Chapter 13
Kantian Foundations for a Cosmocentric Ethic

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13.1 Getting a Cosmocentric Ethic off the Terrestrial Ground

The deeply perplexing issues arising from current planetary exploration are signaling that we need more than just ingeniously designed spacecraft before launching into extraterrestrial territory. We need in addition to equip ourselves with a *cosmocentric ethic* adequately tailored to the distinct ethical entanglement that emerges from our efforts to enlarge the circumference of our own world by transforming others. Professionals and researchers from a variety of disciplines and agencies are voicing this need.[1] Robert Haynes asserts that: "We need from philosophers a new 'cosmocentric' ethics, and perhaps a revised theory of intrinsic value" to achieve such breadth (1990, 177). Mark Lupisella echoes this sentiment with a particular emphasis on the latter point in his assertion that "an important challenge for a cosmocentric ethic is justifying intrinsic value" (2009a, 193) . I attempt here to take on this challenge by offering an account of *intrinsic value* sufficiently broad enough to address ethical issues on a cosmic scale.

My account is rooted in some central precepts of the philosophy of biology and ethical theory of Immanuel Kant.[2] The cosmocentric ethic I develop, however, is

[1]McKay (1990, 186), Lupisella and Logsdon (1997).

[2]Citations from the works of Immanuel Kant include the following abbreviated English titles: *CPR* (*Critique of Pure Reason*), *CPJ* (*Critique of the Power of Judgment*), *OP* (*Opus Postumum*), *GMM* (*Groundwork of the Metaphysics of Morals*), *First Introduction* (*First Introduction to The Critique of the Power of Judgment*). They also include the corresponding volume and page numbers of the standard *Akademie* edition: *Kants gesammelte Schriften*. Citations from the *Critique of Pure Reason*, however, are indicated by the standard pagination of the A and B edition. All quotations are taken from the English translation of Kant's texts in Guyer, Paul and Wood, Allen W. (eds), *The Cambridge Edition of the Works of Immanuel Kant*. Cambridge: Cambridge University Press, 1992.

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not intended to be representative of Kant's own ethical position. Nonetheless I think Kant's account of biological beings highlights a rudimentary feature which, when sufficiently developed, gives rise to moral agency. Living beings, Kant maintains, are regarded *as if* they are capable of a kind of *self-organization* that is irreducible to mechanical explanation. Moral agents, on Kant's view, are characterized by their capacity for *self-legislation*—the feature that endows them with *intrinsic value*. My aim is to show that the capacity for self-legislation possessed by moral beings is just a heightened or more pronounced instance of the general capacity for self-organization manifested by *all* living beings. I conclude from this that intrinsic value is not, therefore, something that may only be attributed to self-legislating beings but rather something that can be extended to *all* living beings. I then proceed to show that, nonetheless, there is still a non-arbitrary basis for viewing self-legislating beings as possessing *greater* intrinsic value than non-self-legislating beings. Equipped with a more clearly defined account of intrinsic value, we may stand a better chance of establishing the moral bounds of the universe.

While the issues pertaining to the ethics of space exploration are vast, I limit myself here to the problem of determining appropriate ethical principles to govern our interaction with primitive indigenous life forms that we may encounter in our efforts to engineer extraterrestrial ecosystems or terraform other planets (Schwartz 2015). Current plans for exploration on Mars present us with the prospect of possibly harming or destroying any extant life forms there, or affecting the potential for future Martian life by adversely altering the Martian biosphere. Can such primitive life forms be considered to possess any value? If so, do they possess merely instrumental or intrinsic value? Biocentrists such as Charles Cockell defend a view that attributes rights to microbes, and one such right is to be left to develop and evolve undisturbed by other life forms, including humans (Cockell 2004, 2005). But what is the basis for these rights? Unless rooted in an adequate theory of *intrinsic value*, such claims are unfounded.[3]

In my attempt to provide an account of intrinsic value that meets the demands of a cosmocentric ethic, I limit myself to the treatment of arguments based on the intrinsic rather than instrumental value of extraterrestrial life—though the latter are certainly important for dealing with other space exploration issues.[4] Ultimately, I contend that: The view that it is morally impermissible to terraform other planets inhabited by indigenous life forms cannot be defended solely on the biocentric principle that "all living things have intrinsic value."[5] Moreover, I support this position with a cosmocentric ethic that is more closely aligned with biocentrism than with anthropocentrism. My strategy is to avail myself of some central precepts in the ethical and biological theory of Immanuel Kant. My approach, however,

[3]More recently, Cockell (2011) has appealed to Aristotelian teleology to defend the intrinsic value of microbial life. See also Cockell's contribution to this volume.

[4]I share the majority view here that extraterrestrial microbes possess significant instrumental value.

[5]I acknowledge, however, that there may be other valid reasons for refraining from such practices. Typically, however, these other reasons are fueled by anthropocentric interests.

departs from the one typically adopted by adherents of Kant's position in these debates, as it emphasizes the biocentric rather than ratiocentric strains in Kant's thought, which, however, Kant himself leaves undeveloped. In the section that follows, I lay out the key elements that I think constitute the general parameters for a cosmocentric ethic, and in the section after that I show how my account of intrinsic value fits into that ethic.

13.2 Determining the Cosmocentric Element in a Cosmocentric Ethic

The very idea of a *cosmocentric ethic* seems to suggest an ethic that prioritizes the cosmos. But how exactly is such an idea to be construed? Our lack of fundamental knowledge concerning the extent and ultimate nature of the universe presents serious challenges. Moreover, many argue that moral laws stem from the viewpoint of human beings—beings capable of forming moral values—and that therefore, moral values and principles have application only for and between human beings. Some appeal to this precept to support *anthropocentrism*—an ethical framework that prioritizes *human beings*.[6] Others, like Don MacNiven, suggest rather that we need to *transcend* our human perspective in order to acknowledge the interests and values of non-human beings (MacNiven 1990). Non-anthropocentrists such as Paul Taylor, Holmes Rolston, and J. Baird Callicott argue that such transcendence is impracticable, though it is nonetheless possible to *extend* moral consideration to non-human beings and ecosystems (Hargrove 1992, 184).

While a *cosmocentric ethic* may very well have to be based on a human viewpoint informed by human values, it may nonetheless be possible to establish a criterion of intrinsic value for universal application beyond the terrestrial realm. The notion of *intrinsic value* that I adopt is this: *a value that something possesses by virtue of its intrinsic properties or nature.* I maintain that establishing a criterion of intrinsic value for a cosmocentric ethic primarily requires the specification of a fundamental property that may, in principle, be extended to any being in the universe. Such a property could then serve as a non-arbitrary criterion for determining which beings possess intrinsic value by assessing the degree to which they manifest this fundamental property (Lupisella and Logsdon 1997, 1).[7] Thus a cosmocentric ethic would require us to consider the realm of candidates to be *all* the beings in the universe—even in the absence of knowledge concerning what *particular* things the universe contains. This is possible on my account because the criterion I adopt is a purely formal one and for this reason does not require a catalogue of the totality of

[6]Schwartz (2013, 9–11) provides an insightful account of some central anthropocentric arguments concerning these issues.

[7]This is the strategy suggested by Lupisella and Logsdon for the establishment of a cosmocentric ethic.

existing beings in the universe, or a complete account of the nature of the universe. Because of the formal nature of my criterion, the position I defend may be viewed as a *weak* cosmocentric ethic. It is *cosmocentric* in the sense that it gives priority to *all beings in the universe that possess intrinsic value*, appreciating that intrinsic value is not restricted to terrestrial beings; it is *weak* in the sense that it does not attribute intrinsic value to *the universe itself* as a being detached from, or transcending, the beings that constitute the universe.[8] For this reason, my position does not amount to a "boot-strapped" view according to which the universe itself actually acquires intrinsic value *through* certain beings contained in it, which themselves possess intrinsic value (Lupisella 2009b, 333). With these constraints in place, I now proceed to my account of a cosmocentric ethic.[9]

While acknowledging the epistemological constraints that Kant specifies concerning our understanding of the metaphysical nature of the universe, it is, I think, legitimate to establish some claims about our *experience* of the beings in the universe, which may help achieve the *practical* aim of providing a guiding principle for a cosmocentric ethical theory.[10] Most notably, the universe manifests the production of a complexity of diverse beings that are organized into structured unities as formed entities or integrated systems. Among these various organized entities are beings that possess the source of this organization or integration within themselves, i.e., they are *self-organizing*. In this sense, such beings may be viewed as *autonomous.* The property of *self-organization*, I maintain, is the fundamental property that grounds our intuitions about intrinsic value. That is to say, of all the properties possessed by the universe's known inhabitants, self-organization is the property that constitutes the basis for intrinsic value. This claim is to be taken as axiomatic in my argument, though in the sections that follow, I show why this is warranted.

The idea of self-organization has some affinity with the idea of *complexity* that certain thinkers attribute to the development of the universe through evolution and the laws of physics.[11] Lupisella remarks, however, that the criterion of complexity alone might not be sufficient to constitute a basis for the notion of *intrinsic value* that could properly inform a cosmocentric ethic. He recommends that the criterion of complexity be supplemented by other factors. I endorse this recommendation, and suggest that it is not mere complexity that constitutes the basis for intrinsic value, but an *autonomously ordered complexity*, which is what is involved in *self-organization*. Martyn J. Fogg intimates that the universe *itself* manifests the capacity for autonomous action captured in my notion of *self-organization* (2000, 210). Although my own argument does not require that "the universe itself" possess

[8]I am grateful to James Schwartz for his suggestions in working out a formulation of this point.

[9]I endorse here Kant's rejection of the possibility of a "rational cosmology" (*CPR* A508/B536-A532/B560).

[10]See Guyer (2005), Ginsborg (2006).

[11]Davies (1995, 102), Smith (2009).

this property, it also does not preclude this possibility—provided that we could form an adequate concept of "the universe itself" in the first place.

Thus I maintain that for the practical purpose of establishing the grounds of a cosmocentric ethic, the basis of *intrinsic value* is the fundamental property of *self-organization*. I argue from this initial axiom that: *the extent to which any being in the universe possesses intrinsic value is determined by its capacity for self-organization*. The issue that confronts us now is: What kinds of beings manifest the capacity for self-organization? I probe this issue in the section that follows.

13.3 The Intrinsic Value of All Living Beings

When considering the various kinds of existing beings that we know of, there seems to be a powerful tendency to view *living beings* as constituting a distinct category. There is just something about living beings that strikes us as unique—though what exactly it is quite eludes us (Cleland 2012). It was the acknowledgment of this fact that inspired the initiative among late eighteenth century scientists to establish the sub-discipline of "biology" as a scientific inquiry specifically devoted to the investigation of living things (Van den Berg 2014). Kant's characterization of a *living thing* was a catalyst in moving this initiative forward, serving as the foundational principle for the life sciences in this early phase, and it is still operative in current biological theory (Deacon and Cashman 2013). What was the distinguishing feature of living things that Kant fastened on?

According to Kant, the fundamental feature of living things that take the form of organisms is that they are *self-organizing* (*CPJ* 5: 372). An organism is not only an *organized* being, as in the case of a machine; it is a *self-organizing* being. We conceive of an organism *as if* it were not controlled by something external to itself, but rather something internal. Thus an organism appears, in this sense, to be a *system* rather than an aggregate, and a somewhat autonomous agent. As such, an organism is conceived *as if* it were a *natural purpose,* since it manifests *reciprocal causality*, i.e., its parts exist for the sake of the whole, and the whole exists for the sake of its parts (*CPJ* 5: 371).[12] The organism does not exist solely to serve some extrinsic purpose (*CPJ* 5: 374). It seems, rather, to contain an *intrinsic purpose* in accordance with which it directs all its activities. All other fundamental features of organisms, e.g., self-maintenance, growth, homeostasis, metabolism, reproduction, evolution through adaptation, etc., depend upon the organism's capacity for self-organization.

The only way we can make sense of the organism's activity is to consider it *as if* it contained a purposive drive within itself. Thus Kant characterizes an organism as

[12]Kant's position should not be confused with that of Aristotle who defends a genuine teleology involving real ends and purposes in nature. The "*as if*" qualification is indicative of Kant's more heuristic sense.

a *natural purpose* (*Naturzweck*).[13] It is this feature of organisms, Kant maintains, that renders a completely mechanical explanation of them impossible, since an organism is always underdetermined by the laws of physics.[14] In effect "self-organization implies intrinsic purposiveness" (Thompson 2010, 140). My view is that the purposiveness exemplified by living organisms is a rudimentary form of a moral constraint. Hannah Ginsborg intimates this view in her claim that Kant's notion of *end* or *purpose* here is bound up with the notion of *normativity*. She maintains that to view an organism as having an end or purpose is essentially "to regard it as conforming to, and a fortiori as governed by, normative rules or constraints" (2006, 464). Kant explains that in our judgment of organisms we compare "the concept of a product of nature as it is with one of what it ought to be" (*First Introduction* 20: 240). I maintain that this "natural normativity," as Ginsborg calls it, may be construed as a prototype of moral constraint that generates a primitive form of moral agency. This is the feature that distinguishes organisms as unique types of beings,[15] and which in some highly developed organisms gives rise to fully autonomous moral agents.

To be sure, since Kant's time the notion of "self-organization" has acquired a much broader meaning, which opened the door to its application to numerous other contexts and fields besides living organisms and biology (Keller 2008). Those applications of the term, however, fail to capture the particular feature of "self-organization" that warrants its association with the domain of ethics, and specifically, for determining the basis of intrinsic value. Kant's characterization of organisms provides us with a *paradigm case* of self-organization for assessing intrinsic value (*CJP* 5: 374–6).[16] Merely existing beings do not possess this property. Thus, on my view, MacNiven's attribution of intrinsic value to systems of merely *existing* beings—which I call an *ontocentric ethic*—would be unfounded. The abiotic features of ecosystems also do not possess this property.[17] It is only by virtue of the organic beings in an ecosystem that the ecosystem itself may be said to involve self-organization. I conclude, therefore, that all living beings, understood as organisms in the Kantian sense, may be viewed as possessing intrinsic value by virtue of their capacity for self-organization.

[13]Although Kant's notion of a "natural purpose" is merely to be taken as a *regulative* concept, as opposed to a *constitutive* concept (Kant *CPJ* 5: 375), it nonetheless points the way to establishing the sort of grounds required to warrant viewing something as an end, and not merely as a means, i.e., as something possessing intrinsic rather than merely extrinsic value. See also Guyer (2005).

[14]More accurately, organisms manifest "a kind of mechanism that is subordinated to teleology" (Ginsborg 2006, 462).

[15]Though Kant's anti-reductionist account of organisms is still unpopular with many, anti-reductionism seems to be undergoing somewhat of a revival in current biology. See Henning and Scarfe (2013).

[16]Kant himself, however, did not make this move.

[17]Schwartz (2013, 22) raises additional compelling arguments against preservationists such as Holmes Rolston, Keekok Lee, Alan Marshall and Robert Sparrow, and expresses objections to the arbitrary "postulation of intrinsic values." I attempt to offer here a method for the non-arbitrary selection of such values.

However, the fact that all living beings possess intrinsic value does not necessarily imply that they all possess *equal* intrinsic value, as Taylor's biocentric ethic presupposes.[18] Some maintain that intrinsic value is an all or nothing thing; it does not admit of degrees.[19] I contend that intrinsic value *does* admit of degrees, and that assessing the degree of intrinsic value possessed by living beings is precisely what is required to resolve some of the most important questions pertaining to the ethics of space exploration, in particular, the question of how the value of microbial extraterrestrial life is to be weighed against the value of human life, along with human desires and activities.[20] I direct my attention to the issue of *assessing intrinsic value* in the section that follows.

13.4 The Distinction Between Self-organizing and Self-legislating Beings

I contend that within the category of *intrinsic value* that can be attributed to things there is a continuous *spectrum.* In other words, intrinsic value admits of *degrees*. I have argued that the relevant trait possessed by living beings is self-organization, a manifestation of their apparent autonomy. Thus the degree to which something possesses intrinsic value is determined by the degree to which it is self-organizing. The task that now confronts us is how to assess the degree to which something is self-organizing.

It is in tackling this task that we must transition from biology to ethics. At this juncture as well, a Kantian framework offers guidance. On Kant's view, certain living beings are distinguished from other living beings by virtue of their capacity to legislate to themselves the moral law of reason, which enables them to function as *moral agents*. This capacity renders rational beings *self-legislating*. Because the moral law of reason is one in form, abiding by this law permits a being to achieve *unity* of person and character by virtue of their more robust autonomy, thus fortifying the being's self-organization.[21] Consequently, beings that are capable of self-legislation are more self-organizing than beings that are not—since self-legislating beings are more autonomous and greater autonomy implies greater self-organization.[22] It is legitimate, therefore, to view self-legislating beings as possessing greater intrinsic value than beings that are merely self-organizing.

[18]Taylor (2011) defends "species egalitarianism."

[19]Smith (2009, 269) defends the view that there are distinct categories for determining whether or not a being has intrinsic value. I suggest that there is a continuum, without clearly distinct boundaries.

[20]Schmidtz (1998) and Milligan (2015, 120) also challenge the species egalitarianism claim.

[21]Korsgaard (1999) refers to this self-organization as "self-constitution."

[22]Kant (*GMM* 4: 440–441). For Kant *autonomy* does not mean "doing what one wants" but rather "doing what the moral law" demands. The former is *heteronomy*, which has nothing to do with morality.

To avoid a serious misinterpretation of my position, it is paramount to acknowledge that I consider all beings of a given species to possess *equal* intrinsic value.[23] Moreover, when assessing their capacity for self-organization, all that matters is the potential for some members of the species to manifest that capacity in the current phase of their evolutionary history. It is not necessary for every member to manifest that property. This crucial aspect of my theory precludes the possibility of employing my argument to discriminate among the members within a species on the basis of race, gender, education, cultural background, wealth, religion, political orientation, sexual orientation, etc. My position, in fact, entails the *prohibition* of exploitation or oppression of some individuals over others in a given species. The above constraint also ensures the extension of the degree of intrinsic value to young, not fully developed, physically impaired, or cognitively impaired members of a given species. However, although the property of intrinsic value may be extended to all the members of a species just by virtue of *some* members possessing a certain degree of self-organization, this does not entail that *every* property of some individuals pertains to all the individuals in the species, e.g., moral responsibility. My claim is simply that all members of the species are equal in terms of their status as *moral patients*, rather than *moral agents*.

This theory also precludes the arbitrary supremacy of the anthropocentric viewpoint, as the only crucial factor determining intrinsic value is the capacity for self-organization, which is not a capacity limited to human beings, or even rational beings. Displacing the anthropocentric viewpoint from the centre of my cosmocentric ethic has the advantage of extending intrinsic value to all living beings in the universe; at the same time, the acknowledgment that self-organization admits of degrees enables us to attribute, in a non-arbitrary manner, the appropriate *degree* of intrinsic value pertaining to a given species.[24] In addition, a significant difference between Kant's view and my own is that Kant asserts that being self-legislating is both a necessary and sufficient condition for the possession of intrinsic value. On my view, being self-legislating is merely a sufficient but not a necessary condition for intrinsic value. I maintain that *capacity for self-organization* is the only necessary and sufficient condition for intrinsic value. Consequently, intrinsic value may be attributed to all living beings.

I contend, therefore, that in a genuinely cosmocentric ethic, the system of *all living beings in the universe* constitutes the domain of beings possessing intrinsic value, by virtue of their being self-organizing beings. Furthermore, there is a basis for attributing greater intrinsic value to some species of living beings over others, depending on the *degree* of self-organization they possess. As argued above, the possession of the capacity for *self-legislation* is a heightened or more pronounced form of self-organization, as it is indicative of a more genuine form of autonomy.

[23]See Gilbert et al. (2012) for discussion on the debate over the ontological status and demarcation of biological individuals and species.

[24]Smith (2014, 210) adopts a different strategy to displace the anthropocentric viewpoint from the centre of a cosmocentric ethic by appealing to a *ratiocentric* principle, supported by his concept of the "sociality-reason-culture" triad.

Thus a species that possesses the capacity for self-legislation possesses greater intrinsic value than a species that lacks this capacity. In general, the more a species achieves the capacity for self-legislation, the greater its intrinsic value.

13.5 The *Respect for Intrinsic Value* Test

To facilitate the implementation of this cosmocentric ethic I propose two things: (a) a fundamental *principle* for determining the degree of *intrinsic value* of living beings, and (b) a *test* for the practical application of this principle. We begin with the biocentric principle established in the previous sections: All living beings possess intrinsic value. Furthermore, all members of a given species possess *equal* intrinsic value. For example, all human beings have equal intrinsic value; all hedgehogs have equal intrinsic value; all beta fish have equal intrinsic value, etc.

The principle I offer is this: The degree of intrinsic value that an intrinsically valuable being possesses is proportional to the degree of its capacity to respect the intrinsic value of other intrinsically valuable beings. Consequently, an intrinsically valuable being that has the capacity to respect the intrinsic value of other intrinsically valuable beings possesses greater intrinsic value than a being that lacks this capacity.[25]

The test I offer for the application of this principle is what I call the *Respect for Intrinsic Value Test* (RIV test). This test is grounded in the Kantian precept that a being with intrinsic value is one that is capable of "respect for the moral law" by means of its freely *legislating* this law to itself—the factor that constitutes its autonomy. Specifically, the moral law dictates that beings with intrinsic value must always be treated as ends in themselves and never as a means only. The test is, in substance, my articulation of a modified version of Kant's *categorical imperative* (*GMM* 4: 420–441).

The test works like this: If an intrinsically valuable being x has the capacity to respect the intrinsic value (IV) of another intrinsically valuable being y, but y does not have the capacity to respect the IV of x, then x thereby manifests greater IV than y. Consequently, if for example, human beings have the capacity to respect the IV of certain Martian microbes, but the Martian microbes do not have the capacity to respect the IV of the human beings, the human beings thereby manifest greater IV than the microbes, by virtue of the microbes' having performed less well than the human beings on the RIV test. On the other hand, if *both* the human beings and the microbes perform *equally* well on the RIV test, then the original equality of their capacity for self-organization is preserved, and thus their original intrinsic value is preserved. To be sure, evaluating a being's performance on the RIV Test poses

[25]Smith (2014, 211) suggests that the "sociality-rationality-culture triad" constitutes the basis of intrinsic value. My position may be construed as a development of Smith's view in that the principle I offer isolates the *catalyst* that initiates the dynamics of this triad.

significant epistemological challenges in many cases. For example, what would count as a *manifestation* of "respect for intrinsic value" in non-human beings, and by what means are we to assess their intentionality and their conscious awareness of value?[26] While these deeply complex epistemological issues merit considerable attention, an adequate treatment of them would take us far beyond the scope of this paper. The central point, however, is that the RIV test is not a "pass or fail test" but rather a "performance test," i.e., a test designed to rate a thing's performance relative to other things, rather than to include it or exclude it from some category. In this sense the test is intended to remove an imagined boundary between things possessing intrinsic value and things which completely lack intrinsic value, by requiring us to acknowledge that intrinsic value may be possessed in degrees.

Equipped with a formal principle of intrinsic value, and with a practical test for its application, we may now consider how various species of living beings would most likely fare in their performance on the RIV test. Clearly, a species of completely self-legislating beings would do extremely well, since they would possess the greatest capacity for respecting the IV of other self-organizing beings. In fact such beings may, for this reason, be viewed as possessing greater intrinsic value than *all* other species of living beings. It is clear that human beings are capable of at least *some* degree of self-legislation, and would thus undoubtedly score quite high. I do not, however, think that it is necessarily the case that *only* human beings would be a species of this sort; the universe may contain other kinds of non-human self-legislating beings.

Moreover, because different species of living things may achieve the capacity for self-legislation in varying degrees, it is also reasonable to suppose that other kinds of living beings that *approximate* the capacity for self-legislation would perform *somewhat* well. For example, species that are sentient, e.g., dogs, dolphins, birds, etc., might demonstrate the capacity to respect the intrinsic value of at least *some* other members of their own species through their ability to care for their offspring. The next level down might include living beings manifesting some degree of sociality, e.g., ants and bees. Among the kinds of living beings who would score even lower on the RIV test would be those that only manifest the capacity to respect their *own* intrinsic value—manifested by their efforts in self-preservation—but not that of any other. Examples of these kinds of living beings would most probably include microbes and plants. It should be noted, furthermore, that one may not argue that a species that currently lacks the actual capacity to perform well on the test may possess the potential to *evolve* into a species that may perform well on the test at some future point. The reason is that, as stated earlier, at least *some* members of the species must *actually* possess the given capacity in the *current* phase of the species' evolutionary history.

This method of assessing intrinsic value addresses Fogg's concerns that prohibiting human beings from terraforming Mars would amount to the view that "humans actually have the *lowest* degree of intrinsic worth of any class of formed

[26]I thank James Schwartz for raising these important issues.

object" (2000, 210),[27] despite the fact that the culture and technology of human beings also arose from biological evolution and are thus themselves *natural.* The RIV test would ensure that human beings, along with all other living beings may be assured a non-arbitrary assessment of their intrinsic value. Thus, provided there were adequate reasons, my position could conceivably justify activities that might result in harm or destruction to extraterrestrial microbial life forms by other life forms such as human beings, provided again that those microbes do not perform as well as human beings on the RIV test. It should be noted, however, that by the same token, if human beings should encounter extraterrestrial life forms that exceed their own performance on the RIV test, then those beings would thereby possess greater intrinsic value than human beings, and human beings would be in a position of subordination to *them* (Kant, *OP* 21: 215).[28]

My argument, however, requires that, regardless of which species of living beings manifests greater intrinsic value, their treatment of living beings should always acknowledge the appropriate degree of intrinsic value of those beings. In the event that the more valuable species fails in this, and that they instead engage in disrespectful behaviour such as wanton destruction or exploitation, then such behavior would be indicative of the fact that they do not, in actual fact, possess greater intrinsic value than the beings they exploit. No doubt, there would be numerous factors that would enter the picture to complicate the assessment of intrinsic value in accordance with the RIV test I propose. Thus a reasonable assessment would, in the end, require an appeal to "practical wisdom" as suggested by Tony Milligan in his expression of skepticism concerning the adequacy of an algorithm for assessing value (2015). While an algorithm such as the RIV test I suggest will not do the whole job, it does do an important part of it. It provides a basis for the presupposition that human beings may very well have a duty to extend human life. In fact, Milligan himself acknowledges that this presupposition requires defense (2015, 58). The RIV test provides a non-arbitrary means for providing this defense.

Though the RIV test aims at achieving only rough assessments of intrinsic value, it has, I think, greater practical import than Rolston's overly simplistic dichotomy between *holders of value* and *beholders of value* (Hargrove 1992, 193). In fact, the RIV test illustrates how being a *beholder of value* actually contributes to one's status as a *holder of value*. Another notable advantage of the RIV test is that any IV *inequality* that results is something that is objectively *established*, by means of the participants' performance on the test. The *degree* of IV is something that the participants may acquire either more or less of—depending, to a very significant extent, on their own test performance. IV inequality is not arbitrarily assumed.

[27] See also Zubrin and Wagner (1996, 248–249).

[28] In fact, Kant himself conceived of the possibility of living beings more perfect than human beings. See also Baum (2010) and Baum's contribution to the present volume.

Furthermore, it should be stressed that a participant's acquisition of greater IV than another participant on this test does not *negate* the IV of the latter, and transform it into mere instrumental value. Rather, the latter's IV is still preserved, only it is now diminished in *degree* by its having performed less well on the RIV test than the other participant. Moreover, although the RIV test does not enable one to quantify the precise degree of IV in any possible situation that may arise, it does provide some general guidelines as to how we may *begin* to weigh the IV of different kinds of living beings in a non-arbitrary manner.

13.6 Concluding Remarks

My cosmocentric ethic provides a starting point for addressing, in particular, the issue of how to assess, in a non-arbitrary fashion, the relative value of different kinds of living beings, all of which, by virtue of being living beings, possess some degree of intrinsic value. This has significant utility in attacking the problem of the moral permissibility of conducting activity on other planets that could disrupt the indigenous microbial life on those planets. I conclude thus: *The view that* "*it is morally impermissible to terraform other planets inhabited by indigenous life forms*" *cannot be defended solely on the biocentric principle that* "*all living things have intrinsic value.*" As I have shown, the moral impermissibility of such activity requires a compelling argument in support of the much stronger view that: "*all living things have* equal *intrinsic value*"—which I deny. Thus, provided space exploration is conducted with a genuine respect for the *intrinsic value* of possible indigenous extraterrestrial life forms, it is not, in principle, morally impermissible to prioritize the value of human beings in such endeavours, given their considerably greater degree of intrinsic value than microbial beings, by virtue of their capacity for *self-legislation*.[29]

Nonetheless, this does not grant free reign to human beings in their treatment of less intrinsically valuable life forms, including microbes, since, as living beings, they still possess some *degree* of intrinsic value. I am merely arguing that our moral obligations to them ought to be determined in consideration of the intrinsic value of *other* living beings—especially those possessing greater intrinsic value. Furthermore, given that, on this view, all life forms have intrinsic value, and that life has value and priority over non-life, I agree with Christopher McKay that it is morally permissible to undertake technological endeavours both (a) to protect and promote the survival, richness and diversity of indigenous, extraterrestrial life forms

[29]In addition, there may be strong reasons based on instrumental values for refraining from numerous kinds of activities pertaining to space exploration. I have only limited myself here to arguments that appeal to reasons based on intrinsic value.

on other planets, and also (b) to create an extraterrestrial biosphere that could generate and sustain life on planets that do not currently have life (1990, 194).

I have attempted to offer here an account of intrinsic value to address the demands of a weak cosmocentric ethic. My hope is that the deficiencies in this account may inspire continuing reflection on this important issue, and propel us further towards the establishment of a fully developed *cosmocentric ethic* that will put the human exploration of space in its place.[30]

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