The Disvalue of Genetic Diversity, or: How (Not) to Treat a Sandelian Ethos on Steroids

Russell Powell, Boston University

When Michael Sandel (2007) argues that biomedical enhancement enthusiasts should disavow their Promethean desire to master nature and instead embrace an “openness to the unbidden,” he stops short of recommending that we hug the Ebola virus. Hitting the logical brakes in order to avoid the implication that we should respect “given” disease states creates major conceptual problems for Sandel, because it forces him to draw a metaphysically and normatively problematic distinction between biomedical interventions that merely allow our “natural potentials” to flourish and those that alter our natural potentials themselves. But running afoul of contemporary developmental biological theory is a price worth paying if it means avoiding the ultimate reductio ad absurdum of medical ethics: the conclusion that uncontroversially debilitating disease states are desirable and should not be treated or prevented.

Yet this and a host of other morally repugnant consequences are implications of Rosemarie Garland-Thomson’s (2012) call for the conservation of debilitating disease. Although I agree with Sparrow (2015) that conserving disease-causing genetic diversity at the expense—rather than in the interest—of human well-being is an indefensible position, I think his arguments against this most implausible view do not go nearly far enough. Sparrow’s overly charitable analysis glosses over fundamental problems with what I refer to as the “Disease Conservation Argument” (DCA), resulting in a critical evaluation of the DCA that is far less effective than it could have been, for several reasons on which I will elaborate.

First, Sparrow’s crucial thought experiments fail to accomplish what they set out to do, namely, to determine whether the DCA is motivated by a preference for the status quo and, if so, whether such a preference can be defended in this specific case. Second, as a result of the way its thought experiments are (mis)structured, and because of its misguided focus on genetic variation, Sparrow’s exposition misses the key features that make the DCA spectacularly implausible. Finally, even if we accept the DCA’s conclusion that we ought to conserve the current distribution of disease-causing genes, this not only fails to rule out, but in fact necessitates, the very genetic interventions that the DCA intends to guard against. Because space is limited, I confine my criticisms of the DCA and Sparrow’s treatment of it, to these few points.

Limitations of Sparrow’s Thought Experiments

One major limitation of Sparrow’s analysis is that he misinterprets Bostrom and Ord’s (2006) “reversal test” and, as a result, misapplies it to the case at hand. Had Sparrow applied the reversal test as its proponents had intended, this would have resulted in a substantially more effective critique. The reversal test is a rhetorical device designed to show whether an argument against changing the distribution of some continuous human parameter (e.g., intelligence) is grounded in a preference for the status quo. It does this by querying whether the proponent of an argument that rejects a change in one direction of the parameter would also reject a change in the opposite direction. An argument fails the reversal test only if it rejects both increases and decreases in the parameter. If an argument fails the reversal test, then, according to Bostrom and Ord, this shifts the burden of argument onto the proponent of said preference to explain why she is justified in believing that we currently happen to be at an optimal value for that parameter. If no plausible case for optimality can be made, then the argument is deemed afflicted by status quo bias.

Let us say, for the moment, that the relevant human parameter here is disease-causing genetic variation, as this is the biological unit of diversity that Sparrow focuses on (although I argue in the following that the appropriate unit of analysis lies at the phenotypic rather than genotypic level). Applying the reversal test, we ask whether Garland-Thomson, who argues against reducing current statistically normal rates of disease-causing genetic variation, also rejects interventions designed to increase the same. If she does indeed reject such an increase, then we have identified a prima facie case of status quo bias. If, on the other hand, Garland-Thomson supports an increase, then she avoids the charge of status quo bias, but at the expense of putting herself in the unenviable position of having to defend...
the recommendation that we intervene to increase the proliferation of disease-causing genetic variants.\(^1\)

What’s more, if the relevant biological unit of variation is phenotypic rather than genotypic (see my argument to this effect in the following), then to avoid the charge of status quo bias, the DCA proponent will find herself in an even less tenable position: namely, having to defend the deeply counterintuitive idea that monumental achievements of public health science are prima facie moral regressions that should be eliminated so as to allow for increases in phenotypic disease variation. By shifting the focus of disease conservation from genotypes to phenotypes, cultural (including medical) resources that shape disease distributions become potential targets of intervention (or elimination). One can immediately appreciate the horns of the dilemma that the reversal test, when properly applied, imposes on the DCA.

Curiously, Sparrow does not apply the reversal test in this manner, despite the evident rhetorical power of doing so. Although he purports to rely on the reversal test, Sparrow’s thought experiments are structured in a way that prevents them from making the best use of this device and, hence, the most powerful case against the DCA. In fact, Sparrow employs what more closely resembles (but still departs significantly from) a test that Bostrom and Ord call the “double reversal test” (2006, 673). The double reversal test is intended to apply to arguments that have already failed the basic reversal test just discussed—which, as I’ve noted, Sparrow never applies to the DCA. In the double reversal test, the proponent of an argument that fails the basic reversal test is asked to imagine a future state in which some natural factor will move a given human parameter in one direction—and then asked whether it is morally desirable to counteract this natural factor with an intervention that causes a movement in the opposite direction, so as to maintain the status quo. If the proponent agrees to an intervention to counterbalance the natural factor, then we imagine yet another future time in which the natural factor will be removed and then ask the proponent whether the original intervention should be affirmatively reversed. If the proponent declines to reverse the original intervention, then we are entitled to a strong inference of status quo bias. The double reversal test makes an even stronger case for the presence of a status quo bias than does the basic reversal test, because it effectively stipulates away any risks and costs that might attend the original intervention and hence that might rationally justify a preference for the status quo.

In Sparrow’s first thought experiment, a natural factor reduces the incidence of disease-causing genetic variation, and the question put to the DCA proponent is whether we should introduce mutagens to counteract this change in order to stabilize historically normal rates of disease. For reasons I do not understand, Sparrow only employs the first part of the double reversal test and assesses possible responses in favor of and against intervening to counteract the natural factor in order to preserve the disease status quo. In order to employ the full functional test, which is necessary to establish a status quo bias, he would have to go on to ask the DCA proponent, assuming she agreed to the initial intervention to introduce mutagens to offset the natural factor, whether she would also agree to reversing the intervention if the natural factor were to dissipate. If the DCA proponent declines to reverse the initial intervention when the natural factor dissipates—which in this case would result in rates of gene-based disease increasing beyond their historically normal rates—then the same reasoning supports introducing the mutagen in the environment even in the absence of the natural disease-reducing factor. So what the double reversal test would have shown, were it properly applied and were the DCA to fail it, is how doubly implausible the DCA position is. For it would entail that the DCA proponent should agree to introduce mutagens into the environment now even if there is no natural factor to offset.\(^2\) Nevertheless, one could easily imagine the DCA proponent arguing that the mutagen be introduced to offset the natural factor (in the first part of the double reversal test) and then simply reversed (in the second part) in order to return the distribution of gene-based disease to historically normal levels. In such a case, a preference for the status quo would be established, but whether this preference is due to a bias would remain unresolved. All told, because Sparrow’s thought experiments fail to properly apply the reversal test, they introduce philosophical complexities that do more to obscure than to illuminate the central weaknesses of the DCA.

What we can say with some certainty is that Garland-Thomson’s antidote to the “eugenic logic” of modernity and its “collective investment in futurity” (2012, 352)—which appeals to vague epistemic values allegedly derived from experiencing debilitating disease states—offers absolutely no resources for identifying an optimal distribution of disease. And consequently, because the DCA recognizes no disvalue in disease, it offers no principled resources for resisting the absurd conclusion that we should affirmatively intervene, or reverse existing interventions, or decline to intervene in the future, in order to increase the range and morbidity of disease types.

---

1. This could be accomplished, for example, without altering the DNA of full-fledged embryos or adults so as to not implicate direct harms to existing individuals—such as by irradiating gametes (sperm and eggs) or by widespread in vitro selection in favor of gene-based disabilities.

2. Though it raises different ethical issues that are beyond the scope of the present discussion, Sparrow’s second thought experiment has the same logical structure as his first, and so for purposes of testing for status quo bias, I treat them similarly.
THE RELEVANT BIOLOGICAL UNIT OF VARIATION IS NOT GENOTYPIC

Sparrow overlooks an even more critical failure of the DCA by focusing broadly on genetic diversity. In fact, only a fraction of human genetic diversity has implications for human phenotypes, and only a tiny fraction of this fraction is implicated in debilitating diseases of the sort that the DCA claims should be conserved. Because the DCA argues for conserving “bodily variation,” it is only concerned with a small subset of genes that impact on the phenotype in ways that cause debilitating disease. Only genetic factors that are “felt” by the human organism can shape human experiences or result in what Garland-Thomson refers to as a conflict between human bodies and the “shape and stuff of the world” (2012, 341). Moreover, most common human diseases implicate many genes of small effect and are likely supervene on a wide genetic base—meaning that the same disease state can be produced from different genetic underpinnings interacting with local environments. At the same time, single genes can have numerous effects on the phenotype. Because of this many-to-one mapping of genes onto phenotypes and vice versa, phenotypic variation is partly decoupled from genetic variation—providing further reason for the DCA to focus on the phenotype, which is the locus of any value that might flow from preserving disease.

The rub, however, is that conserving phenotypic variation (including debilitating disease) raises a serious and perhaps even more unpalatable implication of the DCA—one that Sparrow fails to notice, let alone develop. By shifting the focus onto the phenotype—where it clearly belongs—it becomes clear that the DCA requires that not only should we avoid genetic selections/interventions that would reduce the frequency of disease in the next generation—but in addition, we should cease any further efforts to improve public health so that the current distribution of debilitating disease does not decrease. A huge proportion of the variation in human disease is explained by environmental rather than genetic difference makers, and it is far easier to alter distributions of disease by manipulating environmental conditions (such as sanitation, diet, and vaccination) than it is through genetic selections/interventions.

Furthermore, to avoid failing the basic reversal test, the DCA proponent would have to agree to moving the relevant human parameter in the opposite direction—that is, to change social environments so as to increase disease variation beyond currently existing levels. Because the supposed values of debilitating disease do not hinge on its etiology, there are no grounds for the DCA proponent to argue that only gene-based diseases qualify for conservation. Thus, the DCA proponent would be compelled to recommend a dramatic reduction in existing basic public health measures across the board, such as sanitation, vaccination, antibiotics, access to nutritious foods, safe workplace environments, toxicity and safety standards, and perhaps even support for victims of violence.

THE EVOLUTIONARY CATCH-22

One reason to conserve genetic diversity in a biological population whose well-being (or even existence) one wishes to preserve is that genetic heterogeneity tends to confer resilience in the face of infectious disease, which can wreak havoc on genetically homogeneous populations. It is implausible to think that embryo selection or germline intervention could achieve levels of homogeneity sufficient to make the “monoculture” risk serious. However, it is a grave danger in Sparrow’s second thought experiment, in which “genetic variation is entirely eliminated” from human populations, which have come to be comprised of individuals formed from the same embryonic clone. Yet as I have argued elsewhere (Powell 2012), we can avoid the disease-susceptibility risks associated with large-scale genetic homogeneity by maintaining targeted diversity in the immunorelevant regions of the genome. It is true that eliminating genetic variants from the population could, in principle, have the unintended consequence of making humans more susceptible to disease in the future. But the unsubstantiated risk of future disease is clearly not a reason to maintain existing distributions of known disease-causing genetic variation.

In the present context, reasonable worries about genetic homogeneity may be beside the point. It seems that the DCA, which attributes no significant disvalue to disease, cannot regard the risk of pandemics as something to be avoided like, well, the plague—so long as the resultant suffering enhances human camaraderie, produces new ways of knowing, and affirms the fragility of human existence (Garland-Thomson 2012, 349). But let us assume, arguendo, that the DCA finds reasons to avoid increasing rates of disease, as well as to not oppose improvements in basic medicine and public health. Let us suppose that it wishes only to preserve the current statistically normal distribution of disease-causing genes. Let us assume, further, that this preference for the genetic status quo can be reasonably defended (i.e., that it is not a case of cognitive bias). If this is so, then, ironically, the only ethical way to preserve the current distribution of disease and disease-causing genes is to engage in germline genetic intervention.

This is so because, as I argue extensively elsewhere (Powell, in press), relaxed selection pressures on human populations caused by the increasing efficacy and availability of non-gene-alterative medicine allow for the accumulation of disease-causing mutations that will make future generations increasingly reliant on medical technology in order to realize historically normal capacities. The fundamental laws of biology are such that relaxed selection pressures inevitably result in increases in variation and variance at all levels of the biological hierarchy (Brandon and McShea 2011), and medicine-induced relaxed selection results inevitably in increasing rates of debilitating disease. This gene–culture coevolutionary dynamic has a host of interesting ethical consequences that I explore in this commentary. For present purposes, what this shows.
is that conserving currently normal distributions of disease requires genetic interventions to offset increasing rates of gene-based disease that will inevitably occur in current medical and public health environments. This is the Evolutionary Catch 22: Genetic conservation requires genetic intervention. Unwittingly, therefore, Garland-Thomson has offered novel reasons to engage in systematic germline genetic intervention.

ACKNOWLEDGMENTS
I am grateful to Tom Douglas and Irina Mikhalevich for helpful comments on an earlier version of this commentary.

FUNDING
This work was supported by a visiting fellowship at the National Evolutionary Synthesis Center and Templeton Foundation Grant number 43160.

REFERENCES

Genetic Technology to Prevent Disabilities: How Popular Culture Informs Our Understanding of the Use of Genetics to Define and Prevent Undesirable Traits

Sara Weinberger, Zvi Meitar Institute for the Legal Implications of Emerging Technologies, IDC

Dov Greenbaum, Yale University and Zvi Meitar Institute for the Legal Implications of Emerging Technologies, IDC

While the demand that we protect genetic diversity at the risk of allowing for the birth of disabled children is arguably abhorrent, there are some disabled communities that take offense at efforts to eliminate their disabilities through genetic selection; typically, the deaf community comes to mind. More recently, the measles outbreak, associated with unvaccinated children due to concerns of autism, has resulted in the non-neurotypical community, particularly high-functioning autistic individuals, also coming out in defense of their disability and their quality of life. As a result, in assessing what ought to be the metes and bounds of selection in the course of assisted reproduction, we look to one area of law to best accommodate the moving target of parental intentions in employing that selection. To this end, we aim to provide a framework for preventing the misuse of the technology.

With current technologies, putative parents have an unprecedented opportunity to select against a whole host

Address correspondence to Dov Greenbaum, JD, PhD, Yale University, Department of Molecular Biophysics and Biochemistry, Bass 432, 266 Whitney Avenue, New Haven, CT 06520, USA. E-mail: dov.greenbaum@aya.yale.edu

32 ajob June, Volume 15, Number 6, 2015
Copyright of American Journal of Bioethics is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.