Special Section: Enhancement and Goodness

Enhancing a Person, Enhancing a Civilization

A Research Program at the Intersection of Bioethics, Future Studies, and Astrobiology

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Abstract: There are manifold intriguing issues located within largely unexplored borderlands of bioethics, future studies (including global risk analysis), and astrobiology. Human enhancement has for quite some time been among the foci of bioethical debates, but the same cannot be said about its global, transgenerational, and even cosmological consequences. In recent years, discussions of posthuman and, in general terms, postbiological civilization(s) have slowly gained a measure of academic respect, in parallel with the renewed interest in the entire field of future studies and the great strides made in understanding of the origin and evolution of life and intelligence in their widest, cosmic context. These developments promise much deeper synergic answers to questions regarding the long-term future of enhancement: how far can it go? Is human enhancement a further step toward building a true postbiological civilization? Should we actively participate and help shape this process? Is the future of humanity "typical" in the same Copernican sense as our location in space and time is typical in the galaxy, and if so, can we derive important insights about the evolutionary pathways of postbiological evolution from astrobiological and Search for ExtraTerrestrial Intelligence (SETI) studies? These and similar questions could be understood as parts of a possible unifying research program attempting to connect cultural and moral evolution with what we know and understand about their cosmological and biological counterparts.

Keywords: cognitive enhancement; future studies; risk analysis; posthumanity; SETI; moral enhancement

> We can make our minds so like still water that beings gather about us that they may see, it may be, their own images, and so live for a moment with a clearer, perhaps even with a fiercer life because of our quiet.
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> — W. B. Yeats, *The Celtic Twilight*

Introduction: Bioethics and Postbiological Evolution

It might sound paradoxical to consider bioethics and postbiological evolution (or civilization or whatever *post*biological) in the same context, but I argue that it is exactly what ethicists need to do to philosophically and scientifically elucidate the possibility of transition between biological and postbiological domains on Earth

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and elsewhere. Although this transition is obviously pertinent to the question of future human evolution (and other issues in future studies), it is also important to understand that it very well may be relevant in wider contexts as well. Scientific fields dealing with types of cognition *other* than the known human one, such as parts of animal psychology, artificial intelligence (AI) studies, and the Search for ExtraTerrestrial Intelligence (SETI) studies have gained significant momentum in recent decades. As often happens, the discussion of many related moral issues has been lagging behind. It is high time to at least attempt to close that gap.

Here is a recent example of suspecting nonhuman cognition at work. In the fall of 2015, even the mainstream media reported KIC 8462852, a star in the constellation of Cygnus (The Swan) which exhibits irregularly shaped, aperiodic dips in flux of up to approximately 20 percent in observations made by the Kepler mission.[1] If those are eclipses—as properties of the star suggest—the eclipsing bodies must be much larger than planets and of rather irregular shapes. Public imagination was fired by suggestion, made by some astronomers, that those could be artificial contraptions, examples of astroengineering done by an advanced civilization.[2] Although there are other possible—and perhaps more probable— explanations, and the jury is very much still out, it is of paramount importance to consider all the possible consequence of the hypothesis of intentional, artificial origin turning out to be true. Have we just had a first glimpse not only of an extraterrestrial intelligence at work, but also a *morally more advanced one*? There are good reasons to believe that, if a civilization is capable of constructing large astroengineering artefacts, it is advanced not only at the technological, but also at the ethical level: how else could it survive all the "adolescent crises" of societies similar to those we are now facing such as perturbations of its planetary environment, all the tribal conflicts, the tension between individual liberty and species survival through the epoch of great technological capacity for mass destruction, and both natural hazards and poisonous cultural memes, and achieve almost unimaginable levels of economic and cultural prosperity necessary for undertaking any astroengineering project in the first place?

It is crucial to understand that ramifications of a general situation such as this do not depend on the fate of the particular astroengineering hypothesis for KIC 8462852. If it is not that particular star, it will be some other, and, considering the pace of advances in observational astronomy, it will be sooner rather than later. It will then be possible to reflect on the properties of truly enhanced civilization and the pathways leading there. We should better be at least vaguely prepared for such thoughts. In the rest of this article I will argue for the following theses:

1) Natural extension of the bioethical concern over individual human enhancement is the concern about enhancement of the entire human civilization and its transition toward the postbiological/posthuman realm.
2) Analogous processes of reaching more and more complex organizations of matter are taking place throughout the universe, independently of our limited anthropocentric perspective.
3) There is clear bioethical merit in searching for outcomes of such processes via astrobiological and SETI searches.

In other words, questions need to be asked about *extensions* of human enhancement: how far can it go? Is human enhancement a further step toward building a true postbiological civilization? Should we actively participate and help shape—if not

plan—this process? Is the future of humanity "typical" in the same Copernican sense as our location in space and time is typical in the galaxy, and if so, can one derive important insights about the evolutionary pathways of postbiological evolution from astrobiological and SETI studies? Unfortunately, the key questions are still very rarely posed. Outside of what is regarded as "fringe" transhumanist websites, forums, and mailing lists, there is very little academic interest in large-scale future studies.[3] For this reason, it is preferable to at least roughly sketch some of the milestones on this futuristic journey, while fully acknowledging many gaps, technical complexities, ethical dilemmas, and general philosophical mortar to be added in the course of subsequent work. But a bird's view of the unknown landscape is often at least as valuable as a frog's view.

Postbiological and Posthuman

The possibility and properties of *postbiological* evolution have been cautiously discussed for quite some time.[4] What has been lacking so far is a coherent argumentation that the transition between the two realms comes as a rational consequence of human enhancement, as has been discussed often in recent times. The process of "cyborgization" is still considered to be more fiction than science in academic circles, in spite of clear-cut cases such as bionics prosthetics reaching an unprecedented level of sophistication. From time to time, bioethicists are invited to "get real"[5] in the tone similar to the one supposedly used by Aristotelian cosmologists near 1600 CE, when contemporary empirical data still strongly favored a geocentric worldview. In contrast, what is really needed is to go not just the obvious "next step"[6] but several—or several dozen—steps and make bold conjectures about both outcomes and risks of the process (see the schematic view in Figure 1).

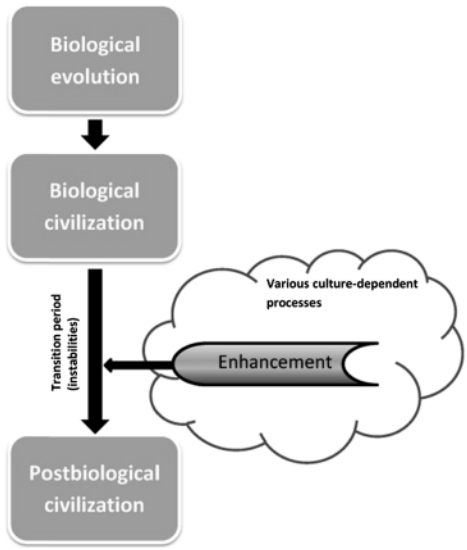

Figure 1. A schematic transition between the biological and postbiological civilizations via progressive enhancement on larger and larger scales. The interplay between biological and cultural evolution is a complex process likely to cause instabilities (whose beginning we may be already witnessing in the world).

As with many other things, this has been prefigured in a literary context. In particular, the great Polish author and philosopher Stanislaw Lem has dubbed it "autoevolution" and suggested, in several of his science fiction works (notably the novels *His Master's Voice* and *Fiasco*, but also short stories from the *Cyberiad*), as well as in the magnificent discursive *Summa Technologiae*, that it is a glimpse of hope in an otherwise rather dark future.[7] As Michael Kandel, Lem's excellent translator and literary critic, wrote:[8]

> In a discussion of the rise of a technological civilization in Fiasco, intelligent beings venture into space only to learn that "the mark of their animal origin [has] been stamped inexorably in their bodies... Where there is mind, there is also cruelty"... According to Lem, our primitive, animal heritage is the engine behind military escalation and the arms race. If we cannot break free of this evolutionary determinism, we will destroy ourselves. One straw of hope against this destruction is the cybernetic idea: machines, growing complex enough, becoming unpredictable, independent. Perhaps, having none of the ape about them, they might escape the doom of their creators, or they might even deliver their creators from that doom... A second straw of hope for Lem is autoevolution, that we might become more truly human, less bestial, by taking evolution into our own hands.

Thus, the self-directed evolution, voluntary self-evolution, autoevolution, enhancement of the entire species belong to the realm of hope, even more poignantly when located within the context of Lem's pessimistic worldview. Many other authors have discussed issues of autoevolution and transition to the postbiological in the discourse of popular culture and literary fiction.[9] Although autoevolution might include many different trajectories, the class of trajectories leading to postbiological civilization does seem to attract the most interest.

Because the transitional period could be expected to contain instabilities, it needs to be studied and so that the safest path through it can be ascertained. Considering the fact that human control over our immediate physical environment has already become a source of significant existential risk,[10] and that the same trend will continue at least for foreseeable future, we, as a society, need to investigate the relevant issues and formulate appropriate strategies to reduce the chances for the ultimate harm.[11]

There are strong risk attractors in the space of instabilities, in particular those dealing with the possibilities of totalitarian control of the global society as the seemingly only way of risk management. It is possible that the only way of navigating between the Scylla of extinction caused by a natural or anthropogenic cataclysm and totalitarian regulation is the process of voluntary moral enhancement.[12] On the other hand, without the transition to the postbiological, it is likely that future human civilization will succumb to either natural hazards, anthropogenic catastrophic risks, or somewhat slower dysgenic pressures. An excellent example of the latter, already taking place in the developed world, is the ongoing pandemic of obesity, diabetes, and other metabolic disorders, which already consumes a large fraction of world's resources.[13] Prevention of existential risks, whose probabilities increase as a result of global instabilities, has already been acknowledged as our ethical priority.[14]

Whatever exact shape postbiological societies take (on which issue we must remain agnostic at present), one thing seems certain: postbiological civilization is

quite unlikely to retain anything like the genetic lottery when the creation of new generations is concerned. In addition, the ease of producing and retaining copies of postbiological organisms in the digital substrate is likely to dramatically change the meaning of terms such as "maturation," "adulthood," "parenthood," or "kin." Therefore, an additional step, symbolically represented as the analogy (biological evolution → postbiological evolution) versus (sociobiology → "post-sociobiology"), needs to be taken.[15]

Clearly, there needs to be much more research and thinking in order to establish what exactly "post-sociobiology" could be, but as a provocation, it may be supposed that it will deal with the "stable ingredients" (to use the expression of the great historian Arnold Toynbee[16]) of postbiological development. In the case of (post)human evolution, one may argue that this will encompass "post-human nature" in the same manner as authors such as Fukuyama invoke "human nature" or "factor X" as an explanatory device.[17] It is very hard to imagine such a dramatic change, but one ought to think as hard as possible about its outcomes because, among other things, some very early decisions can have long-reaching consequences.[18]

A Copernican Generalization

Copernicanism has been officially accepted in most of science and philosophy since the Enlightenment, although the resistance to it in wider segments of contemporary society is still strong at the beginning of the third millennium. One might naïvely think that rejection of Copernicanism is a steep price, unlikely to be paid by anybody except a few religious zealots, stuck in the Middle Ages. Unfortunately, this is far from being the truth, and if anything, the anti-Copernican cartel has grown stronger in recent decades, gathering wildly heterogeneous groups, individuals, and ways of thinking, with the common denominator of either vested interests in anthropocentric institutions permeating our society, or ideological blindness to the reality underpinning the successes of the scientific method, especially during the last two centuries. An extremely wide anti-Copernican front encompasses people ranging from opponents of animal rights and other defenders of anthropocentric legal orthodoxies to various conservative "warriors on science" and their ideological allies, from the Discovery Institute to antivaccination lobbies to self-proclaimed "progressive humanists" incapable of dealing with the rational facts of science on the psychological level (including indubitably enlightened people such as Hannah Arendt or Michael Frayn[19]) to radical futurists believing that we need ideological anthropocentrism to ensure the perceived desired purity of humanity. Fighters against perceived "scientism" and the alleged "coldness" of modern science à la Francis Fukuyama, Leon Kass, or Mary Midgley[20] hold hands *both* with anti-environmentalists who do not recognize Genesis 1:28–30 as the harmful Bronze Age nonsense/superstition it really is, and extreme new-age environmentalists worshipping Gaia as —no surprise there—center of the universe.

Therefore, the job of Copernican revolution is still quite an actual, timely, and risky concern. Although the Inquisition that condemned Galileo seems unlikely to receive any open support today, I submit that this is more because of their old-fashioned garments and politically incorrect language than because of any true dissonance of ideas. The underlying concern stays the same: worry about perceived "well-being of humanity" and its institutions being threatened by "cold"

and "soulless" science and its discoveries, irrespective of the truth. The focus of the odium has shifted from astronomy in Galileo's time to evolutionary biology and computer and environmental sciences today, but the underlying reality remains the same: below a thin skin of modernity a surprisingly medieval anthropocentrism often threatens. This anthropocentrism presents us with an important and dangerous source of instabilities during the *biological → postbiological transition* described in the previous section.

In contrast, a true and open-minded extension of Copernicanism leads to the conclusion that intelligent beings elsewhere in the universe are likely to pass from the biological into the postbiological stage of their evolution at time scales short in comparison with evolutionary or astrophysical time scales. A solid body of astronomical data suggests that most habitable planets are much older than our Earth,[21] so there is reason to believe that the transition to postbiological form has already occurred at least on some of them. Although Copernicanism should not be taken dogmatically here, it has been so incredibly useful in all domains of science so far, that any reason to suspend it needs to be quite uncontroversial; and no such reason is in sight!

In contrast, the great historian of science, Steven J. Dick has argued:[22]

> Lacking a robust theory of cultural evolution to at least guide our way, and 'wildcard' events notwithstanding, we are reduced at present to the extrapolation of current trends supplemented by only the most general evolutionary concepts. Several fields are most relevant, including genetic engineering, biotechnology, nanotechnology and space travel. But one field—artificial intelligence—may dominate all other developments in the sense that other fields can be seen as subservient to intelligence... In sorting priorities, I adopt what I term the central principle of cultural evolution, which I refer to as the Intelligence Principle: the maintenance, improvement and perpetuation of knowledge and intelligence is the central driving force of cultural evolution, and that to the extent intelligence can be improved, it will be improved.

If we use Dick's Intelligence Principle as a heuristic, we can reach important bioethical conclusions as well. As he further notices:[23] "Immortal postbiologicals would embody the capacity for great good or evil over a domain that dwarfs biological domains of influence. There are admittedly deep questions of the nature of 'good', 'evil' and 'morality' in the context of artificial intelligence in the universe... But if the Intelligence Principle holds, postbiologicals are driven by the improvement of knowledge and intelligence. How they would use these qualities presumably remains a value question no less than for humans."

The key insight that is needed to research both the scientific (in the domain of biological and cultural evolution, as well as in astrobiology and SETI studies) and ethical sides of the same evolutionary story is the cornerstone of the research program hereby proposed, which so far has been neglected by philosophers in general, and bioethicists in particular.[24] The circle of relevant questions is so intertwined that separation of cognitive labor no longer works.

It is neither necessary nor desirable for our further considerations to make the notion of postbiological civilizations more precise. If Dick is right in arguing that postbiological evolution is the dominant option for the peaks of astrobiological complexity, such a definitional program is doomed to failure, and epistemology

teaches that even in much better-understood fields, systematization and formalization of knowledge comes near the end, not at the beginning of research (see, for example, the debate surrounding Hilbert's Sixth Problem[25]). The diversity of postbiological evolution is likely at least to match, and probably to dwarf, the diversity of its biological precedent. It is one particular feature—information processing—that is assumed to be common for "mainstream" advanced societies, in accordance with the postbiological paradigm and the Intelligence Principle of Dick. Therefore, whether such peaks of complexity most adequately be described as "being computers" or "having computers" is not of key importance for the analysis; it is just supposed that in either case the desire for optimization of computations will be one important —if not *the most* important—desire of such advanced entities. Therefore, instead of formal definitions, an intuitive understanding of postbiological morphological/design space and related capacities must be sought, nor is the question of how much of the approach to the postbiological transition is actually *determined* by our evolutionary biological past very important in this respect. Even if the answer is (as is intuitively quite plausible when one discards the old-fashioned deterministic doctrines) "very little," one is still very much motivated to search for traces of such transitions elsewhere and to reflect upon such traces or their absence.

Moral Reasons to Search

Many reasons have been advanced so far to engage into searches for intelligent life elsewhere, but there has been usually no appeal to our ethical norms and sensibilities. Hereby, I sketch a possible argument in this direction, while leaving its detailed elaboration to a future study.

If any process in nature or society occurs independently of us as observers, without any possibility of our influencing it, we might still have moral reasons to investigate it, because it can influence us and our values. Even if it is not obvious, or even remotely probable at present, it might become so in the future; even if we cannot influence the decay rates and other properties of radioactive isotopes, the phenomena of nuclear physics do influence our lives and in one particularly worrying aspect might even cause the extinction of humanity and all its values. Therefore, it is with the transition to postbiological domain: if it occurred elsewhere in the universe—and in particular if it is occurring somewhere right now (or close enough in the astronomical sense of time scales)—we should be very much interested in it, because it might have an enormous, literally cosmological impact on ourselves and our values. These values might be unique, in the sense of being produced only by humans, or might be in a sense universal, meaning that any beings, possessing some specified qualities (sufficient complexity, cognition, intelligence, empathy, some unknown qualities) might produce them. We do not know the answer yet, and can proactively consider the ramifications of each view.[26] However, there seems to be no reason to doubt that one or the other option must follow: human values are either unique in the universe, or they can be created and recreated many times by various beings, including nonhumans. It is reasonable to assume that in both cases, the transition biological → postbiological in the case of the human species will result in a large increase in the production volume of these values, comparable to earlier key transitions (e.g., from the hunter-gatherer to the agricultural way of life) in our history.

Irrespective of our position on the uniqueness of human values, we ought to investigate whether there are traces and manifestations of intrinsic value elsewhere in the universe. In particular, the search for artefacts of independently evolved intelligent beings elsewhere in the galaxy should offer us an opportunity to assess presumably older and more advanced intelligent communities.[27] If we believe that human values are unique, then we have practical motivation to learn as much as we can about the overall conditions in the universe to ensure the survival and spread of human values. In particular, we need to assess how many cosmic resources future humanity can convert to values before our rivals do. Limitations on the number of resources within our cosmological horizon make it a zero-sum game in which humanity is morally obliged to participate and stake its claims. Clearly, this type of humanism should motivate a strong and aggressive program of not only exploration, but also of colonization of space.

Even if we hold that human values are not unique, so that different kinds of extraterrestrial observers 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 and invest adequate resources in such research. We need to assess how many values of the same kind we could produce in comparison with other intelligent beings, and we might need a maximization principle as a guide to our standing in the "Galactic Club."[28] If our values are part of the universal pool of values, communication with extraterrestrial intelligences becomes an important source of ethical guidance, because we might reasonably expect that advanced galactic communities are more advanced in that field as well, for the same reasons we have discussed in relationship to KIC8462852. And even if we conclude that our duty is, for example, to submit to morally superior beings (for the very same reasons often quoted in connection with future morally enhanced postpersons[29]), correct justification for that is also to be found through diligent SETI searches, which are the only way to establish whether and to what extent are they indeed morally superior.

Discussion

Although the context of the discussion of human enhancement has so far comprised proximate medical, ethical, legal, and cultural issues stemming from capacities of new transformative technologies to change the human condition in the short term, there are reasons to occasionally un-zoom the perspective and put the current thinking into a much wider perspective. As I have argued, and as becomes more and more apparent, the natural and logical extension of the existing trends leads to the postbiological state as an *attractor* in the overall space of evolutionary trajectories.[30] Whether it is indeed so can be established only through the twofold approach of both (1) assessing current trends and analyzing them from both descriptive and prescriptive points of views, and (2) searching within our past light cone for signs that it has already occurred somewhere. These two concurrent activities are complementary in the sense of promising, at least in principle, both structural and historical view of the processes involved.

Although the main point of the present article is to stress the importance of embarking on a research program—or a series of research programs—dealing with the biological → postbiological transition in the widest comprehensible context, one ought not forget seemingly minor and mundane aspects of such processes.

The proposed research program will help answer a host of questions pertaining to synergy between bioethics and future studies, especially about building quantitative and believable *simulations* of future events and decisions, with analysis of their moral ramifications. In the case of isolated future events, notably those of catastrophic import such as global climate change and the danger of nuclear war/nuclear winter, this has already been done,[31] but those were special cases with obviously large possible negative-value outcomes. The corresponding work in the model space for more complex and uncertain processes, whose outcome might be *eucatastrophes* (or sudden events with large positive moral value) or some combinations thereof has not yet been performed, nor has the need for it been sufficiently motivated and promoted. And such an attitude persists in spite of the clear evidence to the effect that huge *relative* loss of intrinsic value could easily occur as a result of wrong and uninformed technological and social decisions in the present or the near future.[32] It is high time, perhaps in both senses, to reflect upon the course of our actions and their impact on the universe in the widest sense.

Notes

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