Journal of Ethics and Social Philosophy
VOL. 28, NO. 2 · AUGUST 2024
https://doi.org/10.26556/jesp.v28i2.3317

VALUING DIVERSITY

Michael A. Livermore

Domestic and international legal obligations limit the ability of states and individuals to harm endangered species. There are various instrumental, human-centered reasons to preserve many species; these range from the potential discovery of plant-based pharmaceuticals to the recreational value of birdwatching. But many people share the intuition that there are additional, noninstrumental reasons to avoid causing species extinction. One potential foundation for noninstrumental obligations to avoid species extinction is *ecocentrism*, the view that biological aggregates such as species, ecosystems, and landscapes have independent moral value that ought to be respected and given due consideration. The ecocentric view was articulated by Aldo Leopold in his "land ethic" and is reflected in constitutional "rights for nature" and legal rights extended to rivers and mountains in several countries.[1] Several criticisms have been leveled against ecocentrism, including that biological aggregates such as species have only "apparent ends" rather than genuine interests that are worthy of protection.[2]

The claim pursued in this paper is that it is possible to excavate nonecocentric moral intuitions in favor of diversity that, when integrated into a broader welfarist framework, has a range of implications, including providing support for anti-extinction norms. The diversity urged is not biodiversity understood as variety in genomes or phenomes. Rather, the diversity that we have reason to value is diversity of experience. Translating these intuitions to a traditional welfarist framework, I describe a version of welfarism—which I refer to as heteric welfarism—in which diversity takes a place alongside quality (i.e., well-being) and equality of subjective experience.

To state this clearly, the claim articulated here is that worlds that have greater diversity of subjective experience—a greater variety in the forms and qualities of experiences—are better *ceteris paribus* than worlds with less diversity of subjective experience. The reason that worlds with greater levels of diversity

1 Leopold, *A Sand County Almanac*. The country of Ecuador was the first to establish constitutional rights for nature. See Constitution of the Republic of Ecuador, October 20, 2008, art. 71.

2 Sandler, *The Ethics of Species*; and Agar, *Life's Intrinsic Value*.

are better is similar to the reason that worlds with more well-being are better and to the reason that worlds with a fairer distribution of well-being over subjects are better. Diversity is a foundational moral-ethical criterion that can and should be used to evaluate consequences, understood as outcomes or alternative possibilities.

This claim has some resonance with but is very distinct from that offered by G. E. Moore.[3] In a critique of Sidgwick, Moore asked the reader to imagine two worlds, one "exceedingly beautiful," the other as ugly as "you could possibly conceive." Both of Moore's worlds are uninhabited, and therefore there is no one to "enjoy the beauty of the one or hate the foulness of the other." Moore believed that we still have a reason to favor the former world, even if there are no effects on any being's subjective experience. Under the view offered here, there is no morally relevant distinction between Moore's two worlds. It is only through subjective experience that worlds take on moral significance.

The bearers of value in this account are entities that are capable of subjective experience. This set includes, at a minimum, human persons but may also (very plausibly) include nonhuman animals and perhaps even other organisms. It does not include species, ecosystems, or other similar biological aggregates. Nor does it include inanimate objects, landscapes, or even entire planets. What matters under the account articulated here is subjective experience. Because subjective experience matters, worlds that have a greater amount of positive subjective experience (i.e., greater aggregate well-being) are better than worlds with less. The distribution of what matters can also matter, and so the fairness of how well-being is distributed over persons matters, as does (under the heteric view) the diversity of distribution over experiences. More fair distributions (over subjects) are better than less fair ones, and more diverse distributions (over experiences) are better than less diverse ones.

Including diversity in the welfare calculus raises a number of questions, including how to define a meaningful diversity metric and how to balance diversity against the aggregate amount and distribution of well-being. But the value of diversity may also help address some longstanding difficulties for welfarism. Diversity provides a reason to be concerned with the extinction of species, entirely apart from their instrumental value for humans. With respect to animal welfare, diversity can help to justify resistance to efforts by humans to reduce animal suffering by interfering with processes such as predation that are common in the natural world. Within the domain of human morality, diversity can provide welfare-based accounts of the value of protecting

3 Moore, *Principia Ethica*, 83–84.

endangered cultures or ways of life and can offer insights into Parfit's Repugnant Conclusion.[4]

The remainder of the discussion unfolds as follows. Section 1 motivates the view that the diversity of subjective experience is valuable and explains how this experience-based approach differs from prior accounts of the value of diversity, mostly drawn from the field of environmental ethics. Section 2 discusses some of the implications of heteric welfarism. These include how it interacts with other normative commitments such as equal respect and the Pareto principle, as well as its consequences for questions such as species preservation, wild-animal suffering, and the Repugnant Conclusion. Section 3 discusses possible ways that heteric welfarism could be formalized, focusing on one promising method grounded in the notion of Weitzman diversity. The final section offers concluding remarks and notes areas where future work may be warranted.

1. MOTIVATION

Heteric welfarism assigns value to the diversity of subjective experiences and is motivated by the intuition that worlds in which experiences are more varied are in some sense better than worlds in which the range of experiences is more limited. Consider the following scenario.

> *Copied Colonies*: An advanced human society is undertaking a plan of space colonization. Colonization will take place through the construction of massive vessels that will travel over long distances over many years to other solar systems, where they will park in orbit around a star, repurposing each vessel as a permanent colony that will support roughly one million people at a time. There is no anticipation that any of the planets will be inhabitable; the vessel colony is intended to serve as the sole habitation in the solar system. The energy resources of the star will be sufficient to support the colony indefinitely. During the transport stage of the plan, the only means to maintain human life will be in the form of frozen embryos. Once the ships arrive at their destinations, the embryos will be thawed and incubated, then raised by robots until adulthood. This founding generation will then live their lives and raise families, and the colony will continue in perpetuity. It turns out to be much easier to produce vessel colonies with identical founding generations. Under the *Identical Plan*, a single set of one million fertilized zygotes will be selected and then split into many sets of identical (monozygotic) twins that will populate the different vessels. A much larger number

4 Parfit, *Reasons and Persons*.

of vessels can be constructed under this approach than the alternative *Unique Plan*, where every vessel contains a genetically unique population in its founding generation.

In the Copied Colonies scenario, the people in question are biological humans who live in large communities where everyone has substantial opportunities for interpersonal relationships. Although there is no reason to believe that the colonists have any less free will than the contemporary human inhabitants of Earth, we can assume that the colonies will remain extremely similar over time.

The question is whether it would be better for the space-faring society to construct a larger number of vessel colonies with identical populations or a smaller number of vessel colonies with unique populations. Under the Identical Plan, more stars will be colonized earlier, leading to a larger aggregate number of people with lives, each of which is individually worth living. But the cost, if there is one, is that each of the colonies will be extremely similar even over long time horizons. Under the Unique Plan, each vessel colony contains a unique population that can be expected to give rise to a larger range of human experiences. There will be a smaller number of colonies, but they will be substantially different from each other.[5]

There are several reasons to favor the Unique Plan. One is the insurance value of having many different populations. There are presumably many unanticipated challenges that the space colonies will face, and having different starting populations may increase the chances that some of the colonies will survive. This possibility is related to portfolio theory in investing and resilience in ecology.[6] A second reason is that the Identical Plan may undermine the value of the projects of the colonists.[7] Assuming that the colonists are aware of the existence of the other colonies and the circumstances of their creation, the existence of a large number of near copies may deflate the colonists' estimations of the worth of their projects.

Both portfolio-theory and project-value justifications for favoring the Unique Plan can be understood in light of their different outcomes for aggregate well-being (broadly understood). However, our question is whether there is value in diversity separate from effects on aggregate well-being. We

5 To be clear, genetic diversity does not on its own matter. In this scenario, genetic diversity is expected to give rise to a greater diversity of experiences. Furthermore, because the planets are not habitable, the different locations are not expected to give rise to different experiences because each star will be functionally identical, even if located at a different point in the galaxy.

6 Markowitz, "Portfolio Selection"; and Elmqvist et al., "Response Diversity, Ecosystem Change, and Resilience."

7 Scheffler, *Death and the Afterlife.*

can sharpen the Copied Colonies scenario to help clarify matters. First, we can assume that the increase in the total number of colonies made possible by the Identical Plan outweighs whatever portfolio theory–based risk reduction could be achieved through the Unique Plan. From an aggregate perspective, in expectation, the Identical Plan will generate a larger number of colonies. We can assume this to be true even with a substantial amount of risk aversion. Second, we can address the project-value problem. We can assume that the colonists do not care about the existence of other nearly identical colonies—by dint of their inclination, education, and experience, the fact that there is a large number of others engaged in nearly identical pursuits simply does not bother them.

It is possible to argue that if the colonists do not care about the existence of near-identical colonies, they nevertheless should. Accordingly, under certain welfarist accounts, the Identical Plan could have lower aggregate well-being even if the colonists themselves were indifferent. I am interested in a different line of argument in which diversity has value even apart from effects on aggregate well-being. So let us stipulate a social welfare function that is either hedonic or based on people's actual rather than idealized preferences. By analogy, we could consider a society in which people were not averse to inequality and in which there was no diminishing marginal utility of consumption. In such a society, the distribution of wealth would not affect aggregate utility. Nevertheless, there still may be reasons to favor more equal distributions. Egalitarians favor reducing relative inequalities, other things being equal, while prioritarians believe that there is greater value in benefiting people who are worse-off.[8] Neither egalitarian nor prioritarian views necessarily depend on the level of inequality aversion within the population or the shape of the utility curve in consumption.

To reiterate, by stipulation, the aggregate level of well-being is greater in the Identical Plan than in the Unique Plan. For the sake of simplicity, we can hold the distribution of well-being over subjects constant in the two scenarios. The question is whether there is any morally relevant sense in which the Identical Plan is worse than the Unique Plan.[9]

One way in which the Unique Plan is different from the Identical Plan is that the lives lived are more varied. Stated another way, there is a greater diversity of subjective experiences. Ben Bramble argues that from the perspective of an

8 Parfit, "Equality and Priority."

9 I set aside questions related to the person-affecting view, which is that for something to be bad, it must be bad for someone. Under some formulations, the person-affecting view would make comparisons between the Unique Plan and the Identical Plan impossible. I assume either a rejection of the person-affecting view or a suitably revised version in which such comparisons are meaningful. See Adler, "Claims across Outcomes and Population Ethics"; and Masny, "On Parfit's Wide Dual Person-Affecting Principle."

individual life, repeated positive experiences contribute nothing to lifetime well-being.[10] A milder view can be expressed at the aggregate level. If we can expect that many of the lives lived in the Identical Plan will be very similar (i.e., will be nearly repeats of each other), that provides some reason to favor the Unique Plan, other things being equal.

Some may reject the claim that the diversity of subjective experiences matters. Under such a view, worlds in which very similar experiences are had a very large number of times are no better or worse than worlds with a great variety of experiences that are less widespread—so long as aggregate well-being (and perhaps the distribution of well-being over subjects) is the same. We can call such views homic theories (based on the Greek *homos*, i.e., same). The alternative views, in which the distribution of well-being over experiences matter, could be called heteric (based on *heteros*, i.e., different).

Heteric welfarism is analogous to aggregate welfarism in population ethics that favors, *ceteris paribus*, larger populations of experiencing subjects over smaller populations. Both aggregate welfarism and heteric welfarism affirm the value of additional experiences, but in different senses of additional. In the population-size context, aggregate welfarism is sensitive to additional experiences in terms of absolute number. In the diversity context, heteric welfarism is sensitive to additional experiences in terms of variety. Both aggregate welfarism and heteric welfarism can be described as extension-sensitive theories of value, in that worlds in which value is more extensive (i.e., there are more experiences or more kinds of experiences) are favored over worlds in which value is less extensive.

By contrast, average welfarism is indifferent to population size, and homic welfarism is indifferent to the variety of experiences. These views can be described as extension insensitive in the relevant senses. Average welfarism is insensitive to the absolute numerosity of experiences; it is attentive only to the quality of experiences. Homic welfarism is insensitive to how many experiences there are in terms of variety. Mixed views are possible. An aggregate homic welfarist would be extension sensitive with respect to the numerosity of experience but extension insensitive with respect to variety.

Can anything be said concerning the relative merits of extension sensitivity? Broadly speaking, a pure extension-insensitive position is that whatever lives are to be lived, it is best that those lives go well; but it is neither here nor there how many lives are lived or in how much variety. The extension-sensitive view is that it is best that lives go well, but it is also good that there be more—more lives, more variety, or both. In this way, extension-sensitive views are affirming

10 Bramble, "A New Defense of Hedonism about Well-Being."

in a way that extension-insensitive views are not. That said, there is a tradeoff, and extension-sensitive views must be willing in some sense to accept lower quality of life in exchange for more of it.[11]

Heteric theories are compatible with value monism; all that may matter is well-being, and well-being levels may be compared across subjects and experiences. But the different characteristics of experiences may nevertheless matter, in that these characteristics give rise to diversity. In this way, the characteristics of experience are both reducible and not reducible to their effects on well-being. They are reducible in the sense that experiences contribute to well-being levels that can be compared. They are irreducible in that there is additional relevant information concerning the distribution of well-being over experiences that would be lost if all experiences were understood only in terms of well-being levels. This characteristic of heteric theories is analogous to differences between utilitarian and prioritarian/egalitarian theories of welfare. Information concerning the distribution of well-being over subjects is irrelevant for basic utilitarians, whereas it is relevant for prioritarians or egalitarians.

The view that this section has sought to motivate is heteric welfarism. Heteric welfarists find the Unique Plan more attractive than the Identical Plan. For a heteric welfarist, a greater diversity of subjective experiences is a reason to favor one world over another. This reason is moral and not merely an expression of a preference. The level of diversity of subjective experiences is, for the heteric welfarist, a morally relevant feature that ought to be given weight when evaluating alternative worlds.

2. DIVERSITY, EXPERIENCES, AND WELFARISM

Diversity is a potential feature of any set. Just as there is diversity over species in an ecosystem, there is diversity over treats in a candy shop. A diverse ecosystem is teeming with many different types of species; a candy shop that sells licorice and nothing else lacks diversity. Heteric welfarism values diversity of subjective experience, while other types of diversity (whether genetic, physiological, or gastronomic) have only instrumental value.

Philosophers and other thinkers have offered several nonwelfarist conceptions of the value of diversity. Peter Miller argued that the "richness" in natural systems, which includes the concepts of variety and unity, helps explain their value. This claim was taken up and expanded by Gregory Mikkelson. Michael Soulé has described "normative postulates" in the field of conservation biology,

11 This is true if extension plays anything other than a tie-breaking role. The Repugnant Conclusion can be understood as a consequence of this feature of extension-sensitive views. See section 3.6 below.

which include the claims that "diversity of organisms is good" and "biotic diversity has intrinsic value." Ben Bradley argues that rare species have value because they contribute to the biological diversity of the system. And Brendan Cline offers an account of environmental ethics in which the "breathtaking designs" found in nature "have a special value" that "merit[s] our evaluative regard."[12] These accounts all share a common emphasis on diversity in forms of life—which is to say variety in form and makeup of arrangements of organic compounds that engage in metabolism and reproduction and are subject to the evolutionary process.[13]

Heteric welfarism does not value variety in forms of life as such but rather the subjective experiences that track (at least some of) those forms of life. In this way, it is analogous to the view offered by Bramble, which addresses the diversity of experiences in the case of individual well-being.[14] Another view that accords with an experience-oriented notion of diversity has been given by Simon James, arguing that at least some of the value of rare or endangered species derives from their "lifeworld value," which is their unique way of experiencing the world.[15]

L. W. Sumner notes that environmental ethics that extend moral standing to all individual organisms or to biological aggregates such as species face the problem of "an indiscriminate distribution of moral standing."[16] Such profusion runs the risk of trivializing moral concern in part because it is difficult to clarify the boundaries of consideration in a nonarbitrary fashion. The nonwelfarist accounts of diversity discussed above face a similar difficulty unless they can explain why biological diversity—but not the many other kinds of diversity that exist in the world—should be accorded moral significance. Lodging moral standing within the limited number of entities that have subjective experience avoids this problem. Limiting moral consideration to entities with subjective experience is also nonarbitrary because moral value is separate from other realms of value (such as aesthetics) exactly due to its concern for others that

12 Miller, "Value as Richness"; Mikkelson, "Weighing Species"; Soulé, "What Is Conservation Biology?" Bradley, "The Value of Endangered Species"; Cline, "Irreplaceable Design."

13 This is a rough definition of life, a concept that is notoriously slippery. The point is that whatever the criteria for what qualifies as life, subjective experience is not on the list.

14 Bramble, "A New Defense of Hedonism about Well-Being."

15 For James, extinction can be bad because it extinguishes a lifeworld. Accordingly, individual members of endangered species are more valuable than similar members of a numerous species because by existing, they stave off this bad event. As discussed below (section 3.1), this view of extinction is an implication of heteric welfarism. James has not articulated or endorsed any broader claims about the diversity of subjective experience. See James, "Rarity and Endangerment."

16 Sumner, *Welfare, Happiness, and Ethics*, 216.

have, at a minimum, an internal perspective—meaning that there is something that it is like to be them.[17]

That said, diversity of experience is not itself a feature of any individual's experience; it is a holistic property that is observable only from a system-wide perspective. In this way, it is analogous to distribution-sensitive welfarist accounts such as egalitarianism or prioritarianism. An egalitarian or prioritarian attends to the system-wide distribution of well-being over subjects; a heteric welfarist attends to the system-wide distribution of well-being over experiences. Both distribution-sensitive and diversity-sensitive accounts take the individual experiencing subject as the fundamental unit of value—but in a way that admits of consideration of relative characteristics.

3. SOME IMPLICATIONS

Heteric welfarists take diversity of subjective experience as having some value, akin to the quantity and equality of well-being. There are some interesting implications of this view.

3.1. Extinction and Conservation

If diversity of subjective experiences is valuable, it will often be the case that there is a reason to disfavor the extinction of a species. This will hold inasmuch as species reflect different ways of experiencing. The more different subjective experiences are from others, the more valuable they are from the perspective of diversity. Costly efforts to conserve rare species could therefore be justified.

The anti-extinction principle derived from the value of diversity as articulated in this paper differs from accounts offered by environmental ethicists. As noted by Ronald Sandler, species mark a "form of life . . . with [a] distinctive way of going about the world, based on its history, ecology, genetics and phenotypic traits."[18] The concept of a species is primarily scientific—and indeed, there are several different scientific concepts of a species that are put to use in different disciplines and for different purposes.[19] From the perspective of heteric welfarism, the normative significance of the species category is incidental:

17 See Sumner, *Welfare, Happiness, and Ethics*, 217. It is possible that moral consideration might appropriately be further limited, for example, to only those entities for which it is the case that their lives matter to them. Subjective experience, as described here, is a minimum criterion to qualify for welfarist consideration. Additional criteria, such as mattering to oneself or being capable of feeling pain and pleasure (or positive and negative sensations), could be layered on top.

18 Sandler, "On the Massness of Mass Extinction."

19 Zachos, *Species Concepts in Biology*.

inasmuch as species distinctions mark differences in subjective experiences, they are useful for purposes of orienting conservation efforts aimed at increasing diversity. But members of different species may have similar subjective experiences, and members of the same species in a different setting may have different subjective experiences. Conservation efforts to preserve ecosystems, landscapes, or other natural systems may all be justified for purposes of preserving diversity of subjective experience.

The orientation toward promoting diversity of subjective experience is different from an orientation toward preserving biodiversity. There are many practical reasons grounded in human well-being to preserve biodiversity. Inasmuch as biodiversity tracks the diversity of subjective experience, then valuing diversity provides another kind of reason to preserve biodiversity. The lines between species often overlap with the kinds of physical differences that might be thought to bear on subjective experiences, such as differences in perceptual apparatus, differences in diet and reproduction, differences in locomotion, or differences in types of social behavior.

Heteric welfarism is not coextensive with a full-fledged conservation ethic. It does not ground concern for endangered species of flora unless they contribute to the diversity of experience of others.[20] Perhaps more important, heteric welfarism lacks the connection to history that is frequently associated with a conservation ethic: it does not necessarily favor the current distribution or arrangement of species or ecosystems or the state of affairs that existed before human interference or that would arise from human-independent processes.[21] Although heteric welfarism will often in practice overlap with a conservation ethic in seeking to protect endangered species, such alliances are not guaranteed.

Heteric welfarism could even endorse affirmative efforts to generate new or even entirely artificial forms of subjective experience.[22] "De-extinction" is the effort to use biotechnologies to reconstruct species that have been lost to extinction.[23] Although it may be impossible to reconstruct the genomes of lost species, new species could be created that are close phenotypical proxies.[24] Research in synthetic biology involves using technology to construct new forms of life, such as ones based on amino acids that are not found in nature.[25] At its current

20 Assuming that flora do not have subjective experiences.

21 Rolston, *Environmental Ethics*; and Callicott, *In Defense of the Land Ethic*.

22 Bradley notes that the creation of new species would increase biological diversity. Bradley, "The Value of Endangered Species."

23 DeFrancesco, "Church to De-extinct Woolly Mammoths."

24 Lin et al., "Probing the Genomic Limits of De-extinction in the Christmas Island Rat."

25 Dvořák et al., "Bioremediation 3.0"; and Zhang et al., "A Semi-synthetic Organism that Stores and Retrieves Increased Genetic Information."

state of development, research into synthetic life is focused on microorganisms, but it is possible that at some future date, more complex, multicellular forms of life could be constructed using these techniques. Research into artificial intelligence has developed extremely sophisticated computable algorithms that are capable of engaging in high-level pattern detection and strategic decision-making.[26] If the physical processes that underlie consciousness are not limited to biological structures, artificial intelligence systems could theoretically be constructed that could instantiate some form of subjective experience.

The subjective experiences that could be enabled by de-extinction, synthetic life, and artificial intelligence technologies could be substantially different from those that are currently experienced by existing life forms. Other things being equal, the value of diversity offers reasons to favor efforts to generate new kinds of ordered physical systems—whether biological, synthetic, or artificial—capable of having new and varied subjective experiences. Of course, there may be substantial risks associated with de-extinction, synthetic life, and artificial intelligence. The value of diversity does not imply that de-extinction, synthetic life, and artificial intelligence technologies should necessarily be pursued, nor does it mean that the benefits of these technologies are greater than their costs in any particular case. Nevertheless, if they have the potential to increase the variety of ways that it is possible to experience the world, the value of diversity provides a reason to favor them, even in the face of at least some risk.

3.2. Ways of Life

Beyond the context of environmental conservation, the value of diversity is also applicable to human cultures and ways of life. The differences in subjective experiences between a bat and a human, or a bat and an elephant, are vast, but there are also significant differences within the human community as well. If diversity of subjective experiences is valuable, the extinction of the Neanderthals, the Denisovans, and other human species was a grave loss. Based on physiological and inferred neurological differences, the members of these species likely experienced the world in substantially different ways than modern humans. The destruction of unique cultures and ways of life also reduced the diversity of human experiences. Lost languages, religions, worldviews, and life practices constitute a loss of ways of experiencing the world. Social and economic trends associated with modernity have led to greater homogenization of culture—for example, by some estimates, 90 percent of the world's languages currently spoken will be extinct or severely endangered within the

26 Jumper et al., "Highly Accurate Protein Structure Prediction with AlphaFold"; and Silver et al., "Mastering the Game of Go with Deep Neural Networks and Tree Search."

next century.[27] From a value-of-diversity perspective, there are reasons to disfavor this cultural homogenization and to support efforts to preserve distinct and threatened ways of life.

3.3. Wild-Animal Suffering

If we take the subjective experiences of animals to matter, the question arises of whether it would be justified for humans to intervene with processes such as predation that cause great amounts of animal suffering.[28] There are practical limits to how much humans can manage nature in such a way as to reduce animal suffering. Nevertheless, it could be possible to intervene in some limited ways to find alternative means of feeding and entertaining predators and managing prey populations in at least some ecosystems. We could imagine a Managed Nature Program that would limit animal populations through the use of humanely administered contraceptives, with predator animals fed a protein-rich but vegetarian diet and entertained by prey-like toys that do not experience any pain.

The benefits of Managed Nature, from the perspective of alleviating animal suffering, could be substantial. There are some costs that might be relevant as well: the opportunity costs of the resources devoted to running the program, the potential for such ecological interventions to result in negative unintended consequences, etc. We can image a Cost-Benefit-Justified Managed Nature Program such that the cost-effectiveness of the program—comparing the reduction in animal suffering to the costs—is greater than for other existing efforts to improve animal well-being. For example, we can imagine a suite of Humane Farming Requirements that delivers a reduction in animal suffering of one unit at a social cost of $1,000. If the Humane Farming Requirements are justified, then the Cost-Benefit-Justified Managed Nature Program would be justified if it delivered the same marginal benefit at less than $1,000. For the sake of simplicity, we can assume that the Humane Farming Requirements and the Cost-Benefit-Justified Managed Nature Program have the same distributional effects.

There may be some reasons to favor the Humane Farming Requirements while disfavoring the Cost-Benefit-Justified Managed Nature Program. One possibility is that humans have special obligations to domestic animals compared to animals in a natural habitat. Humans have taken on this greater responsibility by breeding and training domestic animals to be helpless without human support. In contrast, animals in a natural habitat arguably exist outside the scope of human activity; although, as noted by Dale Jamieson, predation

27 Krauss, "The World's Languages in Crisis," 7.

28 Cowen, "Policing Nature."

is often influenced by humans in some way.[29] In the case of truly natural conditions, the argument runs, humans are not obligated to take steps to benefit animals in natural habitats.[30] Even more strongly, an appropriate respect for animals might require us to leave them free to lead their own lives, without having human morality imposed on them.[31]

The value of diversity can provide an alternative reason to favor the Humane Farming Requirements while disfavoring the Cost-Benefit-Justified Managed Nature Program. Animals in nature have a great diversity of subjective experiences, which are vastly more varied than the lives of domesticated animals. Were a Managed Nature Program to result in a semi-domestication of wild animals, the richness and variety of experiences in the natural world may be lessened.[32] These diversity effects could be a reason to disfavor a Managed Nature Program, even if it delivered animal suffering benefits at greater (non-diversity-related) cost-effectiveness than Humane Farming Requirements.

3.4. Equal Respect and Consideration

One concern with valuing diversity is that it appears to place greater weight on the well-being of some subjects in proportion to the degree of distance of their subjective experiences from others. This may conflict with treating people with equal respect and consideration. For example, imagine the case of a Lifesaving Medicine in which a choice must be made between saving the lives of the members of a small group with a rare culture versus an equivalent number of lives of members of a large but homogenous culture. If diversity of subjective experience is valuable, that provides a reason to direct the medicine toward the members of the small group rather than the large group.

From the *ex ante* perspective, before life outcomes are known, valuing diversity acts as a kind of insurance for people with rare experiences. If people are risk averse with respect to whether they have rare experiences, analogous to being risk averse with respect to being less well-off, then such insurance could be justified.[33] But unlike the case of well-being, it is unclear why people would want insurance that compensates them when their experiences are rare. Perhaps one might be concerned that people with rare experiences will be politically

29 Jamieson, "The Rights of Animals and the Demands of Nature."

30 Simmons, "Animals, Predators, the Right to Life, and the Duty to Save Lives."

31 Hursthouse, "Virtue Ethics and the Treatment of Animals."

32 The experience of being preyed upon is obviously a negative experience that does not contribute to well-being. As discussed below (section 3.7), there are different ways that heteric welfarism could treat such negative experiences.

33 Harsanyi, "Can the Maximin Principle Serve as a Basis for Morality?"; and Rawls, *A Theory of Justice*.

isolated or face discrimination and so are deserving of special consideration. But this would simply be a case of them being less well-off: people with rare experiences could also be wealthy and politically powerful. Insurance-based arguments do not seem to justify the distributional outcome in the Lifesaving Medicine scenario.

One reason that valuing diversity could arise from the *ex ante* perspective is that people may prefer to live in worlds where there is more diversity, perhaps because those worlds are more interesting, or there is a greater range of lifestyles that are potentially available.[34] But satisfaction of this kind of preference would be an input into well-being rather than an independent consideration. It is also possible that diversity is a natural result of the kinds of good societies that people would favor from the *ex ante* perspective. If good societies are those in which people are free and have a broad scope to determine their life paths, a diversity of experiences may come about from the choices that people make in those societies. In this case, diversity would not be valued for its own sake but would simply be a sign that a society is good in other ways.

The Lifesaving Medicine scenario addresses the question of how people are treated once they are alive. Imagine an alternative Fertility Treatment scenario, in which a scarce fertility treatment must be allocated. As with the case of Lifesaving Medicine, the value of diversity would provide a reason to direct the treatment toward members of the small group with relatively rare experiences rather than toward members of the larger group. The Fertility Treatment scenario involves the question of who will be brought into being, in addition to the question of how people who have already been brought into being (the potential parents) are treated. Although the *ex ante* perspective can be invoked for the questions concerning treatment, it may not give much traction on questions related to who will be brought into being. It places some strain on the *ex ante* perspective to attempt to make recourse to it to address population dynamics, such as whether worlds with larger populations are better than worlds with smaller populations.[35] The value of diversity may be similar in that respect.

Perhaps it is best to say that the independent value of diversity is a different kind of consideration than those that would be important for individuals deliberating from the *ex ante* perspective. It would not be surprising then that the kinds of norms and values that the *ex ante* perspective gives rise to, such as equal respect and consideration, might clash with valuing diversity. Such clashes are not logically necessary, but they cannot be excluded.

34 Dowding and van Hees, "Freedom of Choice."

35 De Lazari-Radek and Singer, *The Point of View of the Universe*, 363–64.

When there are conflicts between diversity and principles such as equal respect and consideration, either could potentially win out. Perhaps the principle of equal respect and consideration is sufficiently weighty in the Lifesaving Medicine scenario that the medicine should be distributed in a way that does not account for the consequences for diversity. But other situations, such as the one described in the Fertility Treatment scenario, could have milder effects on current people but large effects on who is brought into being. Such situations might be a domain in which the value of diversity could win out against conflicting equal treatment principles.

3.5. Pareto Principles

Standard welfarist views satisfy the Pareto principles of Indifference and Ordering. Under the Indifference principle, if everyone in two worlds has the same well-being, the worlds are equally good. Under the Ordering principle, a world is better if at least someone is better-off, and no one is worse-off. Heteric welfare conflicts with these principles. With respect to Indifference, under heteric welfarism, two worlds in which everyone has the same level of well-being are not equally good if, in one of them, the diversity of subjective experiences is greater. For diversity considerations to have any force, heteric welfarism must violate the Indifference principle. With respect to Ordering, a heteric welfarist would not favor a world in which one person is better-off to an arbitrarily small degree (and everyone else if at least as well-off) if, in that world, the diversity of subjective experience is reduced in some sufficient amount; otherwise, diversity is reduced to a mere tiebreaking role.

Notwithstanding these violations of the Pareto principles, there is still a substantial role for well-being in heteric welfarism. Holding diversity constant, worlds are equally good if everyone has the same level of well-being; and worlds are better if someone is better-off, and others are no worse-off. Tracking Matthew Adler, we can refer to these as diversity-modified Pareto principles.[36] Furthermore, under heteric welfarism, worlds are equally good if everyone has the same well-being relevant experiences; this again highlights the well-being orientation of heteric welfarism.

3.6. Repugnant Conclusion

As first articulated by Derek Parfit, if decisions affect not only the well-being of persons brought into being but also the identity and number of persons who are brought into being, then the maximization of aggregate well-being criteria can

36 Adler, "Prioritarianism"

lead to the Repugnant Conclusion.[37] For any given population of persons with high levels of well-being, there is a larger population with lives just above the level that is worth living that will have larger aggregate well-being. This scenario starkly places the extension sensitivity of aggregate welfarism in opposition to the concern with the quality of life that is common to all forms of welfarism.

In the standard formulation of the Repugnant Conclusion scenario, the diversity of subjective experiences is not considered. This may lead to confusing intuitions if one imagines that lives that are barely worth living are also not very different from each other. For example, in contemplating the Repugnant Conclusion, David Heyd has asked, "What is the good in a world swarming with people having lives barely worth living?"[38] The choice of the word "swarm" here may be illuminating. The word literally applies to a "body of bees" or allusively (and, according to the *Oxford English Dictionary*, often contemptuously) a "crowd, throng, [or] multitude" of persons. The word invokes sameness, similarity, and a lack of individuality. At least part of the aversion to the Repugnant Conclusion expressed by Heyd may be that the world envisioned is not only one in which the quality of each individual life is low but also one in which the lives lived are very similar to each other. It is never explicitly stated that lives barely worth living are similar to each other or that lives that are more fulfilling are more varied. But this may be a natural feature of how we imagine the Repugnant Conclusion picture. If this is the case, intuitions concerning the value of the variety of experiences may become confused with intuitions concerning the quality of experiences.

It is possible to offer a slightly reformulated version of the Repugnant Conclusion scenario within heteric welfarism that would avoid this confusion. For aggregate, heteric welfarism, there are two extensive margins: the number of experiences and the variety of experiences. For any world with arbitrary levels on the extensive margins (i.e., a given population with a given diversity) where everyone has a high quality of life, there are alternative worlds that are better because the extensive margins are sufficiently higher (i.e., a larger population; more diversity of experiences; or both) even though quality of life decreases to the point where everyone's lives are barely worth living. This reformulated version of the Repugnant Conclusion separates population size, quality of experiences, and diversity of experiences.

As noted by Stéphane Zuber and coauthors, intuitions concerning very large populations may be unreliable, which makes reasoning about the

37 Parfit, *Reasons and Persons*.

38 Heyd, *Genethics*, 57.

Repugnant Conclusion scenario difficult.[39] Accounting for the diversity of subjective experiences does not necessarily make things easier, because there is an additional parameter of concern (i.e., diversity), and intuitions concerning hyperdiverse worlds may be as unreliable as intuitions concerning worlds with explosively large populations. But the reformulated version does allow consideration of new hypotheticals that were not contemplated in the original formulation of the scenario.

For example, imagine holding the diversity of experiences constant while increasing population size and decreasing quality of life. Begin with Small World, which has a population of some graspable number, say one hundred thousand, living extremely fulfilling and varied lives. Now consider the alternative Big World, which has a larger population of people with lives at a level of well-being just high enough to be worth living but whose experiences are as varied as in Small World. Every person in Big World is as much an individual—no more part of a swarm—as the persons in Small World, but their lives are more difficult, with fewer happy moments and a larger number of setbacks. When the sum of their struggles and satisfactions is taken, there is more total well-being in the larger population. It is perhaps not altogether obvious that favoring Big World over Small World is a truly repugnant conclusion.

Or consider Big Boring World, which has an even larger population, with less variety of experience. If tradeoffs can be made on the extensive margins, Big Boring World may be better than Big World. But there may be declining marginal value, such that as population increases and diversity decreases, ever larger populations would be needed to make up for declines in diversity. There may also be a minimum threshold for diversity, such that no amount of additional population could make up for reductions in diversity. The constraints imposed by diversity may be such that even if there is a Big Boring World that is better than Big World (which is better than Small World), lives are sufficiently varied (and there are sufficiently many of them) in Big Boring World that favoring it is not obviously repugnant.

Finally, consider Small Wild World, with the original population of one hundred thousand, now with lives that are extraordinarily varied but only barely worth living. It is possible that a version of heteric welfarism would favor Small Wild World over Small World—for some, this conclusion may seem repugnant. But diversity may not be entirely population independent. At the limit, there must be at least two people for there to be diversity at all, and small population size would seem to place limits on diversity. If this is the case, then there may not be a Small Wild World that is preferable to Small World. An alternative may be

39 Zuber et al., "What Should We Agree on about the Repugnant Conclusion?"

Larger Wild World, which has a large enough population to support a sufficient diversity of experiences that it offsets the fact that everyone's life is barely worth living. Intuitions may vary concerning whether the conclusion that Larger Wild World should be preferred to Small World is repugnant.

The Repugnant Conclusion scenario is illuminating because it starkly contrasts the extension sensitivity of aggregate welfarism with quality of life. Heteric welfarism complicates the picture by adding another extensive parameter. For some, accounting for diversity may be enough to avoid any repugnant conclusions. For others, because heteric still favors worlds that are very extensive in value but where value is spread very thinly over persons, it too may lead to conclusions of varying degrees of repugnance. But at the very least, accounting for diversity helps separate intuitions concerning the undesirability of sameness (the swarm) from the undesirability of low quality of life.

3.7. Negative Experiences

The value of diversity can provide a reason to favor worlds in which experiences are more varied over worlds in which experiences are more homogenous. One question that naturally arises is how to account for negative experiences.

Under an experience diversity formulation, the only feature of an experience that would be relevant when considering the diversity of experiences is how rare it is, not whether the experience contributed to well-being. This pure experience diversity formulation appears to run afoul of the anti-sadism constraint. A world in which one person lives a good but common life could be disfavored over one in which that person's experiences are all negative, so long as those experiences are sufficiently distinctive.

An alternative formulation would be a value of well-being diversity, in which the diversity that matters arises from positive experiences that are different from other positive experiences. Under this approach, a world in which a person has a good but common life would be preferred to one in which that person suffers in unusual ways. The negative experiences that person has in the second world would not contribute to well-being diversity at all, and there would also be a reduction in aggregate welfare compared to the first world as well.

Even well-being diversity has some undesirable characteristics, including violating the Pareto Ordering principle. A world in which one person lives a good but common life could be disfavored over a world in which that person's experiences are less good (but still positive) and less common. This means that improving one person's lot while leaving everyone else the same would not be preferred if that improvement came with a sufficiently large reduction in diversity. There is some similarity between this result and the leveling down objection to egalitarianism—a concern with the world-level distribution of

well-being (over subjects or experiences) can conflict with more person-centered concerns.

Under the well-being diversity formulation, there are alternative ways to treat suffering. One possibility would be for suffering diversity to be disvalued, such that worlds with similar negative experiences would be favored over worlds with varied negative experiences. The alternatives would be to favor suffering diversity (which would collapse into experience diversity) or ignore suffering diversity and treat all negative experiences the same.

Disvaluing suffering diversity results in a kind of symmetrical treatment of positive and negative experiences. If the world is more full of positive experiences when they are diffused over many types of experiences, one could say that the world is less full of negative experiences when they are concentrated over fewer types of experiences. However, there are reasons to reject this symmetrical treatment of positive and negative experiences. The harm of suffering could be entirely independent of whether the associated negative experiences are common or rare. Indifference over the concentration of suffering over experience would imply that a larger population of suffering subjects is always worse than a smaller suffering population, even if the larger population is made up of the same life lived many times. This is a mild extension of the anti-sadism principle.

Accordingly, the most plausible formulation of the value of diversity focuses on well-being diversity while treating suffering the same, regardless of whether the associated experiences are common or rare.[40]

4. FORMULATIONS

Nothing in heteric welfarism demands (or precludes) any particular degree of analytic formality: it could be realized as a fully articulated quantitative

40 In a critique of Bramble, Timmerman and Pereira criticize what they see as a potential "indefensible ad hoc asymmetry" between his treatment of pleasure and pain if, with respect to an individual human life, "purely repeated pleasures *do not* alter the value of one's life considered as a whole," but "purely repeated pains *do* alter the value of one's life considered as a whole" (Timmerman and Pereira, "Non-repeatable Hedonism Is False," 702). One might extend a similar critique *mutatis mutandis* to the formulation offered above in which the value of well-being is (at least partially) diversity contingent, while the disvalue of suffering is diversity independent. However, there is no obvious reason why asymmetrical treatment must be justified while symmetrical treatment need not be. Well-being and suffering are very different kinds of things, and just as we seek to maximize the former and minimize the latter, we might be concerned with the diversity of well-being and not of suffering. At the very least, the anti-sadism principle provides a reason for asymmetrical treatment.

social welfare function, or it could take the form of qualitative moral evaluations.[41] Nevertheless, it may be useful for even a qualitative analysis to have a clear definition of how diversity could be estimated.[42] In many approaches to measuring diversity, some concept of a *type* is deployed, such that metrics of variation can be estimated within type, and metrics concerning diversity can be used to describe distribution across types. In biological and ecological sciences, species are a common type. Variation is an estimate of the degree of differences found within species for some characteristic, such as height. The relative balance of different species in an ecosystem can be captured with a measure of entropy. Within the field of ecology, different diversity indexes have been proposed that balance the number of types within an ecosystem with the evenness of the distribution across types.[43] Generally, diversity is greater when there are more types with more evenly balanced populations.

Type-based metrics may apply to the diversity of subjective experience. Species are an obvious candidate, in that species boundaries mark out relatively stable differences between organisms. As mentioned above, the genetic or phenotypic distinctions between species do not have foundational moral significance, but they may track differences in how organisms experience the world, which is of moral significance for heteric welfarists. It is possible that type-based metrics of diversity could be made applicable to humans as well, perhaps tracking different sociological categories that deeply influence how people experience the world.

There are, however, several problems with applying type-based measures to the diversity of subjective experience. Most obviously in the case of humans, people do not fall neatly into groups, and efforts to force them into those groups have resulted in many profound harms. Other organisms also create at least some challenges of categorization. More profoundly, type-based metrics treat all types as being similarly different, so that two ant species are counted as two types in the same way that one ant species and one primate species are counted as two types. As a way of understanding the diversity of subjective experience, this characteristic of type-based metrics is a serious limitation.

An alternative approach to measuring diversity, introduced by Martin Weitzman, is based on a measure of distance.[44] The Weizman diversity index can be calculated for any distance measure for which a non-negative, symmetrical distance can be calculated between any two elements of a set. The diversity

41 Regarding the former, compare Adler, *Well-Being and Fair Distribution*.

42 Page, *Diversity and Complexity*.

43 Tuomisto, "A Consistent Terminology for Quantifying Species Diversity?"

44 Weitzman, "On Diversity."

of a set is calculated algorithmically by summing a set of pair-wise comparisons between each member of the set. The calculation begins by selecting a random member of the set (defined as a), then identifying the member with the smallest distance to a (defined as b); the next member is identified with the smallest distance to the set $[a, b]$, meaning the smallest distance to either a or b (defined as c). Then, the next member is identified based on the smallest distance to the set $[a, b, c]$, and so on until all of the members have been identified. At each step, the distance of the member being identified is kept track of; the sum of these distances is the diversity measure.

The major advantage of the Weitzman diversity index compared to other measures is the notion of distance: an ecosystem with two species of ants is treated as less diverse than an ecosystem with an ant species and a primate species. For biodiversity, one natural candidate for distance between two species would be time back to a common ancestor. The common ancestor metric takes advantage of the tree-like phylogenetic structure of biological evolution. Genetic differences can be used to recover evolutionary information based on various biological assumptions or could be used directly to determine distances through some other formalism.

The primary challenge for transposing a concept such as the Weitzman diversity index to the context of subjective experience is in deriving an appropriate notion of distance. At a coarse level, at least some ordinal distance judgments should be relatively uncontroversial: the distance between the subjective experiences of two horses is less than between those of a horse and a cat, which is less than the distance between the experiences of a horse and an octopus. Two undergraduate students at US universities have more similar experiences to each other than one of those students does to a Sumerian farmer in the year 2500 BCE.

Formalized, we might imagine a high but finite dimensional space of subjective experience in which all subjective experiences could be located. In such a space, a measure such as (symmetrized) Kullback–Leibler (KL) divergence could be used to calculate a distance. KL divergence is a flexible metric that can be interpreted as the mutual information between two distributions. If any given experience is understood as a distribution over the possible features of any experience, then KL divergence measures how much any two experiences are alike, where alikeness is understood in the sense that one experience carries a great deal of information about the other.

Even if more formal estimates such as the Weitzman index cannot be calculated in practice, they can help structure the rough judgments that can be made. The upshot is that worlds become more diverse when new subjective experiences are added that are very different from the existing set of experiences. From the perspective of heteric welfare, such worlds are better, *ceteris paribus*.

A final question worth posing about how heteric welfarism is formulated is whether the diversity that matters is diversity of individual experiences or diversity of experiences collected as lives lived. Imagine two different worlds, Left and Right, with experiences drawn from [*X*, *Y*, *Z*] for three individuals [Abe, Betty, Caleb] over three time periods:

Table 1. Left and Right World

	Left world			Right world		
	Abe	Betty	Caleb	Abe	Betty	Caleb
$Time_1$	*X*	*X*	*X*	*X*	*X*	*X*
$Time_2$	*Y*	*Y*	*Z*	*Y*	*Y*	*Y*
$Time_3$	*Z*	*Y*	*Z*	*Z*	*Z*	*Z*

In both worlds, experience *X* is had three times, experience *Y* is had three times, and experience *Z* is had three times. In Left World, those experiences are clustered by person, whereas in Right World, the experiences are spread evenly over persons. Under a life-level understanding of the diversity of subjective experiences, Left World is more diverse because Abe's life is different from Betty's life, and both of their lives are different from Caleb's life. In Right World, each of the inhabitants has the same life. At an experience-level understanding, the worlds have the same level of diversity because the individual experiences in the two worlds are the same.

From the level of the individual, Right World seems superior, if change or richness of experience is valuable.[45] To consider diversity in isolation, we should assume that aggregate well-being is the same in the two worlds (implying that the second experience of *Z* for Caleb is no less valuable than the first), and we can imagine that all of the experiences are of the same quality. Under these conditions, Right World has the problem that each person's life is a copy of the others. The aggregation of experiences over lives can transform the set of experiences [*X*, *X*, *X*, *Y*, *Y*, *Y*, *Z*, *Z*, *Z*] either into a set of copies or into a set of unique lives lived.

Using the Weitzman index, assuming that the distances between *X*, *Y*, and *Z* are the same (imagine an equilateral triangle), the index for both Left World and Right World is the same (the sum of the distances *AB* and *AC*) if an experience-level view of the diversity of experiences is taken. But if the metric is calculated on lives, then the diversity index is zero for Right World (i.e., the distance between identical lives) and is some positive number for Left World.

45 As discussed above, Bramble argues that "purely repeated pleasures . . . add nothing in and of themselves to [a person's] lifetime well-being" ("A New Defense of Hedonism about Well-Being," 98).

The same style of reasoning could be applied at another level of organization. Abe, Betty, and Caleb could be the names of towns rather than people, for example. We can consider whether Right World, which has towns with the same collection of experiences, is less diverse than Left World, which has greater variety at the town level.

Although a diversity measure could be calculated at different levels of aggregation, the individual level has the most obvious appeal. Counting against the experience level would be the difficulty in defining an indivisible experience that could be considered in isolation. Given the rich connection between subjective experiences over the course of an individual's life, this may be impossible. If so, the level of lives, which marks off a clear boundary between entities that experience distinct streams of subjective experience, is the most natural unit.

An individual life can be understood as a distribution over experiences, where experiences are themselves represented as vectors in a high dimensional space of subjective experiences. A Weitzman index would be calculated based on the individual-life distributions, using a metric such as symmetrized KL divergence. The resulting estimate could be incorporated into reasoning that compares the relative goodness of alternative worlds.

5. CONCLUSION

The discussion above provided an overview of heteric welfarism, the view that the diversity of subjective experiences has foundational value within a welfarist framework. This discussion was general and necessarily sacrificed fine-grained detail. The goal was to introduce and describe the view, discuss how it could be formulated, and explore some of its implications. Many of the issues discussed above could bear further scrutiny.

There are many potentially thorny issues that the value of diversity raises for welfarism. In terms of formulations, open questions include whether diversity is considered qualitatively or quantitatively, how best to estimate diversity, and how to trade off diversity against other values. There is likely more to be said about how diversity interacts with other normative criteria, such as the Pareto principle and norms of equal treatment, and with debates within welfarism concerning the Repugnant Conclusion and wild-animal suffering. Different formulations of heteric welfarism likely have consequences for how it fits in with other moral intuitions and criteria.

These questions are worth exploring if there is some minimal plausibility to the view that worlds with a greater diversity of experiences are in some sense better than worlds with less variety of experiences. The Copied Colonies scenario is intended to motivate that plausibility—for those who have the intuition

that the Unique Plan is in some sense better than the Identical Plan, heteric welfarism can justify that appeal. In addition, there is some analogy between heteric welfarism and aggregate welfarism, in that both are extension-sensitive views in which the amount of value (in terms of numerosity or in terms of variety) matters. Extension sensitivity is in this sense affirming in a way that extension insensitivity is not. This may provide another reason to find heteric welfarism at least sufficiently plausible that it is worth further consideration.

A final advantage of heteric welfarism is that it provides a means of understanding the motivation behind certain kinds of nature conservation and a perspective from which to balance concerns with diversity against other important considerations. It vindicates the intuition that diversity matters while remaining grounded in the view that subjective experience is the foundation of moral consideration. In this way, it offers a bridge between welfarism and environmental ethics—fields of moral theory that have for the most part proceeded along separate tracks.

University of Virginia
mlivermore@virginia.edu

REFERENCES

Adler, Matthew D. "Claims across Outcomes and Population Ethics." In *The Oxford Handbook of Population Ethics*, edited by Gustaf Arrhenius, Krister Bykvist, Tim Campbell, and Elizabeth Finneron-Burns, 320–49. Oxford: Oxford University Press, 2022.

———. "Prioritarianism: Room for Desert?" *Utilitas* 30, no. 2 (June 2018): 172–97.

———. *Well-Being and Fair Distribution: Beyond Cost-Benefit Analysis*. Oxford: Oxford University Press, 2012.

Agar, Nicholas. *Life's Intrinsic Value*. New York: Columbia University Press, 2001.

Bradley, Ben. "The Value of Endangered Species." *Journal of Value Inquiry* 35, no. 1 (March 2001): 43–58.

Bramble, Ben. "A New Defense of Hedonism about Well-Being." *Ergo* 3, no. 4 (2016): 85–112.

Callicott, J. Baird. *In Defense of the Land Ethic*. Albany: State University of New York Press, 1989.

Cline, Brendan. "Irreplaceable Design: On the Non-instrumental Value of Biological Variation." *Ethics and the Environment* 25, no. 2 (Fall 2020): 45–72.

Cowen, Tyler. "Policing Nature." *Environmental Ethics* 25, no. 2 (Summer 2003): 169–82.

DeFrancesco, Laura. "Church to De-extinct Woolly Mammoths." *Nature Biotechnology* 39, no. 10 (2021): 1171.

de Lazari-Radek, Katarzyna, and Peter Singer. *The Point of View of the Universe: Sidgwick and Contemporary Ethics*. Oxford: Oxford University Press, 2016.

Dowding, Keith, and Martin van Hees. "Freedom of Choice." In *The Handbook of Rational and Social Choice*, edited by Paul Anand, Prasanta Pattanaik, and Clemens Puppe, 374–92. Oxford: Oxford University Press, 2009.

Dvořák, Pavel, Pablo I. Nikel, Jiří Damborský, and Victor de Lorenzo. "Bioremediation 3.0: Engineering Pollutant-Removing Bacteria in the Times of Systemic Biology." *Biotechnology Advances* 35, no. 7 (November 2017): 845–66.

Elmqvist, Thomas, Carl Folke, Magnus Nyström, Garry Peterson, Jan Bengtsson, Brian Walker, and Jon Norberg. "Response Diversity, Ecosystem Change, and Resilience." *Frontiers in Ecology and the Environment* 1, no. 9 (November 2003): 488–94.

Harsanyi, John C. "Can the Maximin Principle Serve as a Basis for Morality? A Critique of John Rawls's Theory." *American Political Science Review* 69, no. 2 (June 1975): 594–606.

Heyd, David. *Genethics: Moral Issues in the Creation of People*. Berkeley: University of California Press, 1992.

Hursthouse, Rosalind. "Virtue Ethics and the Treatment of Animals." In *The Oxford Handbook of Animal Ethics*, edited by Tom L. Beauchamp and Raymond G. Frey, 119–43. Oxford: Oxford University Press, 2011.

James, Simon P. "Rarity and Endangerment: Why Do They Matter?" *Environmental Values* 33, no. 3 (June 2024): 296–310.

Jamieson, Dale. "The Rights of Animals and the Demands of Nature." *Environmental Values* 17, no. 2 (May 2008): 181–99.

Jumper, John, Richard Evans, Alexander Pritzel, Tim Green, Michael Figurnov, Olaf Ronneberger, Kathryn Tunyasuvunakool, Russ Bates, Augustin Žídek, Anna Potapenko, Alex Bridgland, Clemens Meyer, Simon A. A. Kohl, Andrew J. Ballard, Andrew Cowie, Bernardino Romera-Paredes, Stanislav Nikolov, Rishub Jain, Jonas Adler, Trevor Back, Stig Petersen, David Reiman, Ellen Clancy, Michal Zielinski, Martin Steinegger, Michalina Pacholska, Tamas Berghammer, Sebastian Bodenstein, David Silver, Oriol Vinyals, Andrew W. Senior, Koray Kavukcuoglu, Pushmeet Kohli, and Demis Hassabis. "Highly Accurate Protein Structure Prediction with AlphaFold." *Nature* 596 (2021): 582–89.

Krauss, Michael. "The World's Languages in Crisis." *Language* 68, no. 1 (March

1992): 4–10.
Leopold, Aldo. *A Sand County Almanac.* New York: Oxford University Press, 1949.
Lin, Jianquin, David Duche, Christian Carøe, Oliver Smith, Marta Maria Ciucani, Jonas Niemann, Douglas Richmond, Alex D. Greenwood, Ross MacPhee, Guojie Zhang, Shyam Gopalakrishnan, and M. Thomas P. Gilbert. "Probing the Genomic Limits of De-extinction in the Christmas Island Rat." *Current Biology* 32, no. 7 (April 2022): 1650–56.
Markowitz, Harry. "Portfolio Selection." *Journal of Finance* 7, no. 1 (March 1952): 77–91.
Masny, Michal. "On Parfit's Wide Dual Person-Affecting Principle." *Philosophical Quarterly* 70, no. 278 (January 2020): 114–39.
Mikkelson, Gregory M. "Weighing Species." *Environmental Ethics* 33, no. 2 (Summer 2011): 185–96.
Miller, Peter. "Value as Richness: Toward a Value Theory for the Expanded Naturalism in Environmental Ethics." *Environmental Ethics* 4 no. 2 (Summer 1982): 101–14.
Moore, G. E. *Principia Ethica.* New York: Cambridge University Press, 1903.
Page, Scott E. *Diversity and Complexity*. Princeton: Princeton University Press, 2011.
Parfit, Derek. "Equality and Priority." *Ratio* 10, no. 3 (December 1997): 202–21.
———. *Reasons and Persons.* Oxford: Oxford University Press, 1984.
Rawls, John. *A Theory of Justice*. Cambridge, MA: Harvard University Press, 1971.
Rolston, Holmes, III. *Environmental Ethics: Duties to and Values in the Natural World*. Philadelphia: Temple University Press, 1988.
Sandler, Ronald. *The Ethics of Species: An Introduction*. Cambridge: Cambridge University Press, 2012.
———. "On the Massness of Mass Extinction." *Philosophia* 50, no. 5 (November 2022): 2205–20.
Scheffler, Samuel. *Death and the Afterlife*. Oxford: Oxford University Press, 2016.
Silver, David, Aja Huang, Chris J. Maddison, Arthur Guez, Laurent Sifre, George van den Driessche, Julian Schrittwieser, Ioannis Antonoglou, Veda Panneershelvam, Marc Lanctot, Sander Dieleman, Dominik Grewe, John Nham, Nal Kalchbrenner, Ilya Sutskever, Timothy Lillicrap, Madeleine Leach, Koray Kavukcuoglu, Thore Graepel, and Demis Hassabis. "Mastering the Game of Go with Deep Neural Networks and Tree Search." *Nature* 529 (2017): 484–89.
Simmons, Aaron. "Animals, Predators, the Right to Life, and the Duty to Save Lives." *Ethics and the Environment* 14, no. 1 (Spring 2009): 15–27.

Soulé, Michael E. "What Is Conservation Biology?" *BioScience* 35, no. 11 (December 1985): 727–34.

Sumner, L. W. *Welfare, Happiness, and Ethics*. Oxford: Oxford University Press, 1996.

Timmerman, Travis, and Felipe Pereira. "Non-repeatable Hedonism Is False." *Ergo* 6, no. 25 (2019): 697–705.

Tuomisto, Hanna. "A Consistent Terminology for Quantifying Species Diversity? Yes, It Does Exist." *Oecologia* 164, no. 4 (December 2010): 853–60.

Weitzman, Martin L. "On Diversity." *Quarterly Journal of Economics* 107, no. 2 (May 1992): 363–405.

Zachos, Frank E. *Species Concepts in Biology: Historical Development, Theoretical Foundations, and Practical Relevance*. Cham: Springer Nature, 2016.

Zhang, Yorke, Jerod L. Ptacin, Emil C. Fischer, Hans R. Aerni, Carolina E. Caffaro, Kristine San Jose, Aaron W. Feldman, Court R. Turner, and Floyd E. Romesberg. "A Semi-synthetic Organism that Stores and Retrieves Increased Genetic Information." *Nature* 551 (2017): 644–47.

Zuber, Stéphane, Nikhil Venkatesh, Torbjörn Tännsjö, Christian Tarsney, H. Orri Stefánsson, Katie Steele, Dean Spears, Jeff Sebo, Marcus Pivato, Toby Ord. Yew-Kwang Ng, Michal Masny, William MacAskill, Nicholas Lawson, Kevin Kuruc, Michelle Hutchinson, Johan E. Gustafsson, Hilary Greaves, Lisa Forsberg, Marc Fleurbaey, Diane Coffey, Susumu Cato, Clinton Castro, Tim Campbell, Mark Budolfson, John Broome, Alexander Berger, Nick Beckstead, and Geir B. Asheim. "What Should We Agree On about the Repugnant Conclusion?" *Utilitas* 33, no. 4 (December 2021): 379–83.