

RESEARCH ARTICLE

Extraterrestrial intelligence and moral standing

Milan M. Ćirković¹  and Ana Katić²

¹Astronomical Observatory of Belgrade, Belgrade, Serbia

²Faculty of Philosophy, University of Belgrade, Belgrade, Serbia

Author for correspondence: Milan M. Ćirković, E-mail: mcirkovic@aob.rs

Received: 30 August 2021; **Revised:** 9 July 2022; **Accepted:** 30 July 2022; **First published online:** 01 September 2022

Key words: Astrobiology, extraterrestrial intelligence, futures studies, human bioenhancement, moral enhancement, post-persons

Abstract

We consider the Search for ExtraTerrestrial Intelligence (SETI) activities from a bioethical standpoint. In particular, we argue that there is a moral duty to search for other intelligent beings in the Universe. Some of them could – and are likely to be – morally enhanced in the sense that they are not only capable of unmistakable moral reasoning but are also capable of consistently acting upon the results of such deliberations. Even if the probability of finding such morally superior beings is small, it is higher than zero in any case; in fact, our astrobiological knowledge suggests that this probability is significant. Hence, there are both deductive and inductive arguments for the proposition that our duty is to search for such morally superior extraterrestrial beings. In other words, there is a duty to undertake and support our SETI efforts. The argument to that effect runs parallel to some of the arguments deployed in current debates on human moral enhancement.

Contents

Introduction	57
The deductive argument	59
Bioethics of Copernicanism	60
An auxiliary (inductive) argument	62
Conclusions: a moral duty to do SETI?	63

Introduction

Recently, there have been a significant number of studies on the subject of the potential for human moral enhancement and its various consequences (for reviews from different standpoints see Agar, 2010, 2013a; Persson and Savulescu, 2012; Douglas, 2013). The ongoing controversy surrounds the possibility, as well as desirability, of creating morally enhanced persons, often referred to as post-persons, and the bioethical, social and other consequences of each view on these issues. Proponents of human moral enhancement (most notably Persson, Savulescu, Rakić, Douglas, Walker, as well as transhumanists such as Sandberg or Kurzweil) typically argue from the existential risks we are facing with new and potentially hyperdestructive technologies such as biotechnology, nanotechnology and artificial intelligences, as well as from the conceptual extension of the Enlightenment humanist project of increasing human wellbeing through judicious use of available science and technology. They differ among themselves mainly as to whether the hypothetical moral enhancement should be mandatory (e.g. Persson and Savulescu), per analogy with childhood vaccinations, or voluntary (e.g. Rakić). On the other hand, the opponents of moral enhancement, such as Agar, Harris, Sparrow or Kass, tend to invoke the alleged loss of freedom (Harris), dignity (Kass) or risks inherent in creating morally

enhanced (post)persons (Agar, Sparrow). The debate is very much an ongoing affair, spurred every now and then by new discoveries and breakthroughs in medicine and neurosciences.

Current debates about human bioenhancement, and in particular moral bioenhancement, have been limited to the terrestrial environment, and the kind of actors which evolved or could evolve on Earth. While at some points the examples of possible extraterrestrial moral agents ('Martians') have been invoked (e.g. McMahan, 2002; Neiders, 2015), this has in general been used just as an adornment of thought experiments and not meant literally. Of course, the religious discourse has been pervaded by nominally extraterrestrial moral agents, but this is uninteresting from the point of view of (at least methodological) naturalism¹. Here, we wish to consider the concept of an extraterrestrial post-person (henceforth ETPP), *literally* understood as an independently evolved extraterrestrial moral agent with an enhanced morality and possibly superior moral status. Specifically, the superior moral status² we aim for implies advanced moral reasoning *and* consistent action following that reasoning. We assume that within bioethics, theoretical and practical reasons are inextricably linked. Therefore, advanced moral reasoning and acting are sufficient conditions for superior moral status. Logically it may or may not further imply that ETPP has superior moral knowledge, but this question goes beyond the scope of our work here and remains an important topic for future debates. Our analysis starts from the point of view of strict methodological naturalism and evolutionary theory³.

Some things of value, like rubber or diamonds, had been first found in nature and only much later people learnt how to create them *intentionally*. There are some opposite examples as well; a particularly interesting case is the one of quasicrystals, which had been thought impossible, before they were first discovered in man-made alloys, and only very recently found in natural rocks (e.g. Meier *et al.*, 2018). How about moral values? In the current debates about possible beings with superior moral standing, it is at least tacitly implied that we, current humans, will need to expend effort in order to bring about the existence of such beings. Vojin Rakić puts it even in the title: *We Must Create Beings with Moral Standing Superior to Our Own* (Rakić, 2015), contrasting it to the one of Agar (2013b): *We must not create beings with moral standing superior to our own*. Thus, if we accept both Agar's and Rakić's viewpoints, specific actions on our part are required. Is it not natural, however, to ask whether natural evolution provides for the existence of such beings independently of our actions? Why not say 'we must *find* beings with moral standing superior to our own'? (Or, perhaps, why we must *not* find such beings – which does sound somewhat different and, arguably, the difference in tone says something about the subject matter as well. We shall return to this in the concluding section.)

As far as we stick to methodological naturalism and a sufficiently weak form of scientific realism, such beings do not exist on Earth at this time (and to the best of our scientific knowledge have not existed on Earth in the past). Thus, if they exist at all, they must be extraterrestrial. Therefore, the issue of extraterrestrial intelligence and our searches for it are relevant for the contemporary bioethics debate. In particular, we shall argue that there is a moral duty⁴ to search for other intelligent beings in the Universe. At least some of them have moral status and have developed moral reasoning in the course of local (astro)biological evolution. Some of them could – and are likely to be – morally be enhanced in the sense that they are not only capable of unmistakable moral reasoning, but are also capable of consistently acting upon the results of such deliberations. Such beings are what we shall in the rest of this paper call (interchangeably) ETPPs or morally superior extraterrestrial beings.

¹Under methodological naturalism, we understand the necessary tool of the scientific method: the assumption that science deals only with natural, as opposed to supernatural, causes and events, and therefore a scientific explanation must not include supernatural causes and events. Considering the standard practice of science, no metaphysical commitment to the existence of the supernatural is necessary.

²We use moral standing and moral status as synonyms in this context.

³The present arguments have been alluded to in Ćirković (2017, pp. 465–466), but have not been seriously elaborated so far in either astrobiological or bioethical literature.

⁴The goal of our understanding of the notion of duty is normative, not descriptive, although, in some sense, we compare deontological and consequentialist theories. One of the proposals for further understanding of this topic would be the position of particularism which is based on holism in the theory of reasons (Dancy, 2012).

Even if the probability of finding such morally superior beings is small, it is higher than zero in any case; in fact, our astrobiological knowledge suggests that this probability is significant. We shall show that there are arguments for the proposition that our duty is to search for such morally superior extraterrestrial beings. In other words, there is a duty to undertake and support our Search for ExtraTerrestrial Intelligence (SETI) efforts.

The rest of this paper is organized as follows. In the next section ('The deductive argument'), we construct the main argument regarding the necessity of SETI research. Furthermore, we consider (in the section 'Bioethics of Copernicanism') the indications from astrobiology that ETPPs are not just possible but plausible as well. In the section 'An auxiliary (inductive) argument', we analyse a supporting argument based on the likelihoods of various specific outcomes of our search efforts. Finally, the concluding section 'Conclusions: a moral duty to do SETI?' underscores our moral obligation to support SETI and briefly explores whether the notion of duty in this context is generally compatible with both ethical doctrines: deontological and consequentialist. We should emphasize that to stay connected with the mainstream of bioethical debate on human enhancement (exemplified in the bibliography, in particular in works of Agar, Harris, Persson, Savulescu, Douglas, Rakić, Sparrow and a few other leading thinkers), we adopt the standard person versus post-person dichotomy; the ongoing bioethical debate is centred on it, for good or ill. At all times, however, we acknowledge that phylogenetically disconnected intelligent beings, evolved in biospheres radically different than ours, might be less than adequately described by even the broadest generalization of our notions of personhood.

The deductive argument

Encountering, either directly or through communications, morally superior extraterrestrial beings is both imaginable and possible. We will argue in the section 'Bioethics of Copernicanism' that it is even physically and biologically plausible and, in the long run, probable. For the moment, mere possibility is enough for the purposes of this argument.

The deductive argument can be schematically presented as follows:

- (1) It is morally laudable to seek moral education.
- (2) If morally superior post-persons are possible, they could supply us with moral education through communication.
- (3) A non-zero fraction of morally superior post-persons are ETPPs.
- (4) Our SETI efforts represent the way to communicate with ETPPs.

Hence,

- (5) It is morally laudable to support our SETI efforts.

Assumption #1 has been studied and accepted in moral philosophy since Socrates. Even strong opponents of moral bioenhancement, such as Sparrow or Agar, agree that moral education is desirable in all circumstances (e.g. Agar, 2015); indeed, they tend to argue that moral education is a viable substitute for bioenhancement. Proponents of moral bioenhancement seem to agree; after all, getting to know adequate bioenhancement procedures can be regarded as a form of moral education without any loss of generality. There may be particular restrictions imposed on this assumption, e.g. one's moral education should not cause harm to other moral agents. These restrictions seem rather artificial and do not seem to apply in the domain we are interested in. However, for this reason and the possible other moral duties which could preempt seeking moral education, we refrain from stronger claim that it is indeed our duty to seek such education in any context. Assumption #2 is essentially part of the definition of post-persons, such as used by Persson and Savulescu, Rakić and others, and also a part of the definition of moral education. Therefore, we only need to elaborate on the novel premises #3 and #4.

While we shall discuss the empirical reasons for not only believing premise #3 but also that the said fraction is high and perhaps equal to 1 in the next section, for the moment, it is enough to

establish that the fraction is non-zero. Consider what it would mean to accept that the fraction is zero. This would either mean that morally superior post-persons are impossible or that they could only ever arise on Earth⁵. The first option has been subject to some debate, and it seems that even the opponents of moral enhancement agree that the existence of such post-persons is in fact possible, although they obviously sharply disagree on whether it is desirable or practical to work towards their creation here on Earth. The second option would mean that the Earth is unique, in the sense that biological and cultural evolution is capable of producing post-persons only here and nowhere else. This premise would not only be profoundly anti-Copernican, but also would beg many questions related to the origin of life, cognition and culture. Such uniqueness of Earth nowadays seems to a disturbing degree indistinguishable from creationism and its derivatives like the ‘intelligent design’ movement (e.g. Fry, 2000).

Assumption #4 is trivial in comparison. SETI studies have emerged as a consequence of scientific approaches to what has traditionally been considered reasonable pluralism about abodes of life and intelligence beyond Earth (Crowe, 1986; Dick, 1996). Thus, any communication with such beings, if conducted by scientific means – and not, e.g. religious revelations/miracles – falls by definition within the purview of SETI. Religious or mystical thinkers might object that SETI is just *a* way of searching and communicating; without giving a value judgement of religious or occult experience, as long as we stick to scientific realism, it is *the* way. This does not mean that the actually performed SETI projects have been anywhere near exhaustive in either scope or methodology. Mainstream SETI so far mainly consisted of listening for intentional radio emissions – in a rather narrow band of the radio spectrum, prescribed by the founders in the 1960s – from the vicinity of Sun-like stars. All major projects such as Ozma, Ozma II, META, PHOENIX, as well as the ill-fated NASA HRMS (cancelled in 1993), fit well to this description. In contrast, new, innovative and powerful SETI approaches of the present (e.g. the G-HAT survey of Wright *et al.* (2014) or the *Breakthrough Listen*, see Worden *et al.* (2017)) or near future, are currently expanding our horizons in both literal and methodological senses.

All in all, this deductive argument means that it is laudable and admirable to support *any* form of activities that could result (with non-zero probability) in contact with morally superior post-persons⁶. It includes efforts to create such post-persons, but it also includes SETI projects aimed at finding extraterrestrial versions of such post-persons. For this reason, we should (as societies and evolved scientific institutions) improve these projects and gear them – as much as it is within the realm of feasibility – towards searching for just such, morally superior, extraterrestrial intelligences. The conclusion has one practical consequence we shall discuss in the last section.

Bioethics of Copernicanism

What reasons do we have to suppose that ETPPs actually exist? First, the Copernican principle suggests that local features like the Solar System, the Earth, the terrestrial biosphere and human observers, are not particularly special, or atypical or exceptional *on the average* in their corresponding reference classes. Of course, particular details may vary, but we do not have reasons – at least prior to empirical findings to the contrary – to expect large discontinuities in parameters describing each of these local features. There have been attempts to avoid the Copernican strictures as far as astrobiology is concerned (the most famous being the ‘rare Earth’ hypothesis; Ward and Brownlee, 2000), but they have not been very fruitful so far.

In contrast, we now know not only that there is a huge number of planets out there but also that a large fraction of them are Earth-like. Statistics may vary, but there is hardly any more doubt that ‘other

⁵One could, in principle, argue for a third position: that such persons are possible but have not contingently emerged in the universe so far. Taking into account realistic spatial and temporal scales that astronomy informs us about (e.g., Ćirković, 2004), this does not seem very likely. In a sense, as evolution continues to unfold wherever life emerges, this is tantamount to pushing the dilemma further into the future. In any case, this position is a kind of fallback option one can always return to when other options are exhausted.

⁶Note that this is analogous to the position of most religious thinkers in respect to *supernatural* beings deemed morally superior (God or gods or angels, etc.). Any contact with them, even if ephemeral or fleeting, has traditionally been assigned high intrinsic moral value. Notice also that supernaturalism *per se* does not play any role in the ethical judgement, it just makes the notion of extraterrestrial advanced beings more palatable to traditional audiences.

Earths' are counted in billions, even if we limit ourselves to our Galaxy (Lineweaver and Grether, 2003; Petigura *et al.*, 2013; Kopparapu *et al.*, 2018). Indeed, nowadays, due to the seminal work of Lineweaver (2001), we understand the dynamics of their formation and their age distribution in significant detail (modern studies include Behroozi and Peebles, 2015 and Zackrisson *et al.*, 2016). Notably, we have established that a large majority of Earth-like planets are much older than the Earth itself; the difference between their median age and the age of our planet is about 2 billion years. Advances in observational techniques will very soon determine whether predicted biosignatures exist on at least a fraction of this large set. Consequently, it seems very reasonable to assume that at least on *some* other planets, evolution in a general sense proceeded much farther than has been the case on Earth so far.

At other habitable locales, we may also expect to find, at least in principle, one or more of the following:

- (1) *non-persons* (no moral reasoning);
- (2) *mere persons* (capable of moral reasoning; occasionally incapable of acting in accordance with this reasoning);
- (3) *post-persons* (capable of moral reasoning and always acting on this reasoning)⁷.

We have no particular reasons to doubt that this three-fold division of entities is general enough to encompass any and all regions of the Universe. Even if there are no living or intelligent beings anywhere at the moment, note that it is possible that entities of types #2 and #3 either existed in the past (leaving detectable traces) or will emerge at a later epoch as consequences of biological, cultural and scientific evolution.

If there are intelligent beings somewhere in the Galaxy or other parts of a local universe, then we expect them to fall under category #2 or #3 or both. Now, an argument could be made that if we are to detect any extraterrestrial intelligence at all, they will be of the #3 kind, i.e. that they will be ETPPs. The argument is based upon both the age distribution of extraterrestrial habitats established by astrobiology, and the very same reason authors like Savulescu, Persson or Rakić, advance in favour of creating morally enhanced post-persons on Earth: avoidance of ultimate harm. (Of course, this need not be the *only* argument in favour of such a development. In particular, Rakić in his more recent writings put even stronger emphasis on the general increase happiness following morally apposite acts; cf. Rakić, 2018, 2021).

First, as stated above, we now conjecture with a high degree of confidence that the vast majority of terrestrial planets in the Galaxy are significantly older than the Earth. It is only reasonable to expect that the ages of extraterrestrial biospheres and extraterrestrial intelligent beings will follow a similar pattern. A greater age is likely to lead to increased wisdom *ceteris paribus*, including ethical wisdom. It might sound like a socially conservative assumption ('wisdom of the elders'), but once we accept it is a *probabilistic* inference rather than one of necessity, it is difficult to see the reasons not to accept it. Greater age means more advanced evolution, cultural as well as biological, and the larger corresponding volume of the design space which has been probed. Greater age also leaves more opportunities for facing ultimate harm. Such occurrences will act as a 'filter' or a 'test of time'. Therefore, the existence at present testifies to the improved skill at avoiding ultimate harm; hence the likelihood of improved moral wisdom among the survivors.

Recall that the original motivation of Persson and Savulescu (2008, 2012) in calling for mandatory moral enhancement was the very same notion of *ultimate harm*: a global catastrophe so big that either humanity and its values are wiped out, or at the very least our creative potential is forever limited. Since most studies point out that the most severe candidates for such catastrophes on Earth are artificial (e.g. misuse of biotechnology, runaway climate change or misuse of artificial intelligence), their

⁷As an anonymous referee pointed to us, this may be a too stringent criterion for post-personhood. The present argument is not substantially changed if we conceptualize post-persons as those who act on correct moral reasoning more frequently or more effectively than mere persons.

avoidance boils down to human agents making decisions, particularly making moral decisions. If these human agents were morally enhanced, we would expect that their decisions will steer us away from ultimate harm. Note that *on this specific point*, Persson and Savulescu are in accordance with most of their critics, including Rakić (2014), Carter and Gordon (2015) or Agar (2013a), in contrast to, say, Murphy (2015). The differences arise in whether *bioenhancement* is the way to go and whether there are other unstated risks and costs in the proceeding Persson and Savulescu propose.

The notion of ultimate harm is not inherently associated with Earth or human civilization, except in the trivial sense that the definitions usually refer to humanity or the human species. It is only reasonable to assume that any kind of beings capable of thinking, in general, and moral thinking, in particular, faces some existential risks which could result in ultimate harm (from the point of view of such a being). It is valid for risks from natural phenomena, where the relevant moral duty consists of creating means to avoid or mitigate such risks; and it is valid *a fortiori* for risks coming from the careless use or misuse of technology. Again, there is nothing specifically human or terrestrial about this reasoning. Any technological civilization will destroy itself via, say, nuclear warfare unless it learns how to control its aggressive impulses and creates sustainable forms of political and social organization in which there will be no possibility for massive military use of nuclear weapons⁸.

Therefore, all such risks act as a sieve: beings incapable of managing existential risks will succumb to ultimate harm and will irreversibly disappear from the scene. If Persson *et al.* are correct, the best chances of surviving through the sieve lie in moral enhancement. If Rakić is correct and such moral enhancement results in morally superior post-persons, there is no reason to doubt that the same process will be replicated elsewhere in the fullness of space and time and result in ETTPs. It does not imply that the process replicates *everywhere*, just that it will occur *somewhere*.

Now, if Persson and Savulescu are correct in claiming that moral enhancement is the best antidote to ultimate harm, a simple form of natural selection will take place: those beings and communities which happen to be, on purpose or by accident, morally enhanced are more likely to survive. In fact, in the fullness of time, the measure of any other, non-enhanced beings will be driven to zero, analogously to the measure of differentially unfit populations in the Darwinian theory. Excluding us and our descendants, all the remaining beings with moral standing will be ETTPs as per our definition. And we do not have to be located at the metaphysical ‘end of time’ for this conclusion to be probabilistically valid: the age of the Universe and the ages of other habitats are sufficiently large for the evolution of required complexity (as per the above-cited works of Lineweaver, Behroozi and Peebles and Zackrisson *et al.*). To summarize, the very notion of communicating with extraterrestrial intelligence *probably implies* morally superior ETTPs⁹.

An auxiliary (inductive) argument

A supporting argument has been sketched by Ćirković (2017). We have established that all beings with moral status (as well as other living beings and some other systems) use low-entropy resources of their environment in order to persist in their form, survive and evolve. Entities of types #2 and #3 discussed above, which are moral agents, also create particular values in addition to mere survival; creation of values is contingent upon the existence and availability of low-entropy resources in the Universe (Bostrom, 2003). Consider human values in the fullness of space and time; we may not know exactly

⁸Strictly speaking, an alternative option is that the said civilization is exceptionally lucky. It is exactly in the astrobiological context of the large number of potential extraterrestrial civilizations that the effects of luck – as in any other statistical context, say when calculating insurance premiums or casino profits – average out to zero.

⁹It may fly in the face of many views expressed in the debate about what has come to be called METI (from *Messaging to ExtraTerrestrial Intelligence*) and to what extent it might be dangerous. While it is impossible to even summarize the debate (for points of entry into the literature, see Vaas, 2010; Baum *et al.*, 2011; Haqq-Misra *et al.*, 2013; Brin, 2018), the salient point is that there are many signposts of our presence an advanced extraterrestrial civilization may detect which are entirely independent of our intentions and volition. In other words, for sufficiently advanced astronomical techniques, it is of minor importance whether we shout out or shut up. And, considering how relatively young our civilization is, it is entirely reasonable to assume the existence of such advanced astronomical techniques.

what they are, but it is at least likely that they form a well-defined set. Now, one or the other option must follow: human values are either unique in the Universe (understood in a spatiotemporal sense), or they could be created and recreated many times by various beings, including non-humans. We shall show that in either case, it follows that we should engage in exploring the Universe and searching for other sentient beings capable of moral reasoning and creating values. In other words, we should engage in SETI projects.

Suppose we believe that human values are unique. In this case, safeguarding the survival and creative potentials of humanity becomes a foremost ethical and even political task (as detailed, for instance, in Bostrom, 2013). Protecting humankind against external threats such as cataclysmic collisions with asteroids or comets, a nearby supernova, γ -ray burst explosions, or even the possibility of hostile extraterrestrials requires learning a great deal about the overall conditions in the Universe¹⁰. It is arguably a very *practical* motivation. In addition, there is a specific value-related motivation: we need to assess how many cosmic resources future humanity can convert to values before our rivals do. It is largely independent of whether other extraterrestrial intelligences are friendly or hostile; it is indeed independent of whether humanity itself is morally enhanced or not (in comparison with its present state). Of course, the efficiency of the conversion – or indeed whether it is feasible at all in substantial amount – may vary wildly, but the drive itself exists in all cases. This kind of humanism should motivate a robust long-term space exploration programme with its final purpose – space colonization and settlement¹¹. Our SETI efforts are necessarily an early part of this programme.

Now consider the other horn of the dilemma. If we hold that human values are not unique, so that different kinds of extraterrestrial beings could create the same values, perhaps even more efficient or in some other tangible sense ‘better’ than we did, we still have significant incentives to study this process. In this case, it would be our moral duty to assess how much value of the same kind we could produce compared with other kinds of intelligent beings. If our values are just a part of a larger universal pool of values, communication with extraterrestrial intelligences becomes an important source of ethical guidance. Here we touch upon the deductive argument above and the considerations of the probability of finding ETPPs. And even if we conclude, upon inspection and moral reasoning, that our duty is, for example, to accept different values as superior, the correct justification might only be found through diligent searching and communication. In an analogy that is unfortunately too much linked with historical misuses, a religious conversion – if it is *entirely free and sincere*, which is absolutely crucial – is such an act of accepting different values after much conversation and deliberation. Is it really unimaginable that a similar event might occur upon a contact with much older and wiser species, naturalistically evolved in some other corner of the Universe?

Therefore, there are important moral incentives on both sides of the dilemma to investigate the Universe, especially in the SETI context of searching for beings capable of moral reasoning. Irrespective of our position on the uniqueness of human values, we ought to investigate whether there are traces and manifestations of intrinsic moral value elsewhere in the Universe.

Conclusions: a moral duty to do SETI?

The deductive argument outlined here follows the one of Rakić (2015), with several modifications specific to the case of ETPPs. The most important distinction, arguably, is that the ‘work’ on the creating and selection of morally superior beings is outsourced to the evolution itself and its ergodicity. Since evolution is generally wiser than humans (in the very operational sense of finding ways and means for

¹⁰Notice that *here* we can even relax our assumptions of extraterrestrial intelligences being on the average morally superior.

¹¹There are several auxiliary points to be made here. The tenets of the emerging field of *space ethics* should be considered and, within it, the considerations of the moral status of extraterrestrial life (even if non-sentient) taken into account. Also, marginal costs and utilities of cosmic resources may vary unpredictably, depending on currently unknown future technological developments. It is unlikely, however, that these will change the general conclusion that, *ceteris paribus*, limitations on the abundance of resources within our cosmological horizon (Bostrom, 2003; Ćirković, 2004) implies that humanity is morally obliged to ‘play the game’ and stake its claims.

achieving specific features or characters), especially when its domain expands to include the entire Universe within our cosmological horizon, there is no *additional* need to worry about the mere possibility of morally superior beings: if they are possible at all, they will evolve somewhere. It is then just a question of finding them, which is precisely the mandate of SETI studies.

In contrast to the dark years of the ‘SETI winter’ of the 1980s and 1990s, after the onset of the ‘astrobiological revolution’ in 1995, there has been a revival of interest in biological (e.g. morphological) properties of hypothetical extraterrestrial intelligent beings (Cohen and Stewart, 2002; Conway Morris, 2003, 2011; Levin *et al.*, 2018). So, why not moral properties as well? Isn’t that something that is at least as important for us as morphological properties are? As a hardly deniable side benefit, serious scientific and critical discussion of these issues within the astrobiological framework could do much to quell the tide of ignorance, confusion, fear and paranoia which all too often accompany the social, mass media and pop-cultural characterizations of extraterrestrial intelligence.

The distinction between Rakić’s (2015) deductive argument and the present argument is that no acts of ours can influence the *ontological* status of the considered group (morally enhanced PPs in Rakić and ETPPs in the current discussion). ETPPs exist or not independently of anything we could do at present (and, arguably, in the foreseeable future), in contrast to PPs that could or could not emerge in response to our specific actions. However, as argued above, the difference is not crucial since we may assume that the course of natural evolutionary processes brings about what is possible, at least *somewhere* in a myriad of habitats. Moreover, there is a sense in which one could further argue that outsourcing of the work (necessary to create post-persons) to evolution is *safer* from the point of view of humanity (we may enjoy our cosmic ‘splendid isolation’ across parsecs of distance from any ghastly failures of the enhancement processes), although we cannot pursue this line of argument here¹².

The present line of thinking could be strengthened up to the level of moral duty, which would require more careful and detailed analysis, however, in terms of how such duty relates to the assumptions of the fundamental normative frameworks. Our standpoint is that the duty we are referring to represents the collective responsibility of the highest order of humankind. In other words, moral obligation in this bioethical/astrobiological context is above the difference between individual ethical theories here and now, not only abstractly but also practically. Abstractly, it refers to the specific extraterrestrial being that has gone a step further on the evolutionary ladder accomplishing superiority in moral reasoning. Accordingly, we do not have to know what that superiority contains precisely, it is enough, as already said, to be able to imagine beings whose actions consistently respect a principle that transcends the difference between deontological rightness of the act itself and consequentialist goodness of the action outcome/s. In this sense, although there is no method still to calculate the better principle of moral reasoning, we can certainly assume that methodology for calculating the best possible outcome of a moral decision will be developed and improved on Earth or elsewhere. Practically, we claim that humans are in a continuous process of evolution both at the level of an individual species (so far!), and as a part of evolution at the biospheric level characterized by dramatic rise of complexity (e.g. Gillings *et al.*, 2016; Schwartzman, 2020). Entering the current *anthropocene* epoch (Zalasiewicz *et al.*, 2017) just accelerates and exacerbates these trends.

In this regard, the risk for our ultimate disappearance inherently exists in such a reality. So whether human values are unique or evolution sporadically repeats in a relevantly similar way in the Universe: the moral obligation to support the SETI programme (to prevent global risk *and* discover superior beings who can teach and save us) is compatible with both deontological and consequentialist understanding. Beneath this is our additional assumption that even in this world, we always act contextually

¹²For instance, one could reason that, by analogy with other new, radical technologies, those necessary for the creation of morally enhanced post-persons will include trials-and-errors, with accidents having potentially catastrophic consequences before the technology is fully reliable and mature (compared to the treatment of AI risk – and especially the thorny issue of AI ‘take off’ – in Bostrom, 2014). One could argue that the fear from such accidents motivates at least some of scepticism and uneasiness towards the programme of attaining post-personhood (e.g. Agar, 2013a, 2013b, 2013c; Sparrow, 2013).

balancing in deciding between our internal principles of behaviour and the consequences our decisions will produce, bearing in mind that predictions of these consequences are often very limited. Ultimately, the humanism we propose tends to have the limitations of each ‘now and here’ evolve into creative solutions of our enhanced future, which will transform our parochial moral views into a truly universal and truly *cosmic ethics*.

In the final analysis, it does not matter whether we manage to create human post-persons before or after the hypothetical SETI success; as indicated above, we find it very plausible that SETI success will help in the endeavour of creating morally enhanced post-persons. Even if the probability of creating post-persons on Earth turns out to be much higher than the probability of SETI success, the latter would still be a useful backup project of considerable benefit to humanity. Nothing in the argument itself depends on the temporal ordering of these events. We may first create future human PPs and only then discover the existence of ETPPs, or we may first discover ETPPs and either feel additionally motivated to create human PPs or be instructed how to do so more safely or efficiently. Nevertheless, as our insight into plausible (post)human futures improves, it would be utterly foolish to confine ourselves to the earthly matters and to refrain from applying our best bioethical insights to a wider universe.

Acknowledgements. Three reviewers’ reports for the *International Journal of Astrobiology* helped enormously improved a previous version of the manuscript. Useful discussions with Srdja Janković, Mark Walker and Anders Sandberg are also hereby acknowledged.

References

- Agar N (2010) *Humanity’s End: Why We Should Reject Radical Enhancement*. Cambridge: MIT Press.
- Agar N (2013a) *Truly Human Enhancement: A Philosophical Defense of Limits*. Cambridge: MIT Press.
- Agar N (2013b) We must not create beings with moral standing superior to our own. *Journal of Medical Ethics* **39**, 709.
- Agar N (2013c) Why is it possible to enhance moral status and why doing so is wrong? *Journal of Medical Ethics* **39**, 67–74.
- Agar N (2015) Moral bioenhancement is dangerous. *Journal of Medical Ethics* **41**, 343–345.
- Baum SD, Haqq-Misra JD and Domagal-Goldman SD (2011) Would contact with extraterrestrials benefit or harm humanity? A scenario analysis. *Acta Astronautica* **68**, 2114–2129.
- Behroozi P and Peebles MS (2015) On the history and future of cosmic planet formation. *Monthly Notices of the Royal Astronomical Society* **454**, 1811–1817.
- Bostrom N (2003) Astronomical waste: the opportunity cost of delayed technological development. *Utilitas* **5**, 308–314.
- Bostrom N (2013) Existential risk prevention as global priority. *Global Policy* **4**, 15–31.
- Bostrom N (2014) *Superintelligence: Paths, Dangers, Strategies*. Oxford: Oxford University Press.
- Brin DG (2018) The great silence: the science and philosophy of Fermi’s paradox. *American Journal of Physics* **86**, 878–879.
- Carter JA and Gordon EC (2015) On cognitive and moral enhancement: a reply to Savulescu and Persson. *Bioethics* **29**, 153–161.
- Ćirković MM (2004) Forecast for the next eon: applied cosmology and the long-term fate of intelligent beings. *Foundations of Physics* **34**, 239–261.
- Ćirković MM (2017) Enhancing a person, enhancing a civilization: a research program at the intersection of bioethics, future studies, and astrobiology. *Cambridge Quarterly of Healthcare Ethics* **26**, 459–468.
- Cohen J and Stewart I (2002) *What does a Martian Look Like? The Science of Extraterrestrial Life*. Hoboken, NJ: John Wiley & Sons.
- Conway Morris S (2003) The navigation of biological hyperspace. *International Journal of Astrobiology* **2**, 149–152.
- Conway Morris S (2011) Predicting what extra-terrestrials will be like: and preparing for the worst. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* **369**, 555–571.
- Crowe MJ (1986) *The Extraterrestrial Life Debate 1750–1900*. Cambridge: Cambridge University Press.
- Dancy J (2012) Particularism. In George S (ed). *Ethics: Essential Readings in Moral Theory*. London: Routledge, pp. 418–426.
- Dick SJ (1996) *The Biological Universe: The Twentieth-Century Extraterrestrial Life Debate and the Limits of Science*. Cambridge: Cambridge University Press.
- Douglas T (2013) Human enhancement and supra-personal moral status. *Philosophical Studies* **162**, 473–497.
- Fry I (2000) *The Emergence of Life on Earth: A Historical and Scientific Overview*. New Brunswick: Rutgers University Press.
- Gillings MR, Hilbert M and Kemp DJ (2016) Information in the biosphere: biological and digital worlds. *Trends in Ecology & Evolution* **31**, 180–189.
- Haqq-Misra J, Busch MW, Som SM and Baum SD (2013) The benefits and harm of transmitting into space. *Space Policy* **29**, 40–48.
- Kopparapu RK, Hébrard E, Belikov R, Batalha NM, Mulders GD, Stark C, Teal D, Domagal-Goldman S and Mandell A (2018) Exoplanet classification and yield estimates for direct imaging missions. *The Astrophysical Journal* **856**, 122.
- Levin SR, Scott TW, Cooper HS and West SA (2018) Darwin’s aliens. *International Journal of Astrobiology* **18** (in press).

- Lineaweaver CH (2001) An estimate of the age distribution of terrestrial planets in the Universe: quantifying metallicity as a selection effect. *Icarus* **151**, 307–313.
- Lineaweaver CH and Grether D (2003) What fraction of Sun-like stars have planets? *The Astrophysical Journal* **598**, 1350–1360.
- McMahan J (2002) *The Ethics of Killing*. Oxford: Oxford University Press.
- Meier MM, Bindi L, Heck PR, Neander AI, Spring NH, Riebe ME, Maden C, Baur H, Steinhardt PJ, Wieler R and Busemann H (2018) Cosmic history and a candidate parent asteroid for the quasicrystal-bearing meteorite Khatyrka. *Earth and Planetary Science Letters* **490**, 122–131.
- Murphy TF (2015) Preventing ultimate harm as the justification for biomoral modification. *Bioethics* **29**, 369–377.
- Neiders I (2015) Can there be post-persons and what can we learn from considering their possibility? *Ethics in Progress* **6**, 56–71.
- Persson I and Savulescu J (2008) The perils of cognitive enhancement and the urgent imperative to enhance the moral character of humanity. *Journal of Applied Philosophy* **25**, 162–177.
- Persson I and Savulescu J (2010) Moral transhumanism. *The Journal of Medicine and Philosophy: A Forum for Bioethics and Philosophy of Medicine* **35**, 656–669.
- Persson I and Savulescu J (2012) *Unfit for the Future: The Need for Moral Enhancement*. Oxford: Oxford University Press.
- Petigura EA, Howard AW and Marcy GW (2013) Prevalence of Earth-size planets orbiting Sun-like stars. *Proceedings of the National Academy of Science* **110**, 19273–19278.
- Rakić V (2014) Voluntary moral enhancement and the survival-at-any-cost bias. *Journal of Medical Ethics* **40**, 246–250.
- Rakić V (2015) We must create beings with moral standing superior to our own. *Cambridge Quarterly of Healthcare Ethics* **24**, 58–65.
- Rakić V (2018) Incentivized goodness. *Medicine, Health Care and Philosophy* **21**, 303–309.
- Rakić V (2021) *The Ultimate Enhancement of Morality*. Dordrecht: Springer.
- Schwartzman D (2020) Biospheric evolution is coarsely deterministic. *Journal of Big History* **4**, 60–66.
- Sparrow RJ (2013) The perils of post-persons. *Journal of Medical Ethics* **39**, 80–81.
- Vaas R (2010) Fear of fanatics: why Stephen Hawking is right, and we should not contact intelligent extraterrestrials. *Journal of Cosmology* **7**, 1792–1799.
- Ward P D and Brownlee D (2000) *Rare Earth: Why Complex Life Is Uncommon in the Universe*. New York: Springer.
- Worden SP, Drew J, Siemion A, Werthimer D, DeBoer D, Croft S, MacMahon D, Lebofsky M, Isaacson H, Hickish J and Price D (2017) Breakthrough listen – a new search for life in the universe. *Acta Astronautica* **139**, 98–101.
- Wright JT, Mullan B, Sigurdsson S and Povich MS (2014) The Ġ infrared search for extraterrestrial civilizations with large energy supplies. I. Background and justification. *Astrophysical Journal* **792**, id. 26 (16pp).
- Zackrisson E, Calissendorff P, González J, Benson A, Johansen A and Janson M (2016) Terrestrial planets across space and time. *The Astrophysical Journal* **833**, article id. 214 (12pp).
- Zalasiewicz J, Williams M, Waters CN, Barnosky AD, Palmesino J, Rönnskog AS, Edgeworth M, Neal C, Cearreta A, Ellis EC and Grinevald J (2017) Scale and diversity of the physical technosphere: a geological perspective. *The Anthropocene Review* **4**, 9–22.