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# Manifest Complexity: A Foundational Ethic for Astrobiology?

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## ABSTRACT

### *Manifest Complexity: A Foundational Ethic for Astrobiology?*

This paper examines the age old question of the basis of moral value in a the new context of astrobiology, which offers a fresh perspective. The goal is to offer the broad outline of a general theory of moral value that can accommodate the diversity of living entities we are likely to encounter beyond the confines of Earth. It begins with ratiocentrism, the view that the possession of reason is the primary means by which we differentiate entities having moral value in and of themselves from those having moral value merely by virtue of the uses to which they can be put. I extend this basic position by arguing that reason, sociality and culture tend to arise in evolution as a co-evolutionary “package deal.” Because of this, it’s really the sociality-reason-culture triad (SRCT) which should be the criterion for intrinsic moral value, not reason alone. Interestingly, if the SRCT linkage is sufficiently strong, it follows that this sort of moral valuation would be shared by any non-human entities capable of reflection on the nature of such things, granting it a curious kind of objectivity. Then I suggest that the unfolding of complexity produced by SRCT species may be the best means to realize the manifest destiny (or *manifest complexity*) of all life, which may provide an ultimate, metaphysical foundation for ethical value. Finally, I outline how this new theory can be applied to different types of entities that we may encounter beyond Earth.

# Manifest Complexity: A Foundational Ethic for Astrobiology?

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## 1. Overview

One of the truly fundamental questions in moral philosophy is this: on what basis do entities acquire moral value? Without a clear answer to this question, it becomes difficult to adjudicate whenever the interests of different entities conflict. This question has been the subject of philosophical discussion on Earth for thousands of years, but thinking about ethics through the lens of astrobiology can impact the debate in interesting new ways. First, when only considering the terrestrial context, there is a tendency to treat the small sample of the terrestrial life as representative of what is possible. Thus, because humans are unique in possessing sophisticated rational capacity *on Earth*, even careful thinkers can come to view their special moral status as being due to their *humanity* rather than their reason. Second, when we are talking about life beyond Earth, there is no direct self interest as there always is with terrestrial situations, since we all share the same ecosystem. This makes it difficult to fully disentangle different types of justifications – are we preserving ecological diversity because these non-human entities have intrinsic moral worth or because failing to do so harms human beings indirectly?

In this paper, I wish to suggest a very broad outline of a system of ethical value which can account for the vastly expanded set of possibilities astrobiology opens up. The issues are extremely complex, but the basic structure of my argument is relatively simple. It begins with ratiocentrism, the view that the possession of reason is the primary means by which we differentiate entities having moral value in and of themselves from those having moral value merely by virtue of the uses to which they can be put. I extend this basic position by arguing that reason, sociality and culture tend to arise in evolution as a co-evolutionary “package deal.” Because of this, it’s really the sociality-reason-culture triad (SRCT) which should be the criterion for intrinsic moral value, not reason alone. Interestingly, if the SRCT linkage is sufficiently strong, it follows that this sort of moral valuation would be shared by any non-human entities capable of reflection on the nature of such things, granting it a curious kind of objectivity. Then I suggest that the unfolding of complexity produced by SRCT species may be the best means to realize the manifest destiny (or *manifest complexity*) of all life, which may provide an ultimate, metaphysical foundation for ethical value. Finally, I outline how this new theory can be applied to different types of entities that we may encounter beyond Earth.

Before we begin, however, we have to deal with a common confusion between descriptions of how we *do*, in fact, act towards each other and how we *should* act. Ethics is about *proscribing* actions, not merely *describing* them and failure to appreciate the difference will lead to a number of pseudo-objections to any ethical theory. For example, one might object to ratiocentrism on the grounds that it does not accurately capture how we have historically treated other rational creatures (e.g., slaves, American Indians, etc.). But the fact that people *have* often mistreated other rational creatures does not imply that they *should* do so. It’s the very fact of our many misdeeds that motivates the

development of ethics in the first place. Moreover, we are forced to use ethical ideals to identify and correct such moral lapses: how else could we explain to a slaver *why* what he is doing is morally wrong, other than to appeal to ideals that he does not currently accept?

## **2. Ratiocentrism Simpliciter**

Let me begin with a brief discussion of the ratiocentric position I have developed for astrobiological contexts elsewhere<sup>[1][2]</sup>, though my goal in this paper is not to engage in the daunting project of arguing for ratiocentrism directly, but rather to examine the implications of such a foundation for astrobiological ethics. There is a very long tradition in ethics, going back at least as far as the ancient Greeks, where reason is seen as the *sine qua non* of moral value. More precisely, reason is said to afford an entity moral value in and of itself (intrinsically) as opposed to in virtue of the uses to which it can be put (instrumentally). The basic idea is simple: ethics involves the elucidation of rules and this in turn requires formal abstraction of the sort that is only possible through reason. It is thus literally not possible to think about ethics, as ethics, unless one is able to engage in abstract reasoning – at a minimum, one must be able to formulate and comprehend the nature of rules. This does not, as is commonly misperceived, mean that entities without sufficient reason have no significant moral value. But it's certainly a classic philosophical position that their moral value is of a lessor kind than that of rational beings is different<sup>[3]</sup>.

So I begin with ratiocentrism. But in one of my first public presentations on the subject, when I was part of a NASA workgroup investigating the philosophical, ethical and theological implications of astrobiology<sup>[4]</sup>, I was asked a question by a rabbi which I have been thinking about ever since. The question was simple: “Why reason instead of love?” At the time, I responded by saying that love of the requisite sort to qualify for intrinsic moral valuation would have to incorporate a goodly measure of reason. That is, the simple *feeling* of love would not be enough, since one would have to act in specific ways to communicate and express this feeling, which in turn would require a sophisticated understanding of social relationships, which would require reason. So love is not a truly independent measure of moral value, but is relevant to moral considerations only when expressed by a sufficiently rational being. I still feel this response is essentially correct, but I also think the question demands a more careful exploration of the relationship between reason, emotion and sociality and this is one of the motivations of the present work.

## **3. On Sociality and Social Emotions**

I adopt a thoroughly evolutionary perspective on ethics. Whatever ethical rules we adopt, they are inexorably influenced by the ways in which our brains have evolved. This may seem strange, given what I have already said about the need for ethics to be more than descriptive facts. However, the requirement that ethics be grounded in evolution need not mean that there is nothing more to ethical rules than historical contingency. There is a strong tendency to think of evolution as a random process, and it is in one sense. However, the random nature of mutation does not imply that the results of natural selection, either in a particular case or across an entire system, are random. For example, it may be that fish share the same basic body shape not simply because of accident and shared ancestry, but in virtue of the optimality of this design for movement

in a fluid medium. The more frequently particular patterns emerge in independent evolutionary processes, the more confident we can be that they express underlying principles that transcend the specific circumstances in which they evolved. And this sort of phenomena can apply to behaviors as well as body plans: there has been a lot of work on the identification of evolutionarily stable strategies (ESS's), which are group strategies that can successfully resist invasion by alternative strategies<sup>[5]</sup>. Any particular ESS exists in part because of a complex mix of contingent historical factors, but also in part because of more fundamental, potentially even universal considerations – for example, game theory imposes universal constraints on any entity which must interact with others. Given this mindset, what can be learned from the relationship between socially advantageous emotions, sociality, and reason that will inform our discussion of ethical valuation?

There are a few key aspects of the relationship between sociality, reason and culture that are relevant at present. In particular, the central question is the extent to which these traits can evolve independently of each other. I offer the tentative conclusion that they are essentially a “package deal” and coin the term Social-Rational-Cultural Triad (SRCT) to describe this union of complex potentialities. Below I examine each level of the relationship, giving both empirical and theoretical arguments for this conclusion.

It is clearly possible to have sociality in general without reason or culture, since we have social insects on Earth that possess the one but not the others. However, the type of sociality that social insects embody and the type I wish to discuss are very different. Social insects are social towards their close relatives in a way achieved by neural hardwiring. But this sort of sociality restricts the group to a relatively small set of stereotypical interactions of the sort that is not conducive to the development of truly complex social systems and their attendant culture. Thus, it seems hard to imagine social insects, whose sociality is dependent on genetic relatedness, being able to entertain moral obligations to another species. If, on the other hand, the organisms possess sufficient reason to recognize conspecifics and form theories of their desires and goals based on their behavior, then they can adopt a potentially infinite set of behaviors in response to shifting conditions on very short time scales, including the development of ethical principles governing social interactions. It is only this kind of *adaptive sociality* that I have in mind when I talk about a link between sociality and reason.

Based on the limited sample of organisms we have on Earth, it may be that one can not have reason without adaptive sociality. Consider a few empirical findings from terrestrial evolution:

1. There is a long appreciated (roughly) linear relationship between brain:body ratio (considered the best measure for interspecific comparisons of rational ability) and adaptive sociality<sup>[6]</sup>.
2. Animals which are best at problem solving (e.g., primates, corvids) tend to also live in social groups<sup>[7]</sup>.
3. There are often temporal associations in evolutionary history that suggest a strong causal connection between adaptive sociality and reason – as with the observation that dolphins' brain:body ratio increased dramatically at about the same time they became social<sup>[8][9]</sup>.

4. Terrestrial creatures we know of that possess reason but not adaptive sociality may well be organisms in evolutionary transition. For example, recent work in octopuses, who are highly intelligent but haven't been classified previously as social, suggests that they possess the ability to recognize conspecifics and perhaps even form dominance hierarchies<sup>[10]</sup>.

And “prosocial” instincts which set the stage for ethical thinking are probably part of the mix as well. In recent years, prosocial capacities have been discovered in a wide range of non-humans animals<sup>[11]</sup> and it is often difficult to describe these without resorting to ethical terms. For example, non-human primates seem to have a rudimentary sense of “fairness,” and react to “unfair” situations in much the same way we see in humans. This capacity doesn't (probably) rise to the level of rational principles in such organisms, but manifests rather as a set of emotional responses which serve to bias behavior in socially desirable ways. The same could be said of other emotional responses that often factor strongly in human ethical reasoning – romantic love, for example, is presumably a sophisticated adaptation for the promotions of pair bonding. This emotional substratum underlies the development of conceptual ethical systems once sufficient abstract ability is available.

Of course, a major recurrent problem in astrobiology is trying to discern what patterns we see in terrestrial life represent general trends that would apply on other planets. It is certainly possible that the sociality-reason association reflects something more prosaic than a universal law. But there is also a good theoretical case to be made for a strong association between adaptive sociality and reason. Consider that any non-social organism with the capacity to reason would be at an enormous disadvantage relative to other rational creatures who are both rational and social, since that combination allows them to coordinate the activities of multiple individuals to a single end. Similarly, a social group without reason would be at a severe disadvantage to another group with such capacity. Given this, what should we expect to see beyond the confines of Earth? First, it seems reasonable to suppose that we will rarely see adaptive sociality without reason. Second, since adaptive sociality and reason actively co-evolve, with flexible social systems providing fertile new ground for the exercise of reason and reason enriching the complexity of social interactions, it seems likely that we would not see the highest expressions of either in isolation.

What about culture? At its most basic, culture is a set of learned group behaviors. As with prosocial emotions, recent research has shown that culture is far more widespread than we had previously thought<sup>[12][13][14]</sup>. With culture, the connection to adaptive sociality and reason is more obvious. Culture requires learning from others, so anything more than extremely rudimentary culture will require rationality as well as social organization. Moreover, any group with the cultural capacity to preserve serendipitous discoveries through learning will be at a massive advantage over other, non-cultural, groups and thus there will be powerful selective pressure for the development to culture to quickly follow the social-rational pairing. And certainly anything approaching science could not possibly occur absent a highly developed capacity for abstract thought and a sophisticated social structure to coordinate the activities of individuals, transmit historical information, etc.

It seems reasonable to suppose that adaptive sociality, reason and culture are evolutionarily linked such that they arise and coevolve as a unit. Encountering an

organism beyond Earth with one leg of the SRCT but not the others (in similar measure) will thus be, at the very least, rare. If the development of SRCT is at all common, it will be rarer still that such an organism becomes the dominant species on a planet. Again, the argument is not that it is not *possible* to have partial realization of SRCT, but that this situation is likely a short lived transitional state and thus will be a small portion of any sample of extraterrestrial life we survey.

#### 4. Injecting Normativity

The case I have laid out so far is entirely descriptive, albeit with theoretical elements: there is, as a matter of fact, a strong tendency for adaptive sociality, reason, and culture to co-evolve. Many philosophers would object that no amount of descriptive information about the way the world functions could, in principle, provide normative insight into how things *should* be. Despite my evolutionary orientation, I feel the pull of this objection and thus I want to offer reformulations of two classical arguments which may provide something approaching a normative foundation.

The first argument was originally developed by Immanuel Kant<sup>[15]</sup>. Kant was concerned with the problem of truth in a world where human beings can not directly access mind-independent reality. If all we have for information is mind-mediated interactions with the “real world” through sensation, then on what grounds can we claim that the products of human reason (mathematics, science, etc.) are *objectively true*? However much we resist the conclusion, the inescapable fact is that we could never have good evidence that the products of human reason are truly isomorphic to external reality. Our ethical musings in section 3 face a similar dilemma: the mere fact that the universe seems to us to exhibit these evolutionary patterns does not imply that this is how things *should* be. If there is a mind-independent ethical truth out there, we have no way of knowing how close the world we experience is to this.

The temptation at this point is to shrug and say, “We can’t know ethical truth, so ethical views are ultimately no more than personal opinions.” However, if we go far down that road, there is no meaningful distinction between how people wish to act and how they should act, in which case there is no such thing as ethics<sup>16</sup>. But Kant argued that, despite our grim epistemic circumstances, there is still a sense in which the products of reason can be said to be epistemically privileged. Kant employed a unique *transcendental* argument that works something like this: Suppose we could identify principles that all rational creatures, whatever their circumstance, *must* accept<sup>1</sup>. These would be principles essential to the operation of reason itself and would thus apply to any possessor of reason – human, alien or divine. Of course, the existence of such universally accepted principles does not establish their truth in the intuitive sense of the word, since our reason could still be systematically flawed. However, there is a curious sense in which the very universality of their acceptance confers objectivity. Put crudely, I may not know that mathematics reflects the universe accurately, but I do know that any rational creature like myself will, of necessity, believe that it does. This is as close to objectivity, and thus truth, as we can ever get.

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<sup>1</sup> A more technical formulation would be “insofar as we know anything about the external world from our sensations, we necessarily presuppose certain propositions.”

If I am right about the evolutionary confluence of reason, adaptive sociality and culture, we can make a similar argument about ethical truth. While we can never know whether there is such a thing as objective ethical truth or how closely our views conform to it, we can know this: Any SRCT creature in the universe, which is to say any creature that has ethics, will share our basic outlook. They will all have evolved from non-SRCT organisms and have both self interested and social instincts in place. Their rational capacity will allow them to formulate general ethical principles. And those principles will recognize the value of entities with SRCT capacities like themselves as having intrinsic ethical value. Like us, such creatures will feel the pull of social instincts that force them to consider the potential moral value of non-SRCT creatures, even of non-living objects. But also like us, when push comes to shove, they will believe that the interests of SRCT creatures like themselves must take precedence.

Is this ethical truth? Who can say, since we can not, in principle, acquire compelling evidence that these views match an external, mind-independent ethical reality? But this makes the intuitive notion of truth an impossible standard. Of course, the conclusion that there can be no truly objective truth in ethics is certainly nothing new even in the astrobiological context<sup>[17]</sup>. But what the transcendental argument allows us to do is, in effect, to have our ethical cake and eat it too. It allows us to admit that we have no compelling evidence of an objective ethical truth in general, much less that any particular ethical belief accords with it. But we can still say that an SRCT ethic will be universal in all creatures who can comprehend moral reasoning at all.

## **5. Manifest Complexity**

So far, I have attempted to argue 1) that adaptive sociality, reason, and culture are, in fact, an evolutionary “package deal” and consequently that 2) any SRCT species with ethical beliefs will view the possession of SRCT capacities as the ultimate basis of moral value. Now I must take a dip in metaphysical waters to suggest another reason to think that SRCT should be valued ethically. To this end, I will take another classical philosophical argument, this time from Aristotle, and rework it for an astrobiological context.

Aristotle believed that, to find what the right thing for an entity to do, one first had to identify its unique purpose or goal (*telos* in Greek). All types of entities had a *telos*, so humans, plants, fire, etc. all had their own essential goals. Non-human entities simply acted in accord with their *telos*, of course, but humans possessed reason and thus were given the blessing/curse of reflection on the proper goal to pursue. But even for humans, if the proper *telos* could be identified, then their moral course of action becomes clear, since he held that it is morally requisite for entities to act in such a way as to actualize their *telos*. Unfortunately, humans do, in fact, pursue such a bewildering variety of goals that the task of identifying a single *telos* from among them doesn't seem possible.

But consider the set of all human actions and ask yourself, “What is the shared purpose of these acts?” Certainly, there is a huge diversity of goals in the most obvious sense: Sally goes to work to make money, while Bill attends dance class for the sheer joy of movement, etc. But is there any sense in which all of these immediate goals are actually directed towards a larger, overarching one? If so, then all humans actions, whether we consciously appreciate the fact or not, would be directed toward a single



goal. Aristotle argued that, if we think about it carefully, we see that all human actions are ultimately directed towards the single, universal telos of happiness (*eudaimonia*). Happiness is clearly logically superior to these other goals because, while it makes sense to pursue one of the lesser goals because you think it will make you happy, it makes no sense to pursue happiness because you think it will result in money or pleasure. Ipso facto, happiness is *the* end of all human action – all other goals are pursued, not for their own sake, but in pursuit of happiness.

Now let's do this same type of thought experiment with the expanded notion of life astrobiology affords. Different living entities act for all sorts of ends, but is there something which could potentially count as an overarching, ultimate goal? One obvious basic property of all life on Earth is that it is gloriously, ostentatiously negentropic. Life seems to be characterized by increasing complexity and decreasing entropy, which goes against the overall thermodynamic tendency of the universe in which it finds itself, though there is some debate on this point<sup>[18][19]</sup>. There certainly are many known cases where the lineage of a particular organism is characterized by *decreasing* complexity (e.g., when an organism becomes parasitic). But consider: thermodynamics is a universal tendency with local exceptions. It is not refuted (as creationists claim) by local examples of negentropy such as living beings. Similarly, the observation that life is characterized by increasing complexity is meant as a statement of a global trend, not an inviolate rule, and thus is not refuted by isolated counterexamples. Evolution clearly produces more and more complex organisms over time, though it does not do so uniformly within each lineage at each transition. And there seems no good reason to suppose that this pattern is peculiar to life on Earth as it's hard to imagine anything alive that is not fundamentally negentropic. So just as Aristotle argued that the overarching goal of all human action was happiness, it is quite possible that the overarching goal, or manifest destiny, of all life is the production of ever greater complexity. This idea goes back hundreds of years to the principle of plenitude and medieval musings on the "great chain of being"<sup>[20]</sup> but has also been discussed by others in the astrobiological context<sup>[21]</sup>.

This *manifest complexity* is, of course, highly speculative. But for the sake of argument, let's assume for a moment that there is merit in the idea. If the universe is biased towards the development of living complexity, is there a preferred means to that end? Here, a look at the history of life on Earth is instructive as we see major discontinuities in the amount of diversity present which are often described as "major transitions" or even "phase changes"<sup>[22][23]</sup>. Essentially, evolution is marked by the periodic development of fundamentally new systems which allow for complexity many orders of magnitude greater than previously possible. These are seen in the fossil record as sudden massive spikes in diversity. For example, the "Cambrian explosion" is the sudden appearance, about 540 MYA, of essentially all the animal phyla that have ever existed. This is thought to be the result of the development of multicellularity, which allowed much more complex forms of life. There is some debate over precisely which developments make the list of major transitions, but certainly it would include the emergence of: eukaryotic cells, multicellularity, sociality, and language/culture, because each of these makes possible massive increases in diversity (between parts within cells, between cells within an organism, between organisms within a population and between populations within a species, respectively). Importantly, these developments are not just an historical sequence, they are a logical hierarchy and thus almost certainly would have

analogs in evolution beyond Earth. The degree of diversity possible with multicellular, social creatures is massively greater than that with non-social, single celled organisms, whether we are talking about Earth or Europa. And the greatest degree of diversity is achieved when reason and adaptive sociality combine to produce the kind of sophisticated culture that gives rise to science, with all the new abilities that unlocks.

I freely grant that both of these arguments for injecting normativity into the assessment of moral value are controversial. Philosophers will certainly find reasons to continue their debates about Kantian idealism and Aristotelian naturalism in a new venue and scientists will worry about the precise relationship between entropy and complexity. My goal at present is to suggest an intriguing possibility more than a developed theory. It may be that the attempt ultimately fails, but for now I hope only that it inspires further work along these lines.

## 6. Ratiocentrism Revisited

So, how can we translate this grand ethical theory into practical guidance for astrobiology? As Darwin<sup>[24]</sup> once observed, in any taxonomic undertaking, there are two types of people. There are “lumpers” who want to group examples together with an eye to revealing interesting principles, and there are “splitters” who want to emphasize the ways in which specific cases differ one from another. Certainly, much can be gained by both strategies, but my interests at present are more aligned with the lumpers, since I wish to trace the broad outlines of a general theory. Thus I beg the splitters’ indulgence when I say that there are three basic categories of living things in terms of their moral value.

First, we have living beings with advanced SRCT capacities. Humans certainly fall into this category, as do any aliens with scientific knowledge sufficiently advanced to contact us. With tongue only slightly in cheek we can extend the oft-heard definition of intelligence from the SETI community as “the ability to build radio telescopes”<sup>[25]</sup> to moral contexts. Such entities can do it all: they are capable of moral reflection by virtue of their reason and adaptive sociality and generate an entirely new kind of informational complexity through culture and, in particular, science. As such, they possess intrinsic moral worth, meaning they are different in kind from entities which only have instrumental worth.

This has two basic practical implications: 1) they should not be used in merely instrumental ways - ways that don’t serve their own ends, and 2) all such SRCT organisms should be treated equally (because they are, ethically speaking, equal)<sup>2</sup>. Of course, there can and will be endless questions posed about our specific obligations to other entities within this category in specific circumstances, just as ethicists on Earth constantly debate obligations among humans. But any relationship between humans and other SRCT species should be governed by the same ethical considerations that apply to interactions between humans. For example, it may be ethical to kill an SRCT alien, but only under circumstances where it would also be ethical to kill a human being.

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<sup>2</sup> Critics often charge that ratiocentrism approaches reinforce anthropocentrism, but here it can be seen that SRCT analysis in astrobiological contexts actually *refutes* it definitively.

Second are living beings with enough of the SRCT system in place that they can, at least potentially, participate in the societies of SRCT beings who have ethical principles. Most of the “warm fuzzies” on Earth fall into this grey area to one degree or another. On the one hand, they can participate in, even make significant contributions to, SRCT societies. On the other hand, they lack the SRCT capacity to comprehend ethics or create an information dense culture. They have one foot in each camp and, because of this, their ethical value is of two different sorts. These entities possess intrinsic moral value to the extent they can participate in an SRCT society, but also can be treated instrumentally when needs must. In other words, they have enough intrinsic value to be considered morally different in kind from other forms of non-SRCT life, but their intrinsic worth is of a lesser kind than true SRCT beings. As a first approximation, SRCT beings should respect the interests of such beings as long as this does not conflict with their own essential interests. Thus, while killing such a being for no purpose other than sport would be immoral, it might even be ethically *obligatory* to kill if, for example, science could be significantly advanced by doing so.

One case which drives a lot of our intuition about this category are domesticated animals, particularly pets<sup>3</sup>. They certainly provide instrumental value to human beings - originally by providing assistance with hunting and as a food source. On the other hand, there is a real sense in which they are now truly members of human society. They clearly possess significant SRCT capacity or it would not have been possible to domesticate them in the first place. And we interact with them as members of society - anyone who has owned a dog will understand that we can't help but think about their internal mental states in much the same way we do with fellow humans. These interactions even satisfy our instinctive desire for community since our hindbrain does not carefully differentiate between visiting with your dog and your neighbor. Domesticated animals are, in a real sense, part of our social system and should be accorded moral value accordingly. However, should we find ourselves starving in a lifeboat with both human and non-human occupants, it is not at all difficult to decide who we should eat to stay alive.

Third, we have living creatures with no existing SRCT capacities. For example, microbes, plants and lower animals with only rudimentary neural systems. These entities have no intrinsic value at all and thus can be used as means to the ends of SRCT species, much as with non-living things. However, there are two critical limitations to keep in mind. First, the fact that SRCT *species* can use organisms with mere instrumental value as means to their ends does not mean that every SRCT *individual* or *group* can use them for *any* end they might wish to pursue. For example, a corporation may wish to strip mine Mars at some point in the future, despite there being indigenous bacteria that would thus be endangered. Others might object that we should instead preserve the life for scientific study or even the aesthetic appreciation of ecotourists. A complex debate needs to be had as to how to balance these interests, but note that this discussion should be within the confines of a) the best *use* to be made of the life by b) the SRCT *species* as a whole.

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<sup>3</sup> The ethical status of such entities does not depend on the fact of a social interaction so much as the potential – so octopuses may have just as much potential to interact with SRCT beings as dogs do, even if they have never realized this potential. If so, they should be afforded moral status accordingly.

Second, even though they do not possess SRCT traits at present, as living organisms, these entities are capable to the sort of the open-ended evolution that produces SRCT capacity. Thus, they have the potential to *become* SRCT, given sufficient time and the proper circumstances, and this is a relevant consideration. Thus, bacteria life on Mars may have the potential, in hundreds of millions of years, to develop into a race of sophisticated aliens with whom we could have engaging ethical discussions. However, we should resist the idea that the mere potential to develop SRCT capacity confers full blown intrinsic moral value, as for example with Carl Sagan's famous claim that "If there is life on Mars, I believe we should do nothing with Mars. Mars then belongs to the Martians, even if the Martians are only microbes" is misguided<sup>4</sup>. There are two reasons for this. First, if one adopts a sufficiently long time frame, this potential is a universal property of all living creatures: the bacteria in my bathroom have every bit as much potential to develop into fascinating philosophical interlocutors as those on Mars. Second, whenever SRCT organisms can derive instrumental benefit from using such entities, we are morally required to consider the opportunity costs to humans of forgoing their use. Foregoing a Martian colony in deference to indigenous life, for example, would impose a massive cost to human beings. The ethical relevance of evolutionary potential, therefore, is limited: we should not trade the interests of existing SRCT beings with clear moral value for those of non-SRCT beings with only potential value. Nevertheless, it does make sense to consider such potential – for example, when weighing the interests of one such species against another.

And of course on the bottom of the heap are non-living entities<sup>5</sup>. Here there is no consideration at all other than pure utility to SRCT species. The only restriction is that, as discussed above, it does not follow that any SRCT *individual* can do anything it wishes with non-living entities. The interests of SRCT species as a whole should drive such decisions.

There is a final, rather curious, implication of this theory: moral valuation is first and foremost a property of groups (most obviously, species) and is only extended to individuals indirectly. Sociality and culture are, after all, properties of groups rather than individuals – an individual, whether human or alien, can only possess the *capacity* to be social or cultural and this is a matter of context. We have two basic alternatives, therefore: a narrow view would accord moral value only to individuals who are positioned to actualize this potential in practice, while an expansive one would grant it to all individuals of the species, whatever their individual circumstances. For example, what are we to do about a human being stranded on a desert island who will never again be part of a community or a particular member of an SRCT species with relatively

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<sup>4</sup> It should be noted that Sagan's next sentence is, "The existence of an independent biology on a nearby planet is a treasure beyond assessing, and the preservation of that life must, I think, supersede any other possible use of Mars," which suggests he may be thinking of the value of Martian life in instrumental terms himself.

<sup>5</sup> Strictly speaking, I should say non-*evolving* entities, since it's the capacity to engage in open ended evolution which sets living things apart from non-living ones in terms of their participation in manifest complexity. Truly intelligent machines, for example, would likely be SRCT beings morally equal to humans.

limited rational capacity? I argue that they fall under the protective umbrella of their species characteristics and thus have all the intrinsic value of their species.

There are two basic reasons for this. First, such an expansive approach accords best with our social instincts and emotions, which are not terribly precise. It would do great violence to our psyche to violate these intuitions by treating each individual on his own merits at all times. Much more importantly, however, are considerations which explain why we have the intuitions we do. It seems likely that no social group can function long without the capacity to “carry” individuals who are not currently productive. If we instead treat other human beings strictly in terms of what they can contribute to the group now, each and every one of us will be in jeopardy on occasion. This will weaken our individual justification for being a part of the group – after all, when I am fit and healthy, I don’t need the group as much and if the group will let me die whenever I am not strong and healthy, then what is the motivation for staying part of the group in general?

## **7. Concluding Remarks**

I have argued that ratiocentrism itself is too simple a foundation for a universal ethic, because it tends to evolve in concert with both adaptive sociality and culture. Indeed, the association of the SRCT may be so strong that it constitutes a universal property of other intelligent species in the universe. If so, those with a pragmatic bent may have a means to cut the Gordian knot of endless debate over moral valuation: though we can never fully resolve the question of moral “truth,” but we can at least say that all entities capable of constructing their own ethical theories will agree that SRCT characteristics must be foundational. It may even be that there is merit to the idea that the “goal” of all living things, whether SRCT or not, is to participate in an unfolding of complexity, which offers a potential metaphysical basis for morality. This approach results in the delineation of three basic ethical categories into which all living beings can be sorted: 1) Those with SRCT, which have full blown intrinsic value, 2) Those with only partial SRCT capacity, which have both intrinsic and instrumental value and 3) Those without any SRCT capacity, which have only instrumental value.

This is, to put it mildly, an ambitious project. I freely admit that it is nowhere near completion: there are certainly many criticisms to be answered and details to be worked out. But my goal is only to sketch the broad outlines of a possible general theory of ethical value for astrobiology in a way that generates fruitful debate. If others find this sufficiently intriguing to take up my challenge, it will have been a successful experiment.

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