et al. raise the question, "Would endowing learners with super-memory interfere with their ability to understand what they have learned and relate it to other knowledge?" (2004, 423).
32. Reviewing studies of TMS for cognitive enhancement, Luber and Lisanby contend that although brevity is a drawback of its enhancement effects, it may promote "acute facilitation of skills needed to interact with ever more complex information technology" (2014, 967–68).
33. Unlike tDCS, which involves only neuromodulation, TMS also permits neurostimulation (Cabrera et al. 2014, 35). Though single-pulse TMS is suitable for investigative purposes, repeated use (rTMS) can cause worrisome shifts in neural activity that endure post stimulation (35).
34. Of course, just as high creative potential is essential for creativity but no guarantee that this capacity will be actualized, originality is crucial but insufficient; flexibility, for instance, is also needed (Runco and Acar 2012, 67; Runco et al. 2006, 269). Further, in some domains, having a suitable knowledge base is a prerequisite (Runco et al. 2006, 275–77).
35. "Executive function" may be defined as "[the] cognitive system that controls and manages other cognitive processes and is involved in planning, cognitive flexibility, abstract thinking and inhibiting inappropriate actions" (de Jongh et al. 2008, 761). Similarly, per Arnsten and Li, executive functions "includ[e] regulation of attention, planning, impulse control, mental flexibility, and the initiation and monitoring of action, including self-monitoring" (2005, 1377). The definition of Repantis et al. foregrounds "abilities that enable flexible, task-appropriate responses in the face of irrelevant competing inputs or more habitual but inappropriate response patterns" (2010, 202).

36. Dietrich and Kanso also found that divergent thinking "is not neuroanatomically detectable as a stand-alone, independent entity. Rather, it appears to involve the same brain regions that also handle the normal, noncreative information traffic associated with a given task" (833). Creativity is not "particularly associated with the right brain or any part of the right brain," nor is it "particularly associated with any single brain region, the prefrontal cortex excluded" (845). Moreover, the prefrontal cortex "is evidently not involved in creativity in a simplistic yes-or-no fashion" (845).
37. Cf. Agar, who contests this view by arguing, from the standpoint of "neurological holism," that Kurzweil's law of accelerating returns requires supersession by "new fundamental principles," whose discovery would require pronounced creativity (2010, 45–49).
38. Interestingly, sleep-deprived subjects on modafinil are prone to paint an overly rosy picture of their cognitive performance (Repantis et al. 2010, 204).
39. This reliance on older work calls to mind Savulescu's dependence on Mischel's research involving children and self-control.
40. Further, experimental findings support the view that a negative mood augments politeness (Forgas 2014, 24–26), which is not merely a matter of etiquette construed in an innocuous, nonmoral way.

Chapter 2

1. See, e.g., Vallor (2016), whose argument for "*technomoral* virtues for 21st century life" (10) draws on Aristotelian, Confucian, and Buddhist virtue ethics. Radoilska (2010) draws usefully on Aristotle's *Nicomachean Ethics* when arguing that cognitive enhancement would likely jeopardize the very possibility of agents' excelling in terms of their contributions to epistemic results and appreciation of the epistemic endeavor. Less plausibly, Fröding (2011) argues that "neuroenhancers could enable more people to become virtuous" in Aristotle's sense, claiming that cognitive bioenhancement could "mimic" some "worthwhile aspects of the virtuous life" (231, 229). Fröding rightly observes that Aristotle's virtues "transform the agent" (229). But when she defends the compatibility of his virtue ethics with the use of bioenhancement technologies, Fröding greatly waters down Aristotle's view that moral virtues are uniquely exacting excellences, ones requiring balance between rational and nonrational faculties. She also leaves out of account his insight that extensive habituation and experience, starting in childhood, are needed for one's cultivation of the requisite contextual attunement.
2. Subsequently, Greene argues, unsuccessfully (Klein 2011, 151n14), that while the results of Greene et al. (2001; 2004) were correlational, his newer finding that cognitive load increases response time for utilitarian judgments in difficult moral-personal dilemmas shows "a causal relationship between controlled cognitive processes and utilitarian moral judgment" (Greene et al. 2008, 1147). In fact, Greene's earlier work included an unsubstantiated causal claim (Greene et al. 2001, 2106).

3. Though I oppose dual-process theory as such, Greene's approach has distinctive weaknesses. The findings of Greene et al. (2001) allegedly bear on "the more complicated moral dilemmas we face in our public and private lives" (2107). But situations outside the lab often involve potential harms that Greene's restriction of "moral-personal" harm to the physical variety ignores. In addition, Greene et al. (2001; 2004) ask subjects what is "appropriate" for them to do (or refrain from doing) in particular situations. In the realm of morality, however, "appropriate" is ambiguous between "not inappropriate/permissible" and "the fitting thing to do." Greene et al.'s own formulations of dual-process theory use "ought" and "morally acceptable" interchangeably (2001, 2105); though Greene's dual-process theory is "inspired by" Thomson's formulation of the trolley problem, he ignores her emphasis on the centrality of this moral distinction (Greene 2016, 122; Thomson 1985, 1395). Further, Greene et al.'s dilemmas tend to treat individuals as discrete decision-makers, as though either human lives are not interwoven or those relationships do not bear centrally on individuals' decisions. Finally, Greene (2008) recasts consequentialism and deontology as "philosophical manifestations of two dissociable psychological patterns" (37). Since Greene et al. (2001; 2004) use psychological theory and methodology to shed light on a persistent philosophical quandary, Greene should not simply assume that results tied to this philosophically inspired agenda transfer over intact when their philosophical anchor is replaced by a psychological one (Schleim 2015, 192–95).
4. What's more, when unpacking the social pillar of morality, Haidt claims that his analogy involving bees "is not shallow or loose" (2012, 236). Not only is Haidt's "contrast between the intuitive elephant and the rational rider . . . too coarse," but, despite his claim to provide a truly "integrative" model, a reason-emotion dichotomy undergirds his argumentative reliance on "moral dumbfounding" (Kennett and Gerrans 2016, 80; Greenspan 2010, 549).
5. Though cognitivism and appraisal theories of the emotions are closely related, they are not identical. According to a small group of theorists called "neo-Jamesians," appraisals are rooted, not in cognition, but in our embodiment (Prinz 2004); specifically, emotions are identified with feelings stemming from bodily shifts (Deigh 2010, 20).
6. When used in the context of appraisal theory, the term "adaptation" has a much broader meaning than it does in evolutionary psychology (Wranik and Scherer 2010, 252n3).
7. Scherer elsewhere condenses the first two categories into one, termed "relevance detection" (Wranik and Scherer 2010, 246).
8. *Pace* Lazarus, however, "The apparent speed of an emotional reaction to an event does not rule out a sequential model, if one assumes that at least some of the checks can be performed extremely rapidly (particularly when lower brain structures are involved)" (Grandjean and Scherer 2008, 342).
9. Rather than equating feeling with emotion, like neo-Jamesians, Scherer deems feeling to "serv[e] a monitoring function to facilitate regulation" (Grandjean and Scherer 2008, 341).

10. On the salience of memory in appraisal theory more generally, see Kappas (2001, 162–63).
11. Although Scherer says that the "norm/self compatibility check" is not unique to humans, the way he unpacks it suggests otherwise (1987, 22–23).
12. Use of the term "dimension(s)" within appraisal theory should be distinguished from "dimensional theories" of emotion, which "postulate that emotions can be classified along certain underlying dimensions such as pleasantness, excitement, and tension, suggesting that each emotion occupies a unique region in this multidimensional space" (Ellsworth and Scherer 2002, 574). Generally, these models of emotion "propose two dimensions, *valence* (feeling good or bad) and *arousal* (degree of felt activation)" (Wranik and Scherer 2010, 245). While dimensional models seek only to describe emotions, appraisal theories aim also to explain them (Ellsworth and Scherer 2002, 574).
13. Though Wranik and Scherer make this comment when critiquing "neo-associationism" (244–45), it applies, as well, to basic-emotion theory.
14. Scherer also applies his appraisal theory to emotional disruption in depression and anxiety disorders (1987, 48–49). In my view, Scherer's appraisal theory renders otiose the controversial question of whether there are any specifically moral emotions. In addition to fruitfully covering all emotions and emotional expressions under a single head, it problematizes the existence of firm individual categories such as anger.
15. Libet famously claimed that "voluntary acts can be initiated by unconscious cerebral processes" prior to conscious awareness (1985, 529). Since Scherer, among others, allows that initial evaluations not only can be but frequently are unconscious, experiments such as Libet's do not invalidate his notion that the appraisal process is, broadly speaking, cognitive throughout.
16. My focus is on what views Scherer's theory is compatible with. He need not and does not make all the points I mention; indeed, he might not agree with them all.
17. Tavris goes further, arguing that anger is unique to humans (1989, 33–38).
18. When this conflation occurs, transhumanism mirrors evolutionary psychology (Loewenstein and Lerner 2002, 628).
19. As to scope, my discussion concentrates on areas of the brain that are regularly singled out as important when emotion, cognition, and reason are subjects of debate.
20. Scientists distinguish homology, involving "common derivation," from analogy, or "similar observable properties" (Barrett 2006, 34).
21. As Pessoa observes, "The cortical regions that are considered affective involve the more 'primitive' cortex" (2008, 151). This construction of subcortical and older cortical areas as "primitive" arguably reflects the longstanding, stark devaluation of emotion compared with reason.
22. Buckner and Carroll's view of this network fits broadly with Heidegger's idea in *Being and Time* that, phenomenologically, "past," "present," and "future" are different ways of being intentionally directed in the present (Levin 2019, 164).
23. When defending the view that a single network steers "decision-making and social behaviours" (Moll et al. 2005, 802), Moll et al. (2005) and Moll and Oliveira-Souza (2007) rely heavily on findings for brain-damaged subjects.

24. Methodologically, the view that emotion and cognition are "separate entities" may have been reinforced by the fact that "data arising from single-unit or lesion studies usually allow the researcher to derive conclusions only concerning the specific areas being targeted" (Pessoa 2008, 155).
25. It should be noted that researchers' claims of functional compartmentalization within the brain, made, e.g., in the "region of interest" studies of Greene et al. (2001; 2004), depend on neuroimaging technologies, particularly fMRI, which measures "metabolic correlates of neural activity" (Illes et al. 2006, 156; see also Schleim and Roiser 2009). Faith in neuroimaging is tied to the faulty premise that "mental processes can be analyzed into separate and distinct faculties, components, or modules, and further that these modules are instantiated, or realized, in localized brain regions" (Crawford 2010, 356). Neuroimaging technologies do not yield "pictures of mentation" (355); instead, they operate indirectly, by measuring differences in blood oxygenation (Farah 2010b, 139–40; Canli and Amin 2010, 149; Gray and Thompson 2010, 156). Neuroimaging can show only correlations, not causality, and even its correlational reliability is contested (Ellis 2010, 66–70; Schleim and Roiser 2009).
26. Aristotle's anticipatory role here is widely recognized (Ellsworth and Scherer 2002, 572; Scherer 2002, 563; Deigh 2010, 26; Moors et al. 2013, 119).
27. Translations of *De Anima* are by Smith (1984). In citations of Aristotle, all line numbers and provisions of Greek are from the Oxford Classical Texts.
28. Unless otherwise noted, translations of the *Nicomachean Ethics* are by Ostwald (1962), with certain adjustments.
29. My translation.
30. My framing of the contrast between Aristotle and transhumanists concerning reason differs from Hauskeller's (2013, 80).
31. Aristotle's view is not that any and all acts and responses may sometimes be appropriate; as MacIntyre (1988, 121) observes, on Aristotle's account (II 6), certain ones (e.g., adultery, *Schadenfreude*) are categorically precluded.
32. Unlike Aristotle, Schaefer et al. (2014) leave unaddressed the question of whether they view pleasure in lockstep with desire or in some other, perhaps more flattering, way.
33. When arguing that technological enhancement is needed to help people become virtuous à la Aristotle, Fröding does not adequately differentiate these senses of *phusis* (2011, 226, 231).
34. Translations of the *Physics* are by Hardie and Gaye (1984).
35. The Greek term *logos*, used in *Nicomachean Ethics* I 7 with the meaning "reason," is a "protean word" (Lear 1988, 163) that translates also as "language" and "proportion." Aristotle's account of the human soul and virtue incorporates his commitment to *logos* in all three senses. On the import of linguisticality to human morality per current theorists, see, e.g., Helm (2010, 319); Greenspan (2010, 547).
36. On this basis, those who devote themselves to the satisfaction of *epithumiai* (for Aristotle, the majority) live as befits cattle, not human beings (*EN* 1095b19–20).
37. Casebeer's recognition that his position and Aristotle's are not identical (2003a, 68) excludes the fundamental points that I address. Further, Casebeer grants that

"bringing Aristotle up to date, biologically speaking, will have an impact on his moral theory" (2003c, 49) but does not specify the needed adjustments.

38. So far does Casebeer take this line of reasoning that plants, bacteria, and insects are said to be "minimal moral agents" that "adapt to environments . . . over evolutionary time" (2003c, 92).
39. For present purposes, I need not address Casebeer's handling of connectionism, noting only that the "know-how" he presents (2003c, 104–107) involves "learning" in the sense of "heuristics" (Marblestone et al. 2016). This is not what Aristotle envisioned under "learning" in the case of virtue (*EN* II 1–6).

Chapter 3

1. Though the idea is represented in their debut article (2008), the covering phrase "ultimate harm" figures prominently in their subsequent accounts.
2. We should distinguish the debate over moral bioenhancement from the controversy over whether their superior abilities would invest posthumans with a higher moral status than mere, unenhanced humans, namely, greater intrinsic worth that brings prerogatives including political authority (Buchanan 2009b; Agar 2014, 157–94). Addressing the latter falls outside my purview here.
3. In addition, Elliott's observation that "human beings can watch the gradual destruction by simplification of the Earth's biosystem" (523) makes an intriguing counterpart to the elimination of psychic complexity that Persson and Savulescu would support if needed to forestall ultimate harm.
4. See also de Melo-Martín, who critiques "the use of scientific claims that proponents present as uncontroversial and the weakness of the scientific evidence purporting to show that moral enhancement is plausible" (2018, 27).
5. On occasion, Persson and Savulescu manifest less confidence about the universality of the two traits and even the existence of "altruistic motivation" (2012, 32n18, 39–40, 112).
6. Also significant in this early period was Zak et al.'s contention that oxytocin "respond[s] to a social intention of trust and is associated with trustworthiness" (2005, 526).
7. Kosfeld et al. (2005) is more nuanced than is often suggested. Persson and Savulescu take the study to document stronger reciprocal prosociality (2012, 119). According to Kosfeld et al., however, oxytocin "does not increase the general inclination to behave prosocially" (2005, 675): trustees did not exhibit more trusting behavior, and the more trusting conduct of investors was not coupled with a stronger belief than trustees in others' trustworthiness (675).
8. Further, Persson and Savulescu (2012) wrongly assume that augmented prosociality, where it occurred, would translate into superior results for all causes directed to improving humans' milieu. Marsh et al. studied oxytocin in relation to altruistic causes, finding that it "induced a context-dependent change in altruistic behavior away from pro-environmental toward pro-social donations" (2015, 15696).

9. Bartz et al. also found that "the effect of oxytocin was moderated by individual differences in social proficiency" and that "increasing people's attention to social cues could be detrimental to individuals who are generally hypersensitive to social cues and have a bias towards interpreting them negatively. Indeed, these individual- and population-specific effects of exogenous oxytocin might reflect differences in the endogenous oxytocin system" (2011, 302, 307).
10. Moreover, there is evidence that, in both humans and nonhuman primates, serotonin increases dominance behavior that may be aggressive (Raleigh et al. 1991; Moskowitz et al. 2001, 287; Tse and Bond 2002, 328).
11. In addition to being individually complex, the serotonin, oxytocin, and dopamine systems are not self-contained (see, e.g., Dalley and Roiser 2012, 52).
12. The power of epigenetics is increasingly recognized even in the case of monozygotic twins. Despite sharing a genome, they vary in the incidence and severity of "schizophrenia, bipolar disorder, and autism, as well as in numerous other complex diseases," such as cancer, diabetes, and asthma (Petronis 2004, 965; see also Wong et al. 2005). There is evidence that "epigenetic effects by means of DNA methylation have an important role in development but can also arise stochastically" during aging (Jaenisch and Bird 2003, 245).
13. They note, in addition, experimental work on "knockout mice," namely, those "with a targeted deletion of MAOA" (159–60; Reif et al. 2007, 2376).
14. In its function as launching- and reference point for subsequent research, Caspi et al. (2002) played a comparable role to Kosfeld et al. (2005): both propelled a flurry of attempts to replicate a biological link to a salient, complex phenotypic trait.
15. As with serotonin, the type of aggression under discussion with the MAOA polymorphism is impulsive (Huizinga et al. 2006, 677). Thus, even if—most hypothetically—a clear connection among MAOA-L, childhood mistreatment, and aggressive conduct were one day found, and assuming, further, that biotechnology could handle that situation, the premeditated variety would remain unaddressed; the same applies to antisociality, broadly construed by Persson and Savulescu in *Unfit for the Future* to span all akratic conduct.
16. See also Harris: "A very fundamental problem . . . is that the sorts of traits or dispositions that seem to lead to wickedness or immorality are . . . the very same ones required not only for virtue but for any sort of moral life at all" (2011a, 104). Further, "We would need to be pretty sure that 'the reduction in the degree to which the emotion was experienced' could be precisely targeted only on strong aversions to things it is bad to have strong aversions to and not on things to which strong aversions are constitutive of sound morality" (105). We have no grounds for such confidence. Quite the opposite.
17. While these theoretical distinctions are clear, in practice, as evident from Trivers's discussion of birds and warning calls (1971, 43–45), it can be hard to differentiate behavioral altruism from reciprocal cooperation. It can also be a challenge to delineate reciprocal cooperation from reproductive altruism, food sharing in vampire bats being a case in point (Clavien and Chapuisat 2012, 3).

18. I aim not for exhaustiveness but to bring out the most significant flaws in Persson and Savulescu's argumentation; nor do I purport to consider the full range of objections to experiments that are alleged to support strong reciprocity.
19. We are apparently supposed to assume that these "emotions" are equivalent to the attitudinal core that they are trying to document.
20. Elsewhere they hedge, finding it unclear whether chimps have a sense of justice (35). If they are using "fairness" and "justice" nonsynonymously here, Persson and Savulescu owe us a clarification given their interchangeable use of the terms elsewhere.
21. As we explore the pertinence of these studies to Persson and Savulescu's "sense of justice/fairness," it is useful to bear in mind that in the setting of economic games, fairness is the concept of choice.
22. To the extent that, within economics, the primary focus is "general descriptions or predictions of behaviour in socioeconomic contexts" (136), this omission from game-centered studies in that field makes sense.
23. In addition, attempts to confirm the existence of strong reciprocity outside the lab have been unsuccessful (Guala 2012a, 6–11, 14).
24. Axelrod's finding, that tit-for-tat is the most successful strategy in an iterated prisoner's dilemma game, often taken as gospel, has been subject to challenge (Rapoport et al. 2015).
25. Harris effectively contests this claim (2011a, 106–108; 2013b, 285–86).
26. In general, their term "disposition" is ambiguous between a behavioral tendency and an attitude that motivates from within (2012, 12, 33, 39, 108–109).
27. Similarly, Savulescu and Sandberg support the neuroscientific modification of "lust, attraction and attachment . . . by blockers or enhancers" (2008, 37).
28. Recognition of a sort is also evinced when they introduce a distinction under the head of "moral enhancement," in terms of which reducing cognitive biases would fall under "moral enhancement in a wider sense" (2012, 109).
29. Walker, too, fundamentally mistakes what virtues are: asserting the feasibility of "engineering genetic virtue," he contends that "exhibiting virtuous-like behavior is sufficient for virtue, e.g., it is sufficient for the virtue of truthfulness that one exhibits truthful behavior" (2009, 28, 30). For emphasis on the divide between the notion of "engineering" virtue and what becoming virtuous actually involves, see Jotterand (2011).
30. In passing, Persson and Savulescu raise the issue of balance; for instance, "Too much altruism may be an obstacle by making us turn the other cheek when tit-for-tat requires retaliation. . . . Altruism and . . . tit-for-tat emotions need to be properly attuned to be maximally useful" (2008, 169). Not only would we have to engage in intensive, metalevel reflection on what would qualify as suitably attuned prosocial attitudes/emotions (Raus et al. 2014, 267), but even if we ascertained this, discerning whether or when we had reached them would itself require nuanced, and likely contentious, interpretive mappings of accounts onto phenomena themselves.
31. What's more, insofar as "everyone is much better off for the absence of evil," a world over which the God Machine presided should be attractive to us (414).

32. Based on Sartre's (2001) distinction between theistic and atheistic existentialism, Jaspers is a theistic existentialist, but his positions on freedom and perishing considered here stand independently of that classification (Jaspers 1961, 268, 284–85, 323; Thornhill 2018).

Chapter 4

1. Some utilitarians foreground the moral worth of all sentient beings and argue for "conclusions that . . . flow from the principle of minimizing suffering" (Singer 2009, 21). Transhumanists Bostrom and Pearce evince a utilitarian affiliation when they stress "the ability to suffer as . . . normatively relevant common ground between humans and animals" (Hauskeller 2016, 100).
2. The two do intersect, of course, as when healthcare providers discuss parents' worries about immunization (Porter 1999, 5; Kennedy et al. 2011, 1155).
3. Mill is routinely identified as the original source of this principle, though he did not employ the phrase (Powers et al. 2012, 7).
4. "Personalized medicine" activates the same ethical duty, but with a focus on predictive genetic technologies. This phrase has largely given way to "precision medicine," in recognition that the actual goal here is to identify and influence the conduct of at-risk groups (Juengst et al. 2016, 22–23). This shift is unsurprising, as "human genetics and public health sciences share certain essential perspectives," including "a focus on populations" (Bayer et al. 2007, 354). Precision medicine "seeks to promote a culture of personal responsibility for one's own health, and does so by using the language of empowerment. But because terms like 'participation' and 'empowerment' carry positive connotations, we should be attentive to the full spectrum of ethical implications . . . that these terms might have [for] the public perception of precision medicine" (Blasimme and Vayena 2016, 183). Challenging transhumanism, Koch contends that "a public health perspective based (implicitly or explicitly) on Darwinian competition ignores the degree to which the health of the community affects the health of all. To advance 'personalized medicine' as a marketable commodity is to ignore this" (2014, 1684). Though Koch is right to contest transhumanists' notion of us as isolates, his advocacy of a public-health vantage point is insufficiently cautious and could end up playing into transhumanists' hands.
5. Widespread immunization of children against vaccine-preventable diseases in the United States "led to dramatic declines in the incidence of contagious diseases" over the course of the twentieth century (van Panhuis et al. 2013, 2152). In 2000, for example, "Endemic transmission of measles was declared eliminated" (Shim et al. 2012, 194).
6. Rates of childhood immunization for vaccine-preventable illnesses have fallen in recent decades (Omer et al. 2009, 1981; Phadke et al. 2016, 1150). When legal exemptions are relatively easy to procure, vaccination rates drop and rates of infection rise (Sugerman et al. 2010, 753–54). As a result, the United States is experiencing more outbreaks of vaccine-preventable diseases whose endemic transmission had been firmly under control (Sugerman et al. 2010; van Panhuis et al. 2013; Phadke et al.

2016). Lower vaccination rates undermine herd immunity, even putting vaccinated individuals at risk (Feikin et al. 2000, 3150; van Panhuis et al. 2013, 2152; Phadke et al. 2016, 1154). As is often observed, most people today lack direct familiarity with harms that vaccine-preventable diseases can wreak, and, underestimating their children's risk of disease, parents may be less inclined to vaccinate them. Meanwhile, harmful events post immunization are erroneously assumed to be caused by vaccines (Feudtner and Marcuse 2001, 1158). Parents' increasing refusal of vaccines "poses a threat to [current] vaccination policies" (Shim et al. 2012, 194). Due in no small part to pronounced jumps in reported cases of measles in 2015 and 2019, states have been moving to tighten nonmedical exemptions (Haas 2019; Hall 2019; Koerner 2019). Unlike what Persson and Savulescu propose for moral bioenhancement, this greater legal stringency has evident utilitarian support, as threats from infectious disease and the benefits of vaccines have been amply demonstrated. A stricter policy can be defended on nonutilitarian grounds, too, based on parents' responsibility to preserve their children's prospective autonomy—what Feinberg calls their "rights-in-trust," or "anticipatory autonomy rights" (1980, 125–26).

7. Although weapons of mass destruction that concern Persson and Savulescu include biological weapons, their focus is not epidemiological per se.
8. Annas's criticism of the Model Act for "treat[ing] citizens as the enemy" (2002, 1340) applies all the more to what Persson and Savulescu propose.
9. Parens and Knowles make this point of reprogenetics (2007, 258).
10. Further, Persson sounds a frankly antidemocratic note: "If super-persons would harm unenhanced humans, it is likely to be in morally permissible ways, since we have assumed that their enhancement includes moral enhancement" (2012, 693).
11. The bearing of a public-health milieu is also signaled by transhumanists' emphasis on prevention. Though they dismiss the merit and very coherence of the treatment-enhancement distinction, transhumanists are not as conceptually iconoclastic as this move makes them appear, for their strong motivation to forestall harms that would occur if bioenhancement were not avidly pursued dovetails with current tendencies to broaden the wingspan of public health.
12. This line of argument has also been pursued by Buchanan, a nontranshumanist supporter of bioenhancement, who references herd immunity and economic boons of immunization to buttress his advocacy of cognitive bioenhancement (2008, 10, 12, 29n7).
13. The term "externalities" is borrowed from economics (Sarewitz 1996, 127).
14. I say "generally" because, as Mill himself shows regarding autonomy and justice in *On Liberty*, the principle of utility alone is absolute.
15. Usage of e-cigarettes by young adults (ages 18–24) is also substantial (HHS 2016, 37).
16. Since my focus here is nicotine vaping, I need not address the outbreak of "severe respiratory illness" that has been "strongly linked" to the inhalation of vaping products containing vitamin E acetate—sometimes used to thicken those containing THC, the compound responsible for marijuana's psychoactive effects (FDA 2019; CDC 2019a; 2019b). As of December 20, 2019, the CDC had not ruled out the involvement of additional substances because a small percentage of cases stemmed from vaping products not reported to contain THC (2019b).

17. Here, PB reflects transhumanists' general neglect of contextual impacts, as parents "would only be in a position to confidently select a child with a given level of well-being if they could confidently predict or determine the child's future environment" (Douglas and Devolder 2013, 410).
18. In contemporaneous publications, Savulescu separately gives prominence to moral and cognitive bioenhancement: in Persson and Savulescu (2008), cognitive enhancement, transhumanists' top priority as a group, is portrayed as upping risks of ultimate harm; under PB, however, Savulescu embraces it. He does not reconcile these different perspectives.
19. Decision-making under PB would encapsulate utilitarians' notion of us as rational decision-makers borrowed from economics (Savulescu and Kahane 2009, 278). This model of economic decision-making has been soundly critiqued (Schwartz et al. 2002; Ariely 2010).
20. According to Malmqvist, "It is not clear that therapy [i.e., treatment] and enhancement fit neatly into the broader categories of avoiding harm and conferring benefit" (2014, 52n2). I would say instead that transhumanists find harm-avoidance to be a vastly broader category than therapy construed, as per tradition, remedially.
21. There have been upticks, across decades, in average scores on intelligence tests. Since "these gains are far too rapid to result from genetic changes" (Neisser 1997, 442), inquiry focuses on social factors like education (1997; Blair et al. 2005).
22. That said, "Few believe liberal democracy to be the final and best form of government. . . . As the transhumanist movement grows, there will undoubtedly be a growing conflict between transhumanist defenders of democratic self-governance and advocates of enlightened technocracy" (629–30).
23. The distinctive burden that implementing the moral obligation embodied by PB imposes on women has thus far been underappreciated (de Melo-Martín 2017, 160–96; Overall 2012, 124–31).
24. Further, Johnson's perceptive comments about nanotechnology are applicable here (2007, 29).
25. Beyond their exuberance over anything that would quicken the arrival of posthumanity down the line, transhumanists are personally invested in reaping the boons of investment in, for instance, "curing aging" (de Grey 2004, 725).
26. Overall's own view is that knowingly creating a child who "will experience severe suffering," Tay-Sachs disease being the clearest example, is morally wrong (168, 157). I agree; since, however, my focus is on supporting the moral permissibility of prenatal testing and selective abortion to *avoid* disease and disability, I need not argue for the stronger claim.
27. For defense of a process-centered lens in the allocation of "last chance therapies," see Daniels and Sabin (1998).

Chapter 5

1. Those unaffiliated with transhumanism also use unitary language, for instance, "old eugenics" and "old-style eugenics" (Ekberg 2007, 582; Wikler 1999, 183).

2. Opponents' likening of transhumanist advocacy to Nazi eugenics may be self-serving, too (Paul 2005, 142); in sum, "Both critics and enthusiasts have (disparate) interests in constructing a history that identifies eugenics with brutal coercion" (142). Addressing the point about critics, though certainly important, falls outside my purview here.
3. To illustrate: During the 1920s, Fritz Lenz, "the main link between the [German and American eugenics] movements," had relationships with Laughlin, Charles Davenport, and Paul Popenoe (Kühl 1994, 19). Hitler himself corresponded with American eugenicists (85–86; Burgers 2011, 139). In terms of specific publications, Lenz referenced Laughlin in the 1931 edition of *Human Selection*, and in an article in the journal *Erbarzt*, Davenport sought at once to inform and to impress his German audience with American headway in eugenics (Proctor 1988, 99; Davenport 1936). More generally, the influence of US writings on German policy was facilitated by their German translation (Proctor 1988, 99). Travel of American eugenicists to Germany did not end with the start of World War II; for instance, Lothrop Stoddard, whose racialist writing was prominent in school textbooks there, met with Himmler and Hitler (Kühl 1994, 59–62). In addition, honorary degrees were awarded to several American eugenicists, including Laughlin (Comfort 2012, 97); because the Nazis controlled German universities, the awarding of honorary degrees was "equivalent to official Nazi recognition" (Allen 1986, 253).
4. Though I find the relationship more concerning than she does, I concur with Paul that the true backdrop for transhumanism is Anglo-American, not Nazi, eugenics (2005, 125–26; 2007, 5–6). Bearing on the point about levels of concern, perhaps, is that Paul features transhumans (2007, 5), reserving mention of posthumans, whose capacities would fundamentally surpass ours, for a footnote (15n1). Paul's division suggests that they are detachable, with posthumans being the less-directly-relevant aspiration. For transhumanists themselves, however, the opposite is the case.
5. Extensive common ground exists within the Anglo-American tradition despite movement away from the racialism of so-called mainline eugenics that Osborn illustrates (1968, 11, 104–105). Discussing Anglo-American eugenics by stage, including how far racialism was truly set aside, lies outside the scope of the present inquiry.
6. This feature relates to past and present exaggeration of genes' causal role involving complex phenotypic traits that reflects or verges on genetic determinism. On the deep connection of a belief in genetic determinism to a "rhetoric of futurity," see Esposito (2017).
7. It was C. W. Saleeby who, with Galton's blessing, introduced the terms "positive" and "negative" eugenics (Kevles 1995, 321n1).
8. Haldane eventually retracted his support of positive eugenics (Paul 2005, 132, 143).
9. Judgments of positive and negative in the realm of emotion are distinct from "positive" and "negative" eugenics; notably, positive eugenics includes the augmentation of rationality. That said, they are closely related: on the one side, the tamping down of antisocial emotions falls under negative eugenics; on the other, the heightening of fellow feeling belongs to the positive variety.
10. Well acquainted with Anglo-American eugenics but writing before transhumanism came to the fore, Bayertz offers pertinent remarks: "In [the] absence of . . . an

objectively justifiable vision of the good life, human control over human evolution will necessarily be subject to the technological imperative: orientational markers are not provided by socially constituted and rationally justified values, but by the chances provided by scientific and technological progress, together with the 'requirements' of scientific and technological civilisation" (1994, 283–84).

11. As we have seen, transhumanists urge generous resource allocation to their vision. The work of earlier eugenicists in the United States was supported not only by private funds but also via foundations including the Carnegie Institution of Washington and the Rockefeller Foundation (Davenport 1936, 97; Allen 1986, 236, 260; Kühl 1994, 20–21, 48–49, 66; Kevles 1995, 54, 103; Comfort 2012, 101, 158). Over time, eugenicists themselves got more directly involved in fundraising; for example, when the Pioneer Fund was established in 1937, Laughlin and Osborn were signatories (Kühl 1994, 111n18). After World War II, hopes and prospects for governmental funding brightened (Kevles 1995, 229–31; Comfort 2012, 144–45).
12. On Osborn's formulation, "The radical aspect of eugenics appears . . . in its requirement for a change in many social and economic forms which in the past have grown up, partly by chance and partly in response to immediate personal rather than eugenic needs" (1940, 291).
13. That said, both Haldane and Huxley find socialism preferable to capitalism (1932, 131; 1936, 27).
14. I note, but otherwise leave aside, the inconsistent attitudes toward liberal democracy displayed by Savulescu: hostile overall when defending moral bioenhancement, yet concerned to maintain it as a coauthor of Jefferson et al.
15. For emphasis on the utopianism of transhumanist thought, see Hauskeller (2016), who also notes the frequency of "techno-optimism . . . indeed techno-determinism" reflected in hopes for biotechnology, which "promises to be the real Philosopher's Stone" (17).

Chapter 6

1. Sterelny and Griffiths call these "causal" and "intentional" concepts of information, respectively (1999, 101).
2. In what follows, I cite the second edition (Wiener 1961), which preserves the original version intact, adding two supplementary chapters.
3. Shannon acknowledged Wiener's impact on his own theory of communication (Weaver 1949, 95n1). In the introduction to *Cybernetics*, Wiener situates his work in relation to that of McCulloch and Pitts, Shannon, von Neumann, and Weaver (1961, 1–29).
4. On servomechanisms, see further Gardner (1987, 19–20).
5. This despite the finding of Avery et al. that "a nucleic acid of the desoxyribose type is the fundamental unit of the transforming principle of [the bacteria] Pneumococcus Type III" (1944, 156). Cobb (2014) considers why Avery et al.'s discovery did not catch on in the mid-1940s.

6. For broader discussion of the backdrop to 1953 and the personages involved, see Judson (1996, 51–169).
7. Relatedly, "cognitive metaphors," such as "recognize," were used to depict features and roles of proteins and cells (Oyama 2000b, 54–83; Monod 1972, 46, 88).
8. A less direct source of the notion of a genetic "program" is the fixity associated with instinct (Oyama 2000a, 187).
9. This use of cryptological concepts was prompted by scientists' connection to military projects in that area (Kay 2000, 128–29; Gamow et al. 1956, 40). For a group of theoreticians, the genetic code "became a purely cryptographic puzzle" (Woese 2001, 1060); this notion of puzzle-solving endures (Schuler 1997).
10. In 1986, it was found that under unusual conditions, the meaning of one codon "is changed to specify [a] twenty-first amino acid, selenocysteine. Only a few proteins have selenocysteine in their sequences" (Atkins and Gesteland 2000, 463).
11. Oyama observes that "the conceptual line drawn around the genes . . . delimits inheritance proper, the genetic inheritance that was originally modeled on the inheritance of land, objects, or titles, but that now serves as the paradigm case" (2000a, 194).
12. Depictions of it as "a dictionary, a library, a recipe, a map, or a blueprint construct DNA as a comprehensive and unbiased resource, an orderly reference work. . . . The apparent precision of a map may make invisible the priorities and interests that shaped it" (Nelkin and Lindee 2004, 8).
13. The same parallel is drawn in transhumanist literature (Savulescu 2013a, 38).
14. According to Rathkopf, this analogy "is flawed primarily because it suggests that information is material stuff, which it is not. Blood can be removed from the body and nevertheless continue to deserve its status as blood (blood banks would be pointless were this not so). . . . In vivo, an action potential is just a burst of electrochemical activity. There's nothing particularly informational about it" (2020, 100).
15. I say "mind/brain" because typically in this milieu, the mind "is treated as a machine for manipulating symbols, an information processor firmly ensconced in, or identified with, the individual brain" (Oyama 2000b, 214).
16. Kay points out that "information" in "information theory" is already metaphorical: derived from everyday life and allegedly purified of meaning (2000, 21–22).
17. Among its critics, there is some controversy over whether " 'information talk' in biology" (Griffiths 2001, 395) is wholly inapposite or only mostly so (for discussion, see Oyama 2000a; 2000b; Griffiths 2001; Godfrey-Smith 1999; 2000a; 2000b). Addressing this controversy falls outside my current purview.
18. My items are versions of entries 2, 7, 10, and 6, respectively, on Leplin's list of claims that realists have made (1984, 1–2), but formulated in terms of correspondence theory, specifically.
19. Exceptions include Glover (2006, 99–100); Green (2006, 115).
20. Kant divides the categories into four subclasses: quantity, quality, relation, and modality (*CPR*, A 80/B 106). Translations of the *Critique of Pure Reason* are by Guyer and Wood (Kant 1998); both italics and bold type are Kant's. Page numbers and German quotations are drawn from the edition of Schmidt (Kant 1956).
21. Translations of Grunwald (2006) from the German are mine.

22. Though Grunwald focuses on nanotechnology, his views have wider applicability.
23. On transhumanists' failure to give contrast-dependency its due, see also Dauphin and Abell (2010, 598); Hauskeller (2012); Levin (2017a, 286–90).
24. Translations of *The Myth of Sisyphus* are by O'Brien (2018), with certain adjustments; page references are to the translation.

Chapter 7

1. Though these modern approaches can offer a spot to virtue, that place is secondary (Hursthouse and Pettigrove 2016).
2. A number of theorists have already brought virtue ethics to bear on facets of legal theory, including how we conceive of exemplary judges and attorneys (Farrelly 2008; Farrelly and Solum 2008; Hursthouse 2008; Sherry 2008; Solum 2008).
3. Regarding Heraclitus, see Diels-Kranz (1992) B 4, 43–45, 85, 110, 112, 119; in Democritus, see B 31, 37–40, 55, 61–62, 70, 74, 99, 170–71, 191.
4. The present paragraph draws from Levin (2019, 161–62).
5. Cf. the list of queries that Nussbaum associates with ancient philosophers from Socrates through the Hellenistic period (1990, 16).
6. From the virtue-centered standpoint adopted here, I find plausible Griffin's idea that "'incomparability' is what we accept, and should accept, 'incommensurability' strictly to mean. . . . We have uncovered incommensurability not when we cannot decide how to rank values but when we can decide that they are unrankable" (1997, 36–37).
7. This translation of the *Laws* is by Saunders (1997).
8. This is compatible, of course, with the fact that some, for instance, courage, are also exercised by individuals in reference to themselves, as when someone displays neither too much nor too little fear in confronting an internal challenge.
9. Unless otherwise noted, translations of the *Politics* are by Reeve (1998).
10. In civic friendship, the awareness of reciprocal good will that anchors individual friendships (*EN* 1156a3–5) is indirect and general, based on our joint belonging to a community. Civic friendship is "felt by each citizen for the other citizens en masse, and the only kind of friendship Aristotle recognizes that can be felt quasi-anonymously for a whole group of people. . . . In the political context, knowledge of the nature of the constitution, of the general level of support for it among the different elements of the population, and of what's generally expected of people in that society is the normal way of knowing about these things" (Cooper 2005, 86–87).
11. For examples, see Woodruff (2015, 602–603).
12. Targeting transhumanism, Agar makes the related point that we must preserve our ability to identify with others' accomplishments, which requires our seeing their feats in human terms (2010, 193–96).
13. A pertinent backdrop for me here is the existential function of dashed expectations in Heidegger's *Being and Time* (1984, § 32).
14. Sartre's greater openendedness about what is conveyed (77–89) is irrelevant to my point about virtue ethics.

15. He does say, however, that "if we could change ourselves, the tendencies in the world would also change. As a man changes his own nature, so does the attitude of the world change towards him. . . . We need not wait to see what others do" (Gandhi 2000, 241).
16. Vallor's list of virtues includes traits (e.g., flexibility) that I deem supporting nonvirtues (2016, 120).
17. The American Society of Civil Engineers's assessment of shortfalls does not factor in "catastrophic occurrences," such as Hurricane Katrina (10).
18. "Self-control" may sound like a supporting nonvirtue to us. Within virtue ethics, however, it is a moral excellence. Unlike the quality of tenacity, self-control, discussed further below, is always good for its possessor and has salutary external impacts with respect to human flourishing.
19. My aim in this limited space is to defend an approach to early education, not to detail its implementation.
20. Virtues of reason per se also include contemplative excellence; I do not consider it here since grasping the theoretical tenets of virtue ethics would not be a focus of primary education.
21. This applies both when students act well and when they misbehave (Wynne and Ryan 1997, 104; Watson 2014, 170).
22. Davidson et al. term the latter "performance character," as distinct from the moral variety.
23. Beyond our shifting of several Aristotelian virtues to the category of supporting nonvirtues, certain of the former should simply fall by the wayside; an example is *megaloprepeia* (munificence), which, unlike generosity, necessitates wealth (MacIntyre 1984, 182; *EN* IV 2).
24. For this emphasis to be integrated holistically, ways in which "the current climate of high-stakes standardized testing in schools" (Berkowitz and Bier 2004, 78) works at cross-purposes with that focus must be addressed. The presence of character traits is not strictly quantifiable since they are not reducible to acts and develop over time. Though evidence of the presence of these qualities cannot be as clear-cut as that for domain-specific knowledge or strictly behavioral phenomena, even in primary school, there is evidence that one can gather that would shed some light on where children stand: What reasons do they give for why they did or refrained from a particular thing? Do they enjoy acting well, and are they regretful when they behave poorly? How do they handle opportunities to perform virtuous acts (e.g., are they reluctant or enthusiastic)? Do they take initiative to practice what they are learning? Insofar as this can be ascertained, does what they learn in the classroom carry over to other contexts (e.g., the home, athletics)?
25. Of course, if the cultivation of virtue is to become "more deliberate, systematic and comprehensive," this shift must be reflected in teachers' own education (Sanderse 2012, 202).
26. My focus here on a single virtue is conceptual and not meant to suggest that we acquire (or exercise) virtues themselves discretely (Annas 2011, 83–99).
27. These translations of the *Gorgias* are Zeyl's (1997), with slight adjustments.

28. As things stand, it can be hard to separate causal threads, for low self-discipline can stem from a range of factors, including "classroom work that is too easy or too difficult," "confusing instruction," "unclear . . . expectations (not knowing how to do what the teacher expects)," "poor school- or classroom-management techniques (e.g., uneven enforcement of . . . rules)," and "ineffectual or unenforced punishments" (Wynne and Ryan 1997, 89). The wide-ranging, contemporary construction of what falls under *akrasia*, now a catch-all for failures of self-discipline per se, arguably waters down the status of self-control as a virtue, suggesting that it may instead be a supporting nonvirtue. On Aristotle's construction, its designation as a virtue remains intact: the province of self-control, both narrowly and broadly construed, centers on the disciplining of one's desire for externals, and this entails a recognition that one's flourishing is not rightly gauged in terms of these.
29. King welcomed as allies those "within the white majority . . . who cherish democratic principles above privilege and who have demonstrated a will to fight side by side with the Negro against injustice" (2010, 52–53); "joined by white allies," Blacks "will shake the prison walls until they fall" (1986, 328).
30. Cf. Douglass: "Would you have me argue that man is entitled to liberty? that he is the rightful owner of his own body? You have already declared it. Must I argue the wrongfulness of slavery? . . . There is not a man beneath the canopy of heaven that does not know that slavery is wrong *for him*" (1950, 191). As a matter of justice, therefore, humans' disposition on this matter should be one of solidarity.
31. King also spoke of the greater courage that whites, in particular, required (2010, 34–36, 61–62).
32. Further, Plato's close tie between justice and harmony has a contemporary analogue in King's linkage of justice to harmony, represented for him by integration (*Rep*. 443c–444a; 1986, 219).
33. Here, I substitute "gentler" for Reeve's "tamer" as a translation of *hēmerōterois*.
34. He grants that "there are some particular duties to one's local community that can only be performed through the agencies of the state and . . . some goods that can only be achieved through participating in and perhaps reforming the work of such agencies" (2002, 13–14).
35. Though Annas and I concur that virtue is a regulative ideal, unlike her (2011, 25n12), I allow that, so taken, it represents a form of perfectionism.
36. For discussion of types deemed pathological, see, e.g., Hollender (1965); Burns (1980); Flett and Hewitt (2002); Verhaeghe (2014); Curran and Hill (2019).
37. On this topic, it is useful to consult MacIntyre's concept of "practices" and their "internal" goods, which ties practices closely to virtues (1984, 187–91).

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