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The Ethics of Astrobiology and the Cosmic Bet Argument

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ABSTRACT

Stephen Weinberg posited in 1977 that as the universe becomes more comprehensible, it appears more meaningless owing to a strict division between facts and values. He seemingly overlooked the consideration of the purposes and values of intelligent life in examining its ability to influence the universe's development. The scientific revolution, initiated by Copernicus's heliocentric hypothesis and furthered by Darwin's theory, shifted humanity's perceived place in the cosmos, removing the sacred. However, developments in astrobiology and discoveries related to the Fermi Paradox and the Rare Earth Hypothesis are hinting at humanity's significant role in the universe, suggesting we might be the only intelligent species. This paper argues that advancing scientific knowledge reinforces the hypothesis of human exclusivity and importance in the cosmos, making the potential sixth mass extinction cosmically significant and underscoring the imperative of human persistence in the cosmos.

KEYWORDS

The Fermi Paradox, The Rare Earth Hypothesis, Moral Values, Human Extinction, Cosmic Bet

Stephen Weinberg wrote in 1977 that the more comprehensible the universe seems, the more meaningless it also seems (Weinberg, 1977). This statement is based on a rigid separation of facts and values which, *prima facie,* does not seem to take adequate account of the fact that "if we are to examine how intelligent life may be able to guide the physical development of the universe for its own purposes, we cannot altogether avoid considering what the values and purposes of intelligent life may be" (Dyson, 1979). The scientific revolution removed the sacred from humanity. First, Copernicus, with his heliocentric hypothesis, then Darwin's theory of evolution by natural selection radically challenged humanity's place in the cosmos. However, scientific research, and astrobiology in particular, is now providing data suggesting that humanity's central place in the universe should not be dismissed. In fact, the *Fermi Paradox* and the *Rare Earth Hypothesis* give a reasonable basis for interpreting the evidence from space exploration and direct and indirect observations by astronomers, which support the hypothesis that "we may be the only intelligent species in the Universe." In this paper, I will present some arguments in support of the following theses: 1) the more scientific knowledge advances, the more evidence there is for the hypothesis of *Homo sapiens*'s exclusivity and cosmic importance; 2) the threat of a sixth mass extinction, given point 1, becomes cosmically relevant and supports a cosmic bet in favor of our permanence within the cosmos.

THE CONCEPTUAL FRAMEWORK

Blaise Pascal, the seventeenth-century French philosopher, argued that human beings are at once extremely miserable and extremely significant. We are all destined to die; we are far from being

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omniscient and omnipotent. However, self-awareness and the ability to ponder the puzzling mysteries of the universe make it possible, at least in part, to reverse our predicament (Pascal, 2013).

Today, however, we face a somewhat new predicament. Apart from the ever-present possibility of being wiped out by natural causes (e.g., the impact of an asteroid or the associated explosion of super volcanoes), additional global catastrophic risks arise from the malevolent activities of certain individuals or from the cumulative impacts of actions that are not explicitly intended to devastate the planet. (see Bostrom & Ćirković, 2011). Humans have become a geological force (Cooper et al., 2018) capable of altering ecosystems and affecting the biosphere.

Fundamentally, the scientific revolution has removed the sacred from humanity (Eliade, 1959). First, Copernicus, with his heliocentric hypothesis, then Darwin's theory of evolution by natural selection radically challenged humanity's place in the cosmos. However, scientific research, and astrobiology in particular, is now providing data suggesting that humanity's central place in the universe should not be dismissed (Chon-Torres, 2018). In fact, the *Fermi Paradox* and the *Rare Earth Hypothesis* give a reasonable basis for interpreting the evidence from space exploration and direct and indirect observations by astronomers, which support the hypothesis that we may be the only intelligent species in the universe (see Snyder-Beattie et al., 2021). In this paper, I argue that: 1) the more scientific knowledge advances, the more evidence there is for the hypothesis of human exclusivity and cosmic importance; 2) the threat of a sixth mass extinction, given point 1, becomes cosmically relevant and the possibility that our extinction could be bad *sub specie aeternitatis*[1] should encourage a cosmic bet in favor of our permanence within the cosmos.

THE COPERNICAN PRINCIPLE AND HUMAN CONTINGENCY

At first glance, our position in the cosmos seems to be marginal. Indeed, we are nothing more than a glimmer in cosmic time and space. This unprivileged position is well captured from the *Copernican Principle*. This principle affirms that we are neither central nor privileged within the cosmos (see Scharf, 2014).

In an article published in *Nature* (1993), astrophysicist Richard Gott states that the Copernican Revolution taught us that it was a mistake to assume, for no good reason, that we occupy a privileged position in the universe . . . Our position around an ordinary star in an ordinary galaxy, in an ordinary supercluster of galaxies continues to appear less and less special to us. The idea that we are not placed in a special position has been crucial in cosmology . . . In astronomy the Copernican Principle works because, of all the places where intelligent observers could be, by definition there are only a few special and many non-special places, so you are likely to be among the non-special places. (p. 315)

The Copernican principle arguably suggests that a) we are not central within the universe, b) many non-special places plausibly exist within the universe, and c) other observers may occupy a special place within the universe. This would mean that both the physical and the chemical conditions that allowed the emergence of life on Earth are potentially widespread *in the universe*[2]. However, current data and hypotheses in astrophysics and astrobiology suggest that life is not such a *trivial* phenomenon and that the chances of intelligent life-forms on other celestial bodies might not be so high (Davies, 1995; Webb, 2002). In a sense, we have moved beyond the *inflationary* interpretation of the Drake equation[3], which was optimistic about the presence of evolved civilizations in the cosmos.

THE FERMI PARADOX AND THE RARE EARTH HYPOTHESIS

Advancements in space exploration and astronomical observations, coupled with novel discoveries in the realm of exoplanetology, are unveiling a universe shrouded in obscurity. To date, the extensive exploration has led to the identification of a myriad of celestial entities, yet interactions with extraterrestrial life-forms remain elusive, with no recorded encounters of any kind. The prerequisites for the genesis of life are proving to be increasingly stringent, necessitating specific planetary

dimensions, the existence of an atmosphere and surface liquid water, appropriate stellar dimensions within the planetary system, the optimal size of surrounding planets, and the presence of oxygen, carbon, certain metals, and additional biosignatures (Covone & Giovannelli, 2022). Consequently, as astrobiology continues to amass data on exoplanets, the likelihood of the emergence of life appears to be diminishing (Schwartz, 2018).

The Fermi Paradox and the Rare Earth Hypothesis serve as an exemplary theoretical framework to accentuate this hypothesis of uniqueness. The term "Fermi Paradox" is coined from the renowned Italian scientist Enrico Fermi. It originated from a query he posed in 1950 during an informal conversation with colleagues, asking, "Where is everybody?" He was alluding to the conspicuous absence of any detectable alien communications, a puzzling scenario, considering the incomprehensible expansiveness of the universe (Webb, 2002). Perhaps the most plausible explanation for this cosmic silence is the solitary existence of intelligent life—us—or, due to the astronomical distances involved, the impossibility of ever ascertaining the existence of other intelligent entities throughout the universe.

Milan Ćirković, in his recent scholarly contribution, elucidates three distinct formulations of the Fermi Paradox (FP), termed as 1) ProtoFP, 2) WeakFP, and 3) StrongFP. These formulations are posited to extend well beyond the original conjectures attributed to Fermi (Ćirković, 2018). ProtoFP posits that the conspicuous absence of extraterrestrial entities on Earth is incongruous with the postulated abundance of extraterrestrial civilizations and our prevailing postulations regarding their capabilities (p. 4).

This rendition furnishes a fundamental comprehension of the Fermi Paradox, presenting a perspective that is relatively resilient to empirical falsification. In contrast, WeakFP asserts that "the absence of extraterrestrial entities or their artifacts on Earth and within the Solar System is in conflict with the presumed prevalence of extraterrestrial civilizations and the conventional presuppositions regarding their capacities" (p. 9). It is evident that WeakFP adopts a more sweeping stance than ProtoFP, extending its scope to include both the Earth and the Solar System. This broadened perspective permits the incorporation of a more extensive array of data derived from astrobiological investigations.

StrongFP further extrapolates the parameters set by WeakFP, asserting that "the lack of discernible intentional activities, manifestations, or remnants of extraterrestrial civilizations within our past light cone is irreconcilable with the assumed ubiquity of extraterrestrial civilizations and our established assumptions regarding their capacities" (p. 10). This final formulation extends the purview to encompass the entirety of the observable universe, representing the quintessential Great Silence Paradox. This interpretation postulates a solitary existence for humanity within the cosmos. The universe, under this paradigm, is portrayed as a vast expanse of desolation, a barren and lifeless abyss with but a flicker of existence residing on a pale blue dot (Sagan, 1997).

The Rare Earth Hypothesis is increasingly being adopted by a growing number of cosmologists and astrobiologists as a framework to interpret the data accrued from years of observational research (Ward, Brownlee, 2000). In essence, the Fermi Paradox serves as a representation of the prevailing state of astrobiological inquiry. Thus far, it illustrates a universe in which no signals or indications of extraterrestrial activities have been perceptible to human detection. The Rare Earth Hypothesis posits a plausible explanation for this observed reality, proposing that the existence of planets analogous to Earth—harboring abundant intelligent life—is highly improbable. The emergence of life is contingent upon the presence of numerous biosignatures. As more biosignatures are identified as critical for the genesis of life, the probability of the emergence, and subsequently the existence, of intelligent life on other celestial entities appears increasingly remote.

ARGUMENTS AGAINST EXTINCTION

From the considerations made so far, it seems problematic to state that the disappearance of *Homo sapiens* would not be a bad thing. To stress this point, I start from Benatar's thought that *it would be better never to have come into existence* (Benatar, 2006). To present his perspective, the South

Table 1. Benatar's assessment of human existence

Scenario A	Scenario B
(X exists)	**(X never exists)**
1) Presence of pain (Bad)	**3) Absence of Pain** (Good)
2) Presence of pleasure (Good)	**4) Absence of pleasure** (Not Bad)

African philosopher uses the argument of asymmetry. There is a basic asymmetry between pleasures and pains (between evils and goods). This asymmetry means that the presence of pleasure is good, and the presence of pain is bad. However, a symmetrical consideration does not apply to the absence of pain and pleasure. Whereas the absence of pain is good even if there is no one to experience that good, the absence of pleasure is not bad unless there is someone for whom that absence represents a deprivation.

To clarify his reasoning, Benatar invites us to consider two scenarios (Table 1). In Scenario A, there is an existing X; in Scenario B, an X that has never existed. For the one who has never existed, there is no interest in coming into the world, since existence will never be without pain, and the absence of pain is good. In contrast, the absence of pleasure is not bad unless there is someone for whom that absence represents a deprivation.

Benatar's reasoning is completed by the so-called *Quality of Life Argument* (Benatar, 2017). According to the latter, the quality of human life is lower than most people are willing to admit. Indeed, there are many psychological mechanisms that prevent us from making reliable judgments about the quality of our lives. Among them, Benatar mentions 1) Pollyannaism, 2) adaptation, and 3) comparison. In other words, we are inclined to underestimate the negative aspects of our lives and overestimate the positive ones (the optimism *bias* or Pollyanna effect); we are inclined to adapt to the arrival of adverse circumstances (for example, if we have suffered an injury, after an initial phase in which we judge our situation negatively, we tend, even though the disadvantageous situation *objectively* persists, to adapt); finally, we tend to compare our condition with those who are worse off than us. This bleak picture leads Benatar to assert that the best way to avoid the continuation of our suffering is to stop procreating (anti-natalism) and, by doing so, *push* our species into early extinction.

Now, there are several possible objections to Benatar's arguments. Here I am interested in focusing on one. We ignore whether our existence has any importance[4] from a cosmic perspective. However, our epistemic ignorance *must* prompt us to apply the *precautionary principle*. We do not know what the effects of our extinction might be. It could, as far as we know, decree the termination of the only chance the cosmos has "given itself" for self-understanding. We could be of immense cosmic significance, even if we do not know it.

Now, if we were of immense cosmic significance, the effect of our extinction would be *non-local* and would have tremendous consequences. On the other hand, if we were not of immense cosmic significance and did become extinct, the effect of this extinction would still be a bad thing for our species. Also, if we were of immense cosmic significance and did *not become extinct,* this would certainly be a good thing. So, in comparing these scenarios, we may conclude that *it is better* to bet on our cosmic significance and make any effort to delay our extinction.

THE ARGUMENT OF MORAL EXCLUSIVITY

As far as we know, we are the only living beings capable of moral thinking.[5] Also, we are the only living beings capable of creating values or at least appreciating the (intrinsic or instrumental) value of things. Values are part of the fabric of the universe. The extinction of *Homo sapiens* would imply the disappearance of values as part of the furniture of the universe. Nevertheless, this simple

Table 2. The benefit of human existence

	Human extinction	Human preservation
Sub specie humanitatis[7]	Bad	Good
Sub specie aeternitatis	Not Good (maybe bad)	Not Bad (maybe good)

statement is not sufficient to argue that the demise of values from the fabric of the universe is bad not only for our species but from the point of view of the universe.

We *are a part of the universe*. However, precisely because humanity is part of the universe, and values (including knowledge) are part of the universe's furniture, their disappearance is probably a bad thing, since the universe, in its capacity of self-understanding, self-perceives (through *Homo sapiens*) moral values (including knowledge) as a good to be preserved.

Toby Ord writes in *The Precipice* (2020) that If we are the only moral agents in the universe—the only entities capable of making choices about right and wrong—then the responsibility for the history of the universe rests entirely *with us*. This would also be the only possibility of structuring the universe in the direction of what is right, what is good, what is best for everything. If we fail to do this, then not only the potential of humanity, but of every possible moral action, would be irrevocably destroyed. Conversely, if we are the only entities capable of asking questions about the universe, then we might have ulterior motives for pursuing this kind of knowledge. For it would only be through us that a part of the universe could achieve a full understanding of the laws that govern it. (pp. 53–55)

We could say, not literally, that, through humankind, the universe *thinks about itself* and *develops itself* in a moral direction. So it would seem reasonable to claim that preserving moral values (including knowledge) is good not only *sub specie humanitatis* (which is somewhat self-evident) but also *sub specie aeternitatis*. Indeed, humanity is part of the cosmos, and the cosmos knows itself, as far as we know, in terms of moral values. This must lead us to think that it would be bad for the entire universe if such *elements disappeared from the universe's furniture*[6] (Kahane, 2014).

CONCLUSIONS

The Fermi Paradox, combined with the Rare Earth Hypothesis, implies that life—let alone intelligent life—is a rare occurrence in the vast universe. This suggests that if humanity were to vanish from Earth, something of great value would be lost to the cosmos (Ord, 2020). However, the existence of humanity is precarious; our survival is not guaranteed, given the threats we face from nature and our own actions (Bostrom & Ćirković, 2011).

To reconcile our fragile existence with our perceived cosmic significance, let us explore the Cosmic Bet Argument. Let us imagine a scenario where a galactic entity offers us a cosmic wager, with the existence or extinction of our species at stake. I would argue that it is wiser to bet on our continued existence (Lo Sapio, 2022). From our perspective, it is beneficial for us to survive, and from a universal standpoint, our extinction would be, at the very least, not good (perhaps bad). Moreover, the moral implications of its potentially being disastrous make it reasonable to prefer our survival (see Table 2).

Indeed, there is a significant chance that we might be the sole bearers of intelligence in the universe, reinforcing the importance of our continued existence (Sagan, 1997).

Moreover, one could postulate that our perspective is congruent with the all-encompassing viewpoint of the universe. Consider a scenario where, within a collective of entities, a singular entity possesses a unique perspective. If we adhere to the premise that we are observing a collective and discern that within this collective, only one entity holds a perspective, it is logical to deduce that the collective's viewpoint is synonymous with, or is articulated by, that individual entity. The universe is essentially a compilation of every individual and each constituent part thereof. Hence, if within

the universe, a segment of it—humanity, in this instance—possesses a perspective, it can be inferred that this perspective is reflective of the universe's overarching viewpoint.

This conceptualization impels me to assert that our cosmic obliteration would equate to the loss of a uniquely invaluable and singular segment of the universe. The deductions drawn herein could pave the way for an anthropic renaissance, in which the realization of our transitory existence is counterbalanced by a rejuvenated comprehension of our position within the cosmic expanse (Lo Sapio, 2022).

COMPETING INTERESTS

The author of this publication declares that there are no competing interests

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REFERENCES

Benatar, D. (2006). *Better Never to have been: The harm of coming into existence*. Oxford University Press. 10.1093/acprof:oso/9780199296422.001.0001

Benatar, D. (2017). *The human predicament: A candid guide to life's biggest questions*. Oxford University Press. 10.1093/acprof:oso/9780190633813.001.0001

Bostrom, N., & Ćirković, M. M. (2011). *Global catastrophic risks*. Oxford University Press.

Chon-Torres, O. A. (2018). Astrobioethics. *International Journal of Astrobiology*, *17*(1), 51–56. 10.1017/S1473550417000064

Ćirković, M. M. (2018). *The great silence: The science and philosophy of Fermi's paradox*. Oxford University Press.

Cooper, A. H., Brown, T. J., Price, S. J., Ford, J. R., & Waters, C. N. (2018). Humans are the most significant global geomorphological driving force of the 21st century. *The Anthropocene Review*, *5*(3), 205301961880023. 10.1177/2053019618800234

Covone, G., & Giovannelli, D. (2022). Stellar metallicity is a key parameter for the search of Life in the Universe. Advance online publication. ArXiv. arXiv:2207.03748

Davies, P. (1995). *Are we alone? Philosophical implications of the discovery of extraterrestrial life*. Basic Books.

Dyson, F. J. (1979). Time without end: Physics and biology in an open universe. *Reviews of Modern Physics*, *51*(3), 447–460. 10.1103/RevModPhys.51.447

Eliade, M. (1959). *The sacred and the profane: The nature of religion*. Houghton Mifflin Harcourt.

Gott, J. R.III. (1993). Implications of the Copernican principle for our future prospects. *Nature*, *363*(6427), 315–319. 10.1038/363315a0

Kahane, G. (2014). Our cosmic insignificance. *Noûs (Detroit, Mich.)*, *48*(4), 745–772. 10.1111/nous.1203025729095

Lo Sapio, L. (2022, October 11). The ethics of astrobiology: Humanity's place in the cosmos and the extinction problem. *Frontiers in Astronomy and Space Sciences*, *9*, 9. 10.3389/fspas.2022.1008265

Ord, T. (2020). *The precipice: Existential risk and the future of humanity*. Hachette Books.

Pascal, B. (2013). *Blaise Pascal thoughts: Selected and translated*. Cambridge University Press.

Sagan, C. (1997). *Pale blue dot: A vision of the human future in space*. Ballantine Books.

Scharf, C. (2014). *The Copernicus complex: The quest for our cosmic (in)significance*. Penguin.

Schwartz, J. S. J. (2018). *The Ethics of space exploration*. Springer.

Snyder-Beattie, A. E., Sandberg, A., Drexler, K. E., & Bonsall, M. B. (2021). The timing of evolution transitions suggests intelligent life is rare. *Astrobiology*, *21*(3), 265–278. 10.1089/ast.2019.214933216655

Spinoza, B. (1677).. . *Ethics*, *II*, ●●●. https://faculty.umb.edu/gary_zabel/Courses/Spinoza/Texts/Spinoza/build3.htm#TOP?/gary_zabel/Courses/Spinoza/Texts/Spinoza/ethcnt1.htm

Ward, P., & Brownlee, D. (2000). *Rare Earth: Why complex life is uncommon in the universe*. Copernicus Books. 10.1007/b97646

Webb, S. (2002). *If the universe is teeming with aliens…WHERE IS EVERYBODY?* Fifty solutions to the Fermi paradox and the problem of extraterrestrial life. Copernicus Books.

Weinberg, S. (1977). *The first three minutes*. Basic Books.

ENDNOTES

1 "*Sub specie aeternitatis*" is a Latin phrase meaning "under the aspect of eternity." It is a philosophical concept often associated with the works of Baruch Spinoza, and it refers to viewing things from the perspective of their significance in the grand scheme of eternity, rather than their fleeting roles in the temporal world. It is a lens through which one can achieve a sense of perspective, detaching oneself from immediate circumstances and considering the timeless or universal context. See Proposition 44 in Spinoza's *Ethics, II*.

2 This, by the way, was one of the reasons behind SETI's search for extraterrestrial life.

3 Drake's equation, first presented in 1961, at the Green Bank meeting, was based on elaborate conjectures about the number of planets in the galaxy, the percentage of those that could harbor life, and the percentage of planets on which life could not only develop but also evolve into complex civilizations. Using the best estimates of the time, Drake concluded that intelligent life should be widespread and common in the galaxy and that since our galaxy is but one of hundreds of billions of galaxies in the universe, the number of intelligent alien species would reach enormous numbers. The Drake equation is as follows: **N = R * - fp - ne - fl - fi - fc - L N** = *The number of detectable civilizations in our galaxy. This is the number that the equation is trying to find*. **R *** = *The appropriate speed that stars have for the development of intelligent life and are forming*. **fp** = *The fraction of those stars that have solar systems*. **ne** = *The number of planets in each solar system that could support life*. (Note that the number N is being reduced little by little.) **fl** = *The fraction of those habitable planets that actually contain life*. **fi** = *The fraction of those living planets that actually have intelligent life*. **fc** = *The fraction of intelligent civilizations that develop technology that releases visible signs of their existence in space*. **L** = *The time period in which those signals were transmitted*. This interpretation has, however, been challenged, since the interpretation of the equation includes implicit assumptions that are not at all obvious and, above all, since it assumes that once life has originated on a planet, it must necessarily evolve into complex forms, culminating in the development of civilizations (see Ward & Brownlee, 2000, pp. XVII-XVIII).

4 By "importance" I mean here the ability to transcend oneself, leave a trace, be significant, relevant, etc.

5 By "moral thinking" I mean the ability to make judgements about states of affairs in the world according to the categories of good and evil, right and wrong, as well as the ability to attribute values to specific states of affairs in the world (people, actions, etc.).

6 The picture would change if other life-forms were discovered in the universe, and even more so if these life-forms were comparable to *Homo sapiens*. Indeed, should this hypothetical scenario be true, the cosmic importance of *Homo sapiens* would diminish, and the insights discussed here would need significant revision.

7 Meaning "under the aspect of humanity." It is less common than "*sub specie aeternitatis*," but it is used in a philosophical or sociological contexts to suggest a perspective that emphasizes the commonality of the human experience and the shared characteristics of humanity. From this viewpoint, individual differences are de-emphasized in favor of an emphasis on universal human traits and conditions. This can serve as a lens to better understand and explore human behavior, morality, and shared experiences.

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