Mind Uploading and the Question of Life, the Universe, and Everything

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Abstract

Mind uploading is most often motivated by individual life extension. Other benefits and motives are generally considered only with secondary priority. We propose an alternative primary motive for pursuing mind uploading technology, that of perpetuating fundamental metaphysical purpose in the universe by preserving conscious minds from whom such purpose must derive. This approach lends the field of mind uploading—both scientific and philosophical—greater credibility by substituting grand civilizational goals for mere personal goals. Furthermore, this approach illuminates what should be the single greatest existential concern of any civilization and its conscious members: determining and then maintaining universal purpose over cosmological timespans.

Introduction

One of the most popular reasons to pursue *mind uploading* (MU) (Wiley 2014) technology is the desire for individual life extension, i.e., to mitigate otherwise inevitable impending biological death. Other reasons include enhancing intelligence, expanding the range of human experiences, curing neurological and psychological diseases, or enabling virtual reality with an otherwise biologically unachievable verisimilitude, but in truth, most introductions to the topic emphasize life extension. To some audiences, individual life extension may sound narcissistic and/or dismissive of more prosaic problems, like poverty. Additionally, when poorly presented, the topic can invoke fears of unequal access. While counterarguments can be raised against such concerns, another approach is to offer a different primary reason in the first place. As reasonable as it may be to empower people over their own death, such a goal does not implicitly serve any grander ambition, such as advancing civilization. A complete philosophy of life and of humanity should include such far-reaching aspirations.

Toward that end, we offer a more monumental reason for the necessity of MU: that it is an essential stepping stone not only in establishing humanity's long term survival, but in guaranteeing that humanity, the universe, and even existence, all have a fundamental *metaphysical purpose*, essentially the cosmological extension of the individual notion of *meaning of life*.

Metaphysical Purpose

In physics, the *standard model* includes the notion of fundamental particles and forces. The term *fundamental* implies that such particles and forces cannot be reduced to, or explained by, lower causal phenomena. They are essentially axiomatic to physical reality. In metaphysical

philosophy, a similar concept is *purpose*: an independent, first-cause-like, inexplicable *motive* or *reason for being* that underlies some entity's existence, say that of a person, a civilization, a species, a cosmic locale (planet or galaxy), or the entire universe. Purpose might even apply to the abstract notion of reality (the fact that anything exists in the first place). This idea is also jocularly recognized in Douglas Adams' *Ultimate Question of Life, the Universe, and Everything* (Adams 1979), from which we adapted this paper's title, and is captured by deep introspective questions such as "*What is my purpose in life?*" or "*What is the meaning of life?*". We propose that it is possible to define at least a partial form of fundamental metaphysical purpose, that of preserving conscious minds, and then further prescribe certain priorities stemming from that purpose, namely developing computerized intelligence (CI), either in the form of MU, or artificial intelligence (AI), or augmented intelligence (AugI) (in which the brain benefits from neuro-computational prostheses; in the limit, AugI would essentially converge on full MU).

Extinction vs. Existential Risk

This paper's primary point comes down to avoiding either human extinction or other outcomes practically as bad as extinction. Extinction refers to the total vanishment of all members of a species. Comparably deleterious outcomes other than extinction are generally known as *existential risks* (Bostrom 2014). This article uses both terms somewhat interchangeably. Outcomes that may not represent extinction in the short term can be interpreted as delayed extinction in the long term. Examples include an unrecoverable collapse of our energy infrastructure (say if we deplete accessible fossil fuels before using the last reserves to power a transition to alternatives) or a ravaging by climate change that renders advanced civilization unrestorable. By failing to preserve a functional civilization, we are most likely dooming ourselves at a later time. Consequently, the distinction between extinction and existential risk is not crucial to the issues this article addresses.

Computerized Intelligence

In this article we frequently refer to *computerized intelligence*. This term indicates any of MU, AI, or AugI wherever one is not required over the others in a particular statement. However, MU generally offers the best advantages to the topics under consideration. MU and AugI can carry our individual selves forward, whereas AI does not preserve personal identity; one's values and desires must be handed off to the next generation of minds.

Additionally, MU and AugI more effectively preserve the human condition, i.e., the uniquely human way of being intelligent and sentient. While AI developed on Earth is likely to better reflect human psychology than AI developed by extraterrestrial species, it is nevertheless further removed from humanity than MU or AugI. AI therefore does not maintain humanity's metaphysical purpose as effectively as the other two.

On the other hand, MU and AI offer a different advantage, namely facilitating space travel, a crucial point of the argument we present in this paper. Since AugI has one advantage, AI has another, and MU has both, MU is the focus of this article.

The Argument

Overview

We first present the argument in broad strokes and then examine each point in greater detail later. Each point is either a premise (marked with a 'P') or a conclusion from earlier points (marked with a 'C'). Here is the simplest presentation of the entire chain of reasoning.

Consciousness Underlies Purpose

(P1) Consciousness is the only phenomenon that grants or supports metaphysical purpose
- Corollary: Metaphysical purpose is confined to a species' light-cone

(P2) Most intelligent species develop mind uploading and artificial intelligence early in their technological evolution

(C3) From P2: Most intelligent species develop mind uploading and artificial intelligence before interstellar travel

(P4) Interstellar travel is incredibly difficult in biological form

(C5) From C3, P4: Computerization of minds significantly simplifies interstellar travel

(C6) From C3, C5: Biological interstellar travel is economically irreconcilable in the face of an alternative computerized option

Rare Intelligence

(C7) From P2, C5: The most likely solution to the Fermi Paradox is that technological species are extremely rare

(C8) From C7: We are all but alone in the galaxy

Human Responsibility for Purpose

(C9) From P1, C8: Humanity is responsible for consciousness, and by extension for purpose, in our galaxy

(C10) From C9: Avoiding human extinction is even more important than might be commonly acknowledged

(P11) Single-planet species face serious extinction risks

(C12) From P11: Even single-solar-system species still face unacceptable extinction risks

(C13) From P11, C12: We must spread out on interstellar scales to alleviate the single point of failure aspect of extinction risks

(C14) From C5, C6, C10, C13: We must develop computerized intelligence to enable interstellar colonization to avoid extinction to preserve metaphysical purpose

(C15) From P1, C14: Developing computerized intelligence is amongst the most important goals of our civilization

Figure 1 summarizes the argument, with premises indicated by sharp-cornered boxes, conclusions indicated by round-cornered boxes, and implications between boxes indicated with arrows.

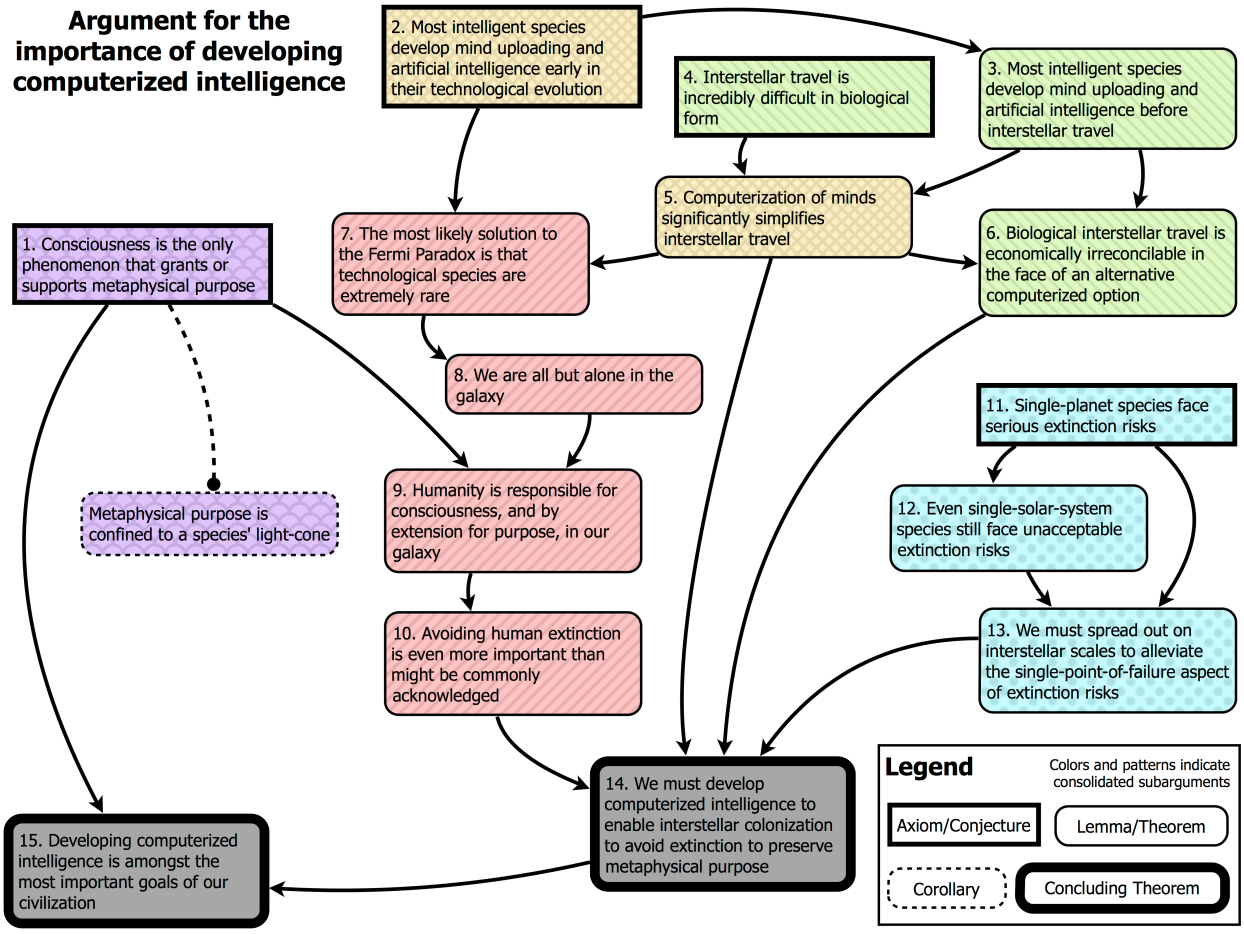

Figure 1. This figure presents the argument for the importance of developing computerized intelligence in the form of a theorem of sorts. Initial claims (axioms) propagate lines of reasoning through intermediate claims to the two concluding statements at the bottom. This figure is essentially synonymous with the version of the argument presented in the text in list form.

Argument with Brief Explanations

In this section, each point of the argument is offered with a brief explanation. Later, some of the points are scrutinized in greater detail. Additionally, later sections consider how the overall argument would be affected if individual points were weakened or entirely negated. Note that references are minimal in this section, the bulk being left to the later discussion.

1. ***Consciousness is the only phenomenon that grants or supports metaphysical purpose***
   We propose that it is axiomatic that consciousness is essentially the only phenomenon that can grant *metaphysical purpose*. Without consciousness, purpose can't exist or occur. Physical events may transpire. They may yield complex cosmology, and eventually chemistry and biology. These phenomena may easily occur without necessarily producing consciousness, but by failing to achieve that last milestone, there is no *fundamental* purpose to any of it. Others have made similar claims, such as when Camus wrote "*For everything begins with consciousness and nothing is worth anything except through it.*" (Camus 1961)

   Some readers might object that it is only our opinion that there is some fundamental purpose, or what actions such a purpose might require of us, but that misses our point. We are not prescribing what the fundamental purpose is in the first place. We are not even necessarily arguing that such a purpose must definitely exist. Rather, we are arguing that *if* there is some grand universal purpose then consciousness is a prerequisite for it because purpose can only occur in the presence of conscious minds and experience. In this way, we can argue that the preservation of consciousness is an essential goal in that any *hypothetical* purpose requires it, even as we leave the question of establishing *what* that purpose is open for future generations.

   Metaphysical purpose can apply to subjects at various scales. It may apply to individual people (consciousness gives a person genuine purpose in a particular way that an unconscious entity can never possess). Purpose may apply to civilizations or species (a society's or a species' purpose arises from the conscious experiences of its members, or those of external individuals whom its actions affect). It may apply to locales (nations, planets, solar systems, galaxies, etc., or to the entire physical universe). Finally, consciousness can grant purpose to the bare notion of physical existence (the fact that reality exists at all). In this last case, do not confuse purpose with explanation. Physics and cosmology (to say nothing of religion) have long sought explanations for why and how the universe or spatiotemporal reality exist (Hawking & Mlodinow 2010, Krauss 2012), but that is a separate topic from the question of *what it's all for*, i.e., its purpose, if any.

   To be clear, entities listed above which are larger than an individual aren't necessarily conscious themselves. Rather, the presence of conscious beings bestows purpose to these larger entities through their conscious experiences. In this way, we may speak of a civilization's or a galaxy's purpose as it derives from the experiences of its members or the recipients of its members' actions. Consequently, a universe devoid of consciousness beings

is also devoid of purpose. Likewise, a galaxy that does not harbor conscious beings, or influence them from afar, lacks purpose.

- Corollary: ***Metaphysical purpose is confined to a species' light-cone***
  At best, an entity's purpose cannot exceed its light-cone, the space-time volume that represents its maximum temporal and spatial causal reach. We may refer to the actual achieved reach as the *purpose-cone* (or perhaps *causal-cone*), the spatial locales and regions of time during which an entity (e.g., a species) has causal impact (which can include artifacts that outlast the entity's lifetime to affect the conscious experiences of future minds).

2. ***Most intelligent species develop mind uploading and artificial intelligence early in their technological evolution***
   Virtually all intelligent species probably develop CI (any of MU, AI, or AugI) quickly relative to cosmological and evolutionary timescales. For example, assuming the dawn of agriculture reasonably demarcates humanity's dawn of intelligence, then it appears that we will likely achieve CI within a few millennia from that starting point, a cosmological and evolutionary blink of an eye.

   It is admittedly difficult to prove that most intelligent species will develop in a similar way since we have only our own history to inform on the matter. However, it is reasonable to apply a mediocrity principle: humanity should not represent an unnecessarily special case of the progression of intelligence—*once intelligence has arisen in the first place*. The caveat admits that humanity has already violated mediocrity amongst the pantheon of Earthly species, but from the set of hypothetical species that *do* reach the intelligence threshold, we should not unreasonably expect humanity to be special in any further way. Nonmediocrity applied to human history suggests that once intelligent species arrive and begin to apply their intelligence in cultural and technological ways, they are only a few thousand years away from full CI.

3. ***Most intelligent species develop mind uploading and artificial intelligence before interstellar travel***
   Not only does P2 claim early development of CI, but we have argued elsewhere that most species probably develop CI before developing interstellar travel (Wiley 2011a), an argument that will not fit here.

   Consequently, considerations of, or planning for, biological interstellar travel may be poorly aimed enterprises at best, and worse, may distract us from the more likely scenario of computerized interstellar travel. In the worst case, such distractions could jeopardize the more likely scenario due to misappropriation of resources. In that way, we could become trapped in this solar system or on Earth, an outcome which P11 and C12 will show to increase our existential risk.

4. ***Interstellar travel is incredibly difficult in biological form***
Speculative proposals for biological interstellar travel are difficult to rationalize. They generally take one of three forms: embryonic or genetic seeds, generation ships, and suspended animation (Crowl et al. 2012, Griggs 2014, Hein et al. 2012). The first option barely maintains our own civilization in the first place. New-born humans, raised by nanny-like AI and robotics, will lack a familial connection to their progenitor civilization. Admittedly, if we had no better option, we would pursue this one, but CI *is* that better option. Besides, the AI that would raise such new-borns would likely require a human level of intelligence to accomplish its parental tasks, which leads directly back to C3 (i.e., that AI must precede embryonic or genetic seed interstellar travel, thus undermining the motive for such a venture ala C6 below).

The second option, generation ships, is not practical. Despite being a popular science fiction trope, both the technical and the psychological challenges are virtually insurmountable. Even if one of those two challenges could be solved, the other might remain prohibitive, and if both challenges could be solved, this method would still likely arrive after the other two solutions (embryonic seeds and suspended animation) since it is the most technically challenging. Will we really forego embryonic seeds and/or suspended animation while we wait for generation-ship technology to mature?

The third option, suspended animation, offers the best mixture of the other two. It would maintain a direct, cultural connection to the home-world's civilization while at the same time would simplify both the technical and psychological mission requirements. However, C5 below, undermines any point in pursuing biological interstellar travel anyway. We have expanded on this argument elsewhere (Wiley 2011a, Wiley 2011b).

5. ***Computerization of minds significantly simplifies interstellar travel***
Assuming C3 and P4, then once a species' minds and bodies become computerized (MU or AI) and robotified, interstellar travel becomes much easier compared to its biological alternatives. In computerized and robotic form, galactic colonization should be completed in a few million years (Hart 1975, Jones 1981, Kurzweil 2005, Tipler 1980, Wiley 2011b).

While one might respond that AI is not a meaningful replacement for biological interstellar travel since it doesn't preserve personal identity, this reasoning does not apply to MU or AugI (Wiley 2014). Of the two, MU is much stronger. MU and AI have the advantage of full computerization, thereby facilitating space travel, while MU and AugI have the advantage of preserving human-like cognition and even personal identity, but only MU offers both advantages.

6. ***Biological interstellar travel is economically irreconcilable in the face of an alternative computerized option***
From C3 and C5 we conclude that even if biological interstellar travel is technically feasible,

there is still no point in pursuing it since computerized interstellar travel is significantly easier and will likely be available sooner than interstellar travel.

7. ***The most likely solution to the Fermi Paradox is that technological species are extremely rare***
   P2 and C5 combine into a serious challenge to the Fermi Paradox, the conundrum that we don't see pervasive signs of intelligent life elsewhere in the cosmos. Quite simply, they should have already arrived here, in our very own solar system. In fact, such arrivals should have occurred numerous times over the millennia and should be continually occurring on a regular basis. The literature is replete with considerations of the Fermi Paradox. Many proposals attempt to salvage extraterrestrial intelligence from the paradox, while others favor the conclusion of a scarce distribution of intelligence. We cannot possibly give the field sufficient coverage here, but offer an expanded discussion later. Furthermore, we have written a comprehensive paper on the matter that we encourage curious readers to consider (Wiley 2011b).

8. ***We are all but alone in the galaxy***
   From C7 we conclude: that humanity represents a staggeringly rare occurrence of intelligence. We may be one of the only intelligent species in our galaxy.

9. ***Humanity is responsible for consciousness, and by extension for purpose, in our galaxy***
   From P1 and C8 we conclude: that humanity may be almost exclusively responsible for consciousness and metaphysical purpose in our corner of the cosmos.

10. ***Avoiding human extinction is even more important than might be commonly acknowledged***
    From P9 we conclude: that it is therefore crucial that we neither go extinct nor whither into some perpetually unrecoverable state (Bostrom has considered how various forms of dilapidation might compare or contrast with full extinction (Bostrom 2002)). We must not only survive, but we must grow such that our purpose is realized to an ever-greater extent over the expanse and timeline of the universe.

    It could be argued that such reasoning is unnecessary. After all, we already have a strong motivation to avoid extinction for fairly conventional reasons. But C9 vastly increases our cosmic responsibility. We owe it not only to ourselves, but to the local cosmos, and potentially to the entire universe, to insure that Earth's legacy (and by extension the universe) maintain consciousness so as to maintain purpose. Maintaining grand fundamental purpose is the highest priority of the universe and of existence, and the only way to do that is to maintain consciousness, i.e., to avoid extinction.

11. ***Single-planet species face serious extinction risks***
    We face numerous existential risks while we remain confined to a single planet. Hawking, Musk, Sagan, Griffin, Tipler, Tyson, Roddenberry, Zubrin, and Davies have all emphasized the importance of spreading human civilization beyond Earth to protect against localized

single-planet extinction risks (Andersen 2014, Davies 2004, NASA's 2005, Roddenberry 1981, Sagan 1994, Shiga 2008, Tipler 1993, Tyson 1994, Zubrin 2000). Likewise, the presence of organizations such as the Centre for the Study of Existential Risk at Cambridge, the Future of Humanity Institute at Oxford, and the Lifeboat Foundation illustrate that this is a problem some people take seriously. Admittedly, some of these groups focus on whether the development of AI is itself the biggest risk. We address such concerns below.

The largest categorical distinction might be between nonanthropogenic risks (natural disasters) and anthropogenic risks, those arising from human civilization and industry (a third category might be threats from other galactic civilizations (xenogenic risks), but due to C8 we are not concerned about such threats). Another way of conceptualizing risks is Bostrom's four categories: bangs, crunches, shrieks, and whimpers (Bostrom 2002). With regard to the focus of this article, these distinctions don't matter too much, except where methods of avoidance might differ, but practically across the board all risks are addressed by C13, the proposed solution of spatially distributing humanity among the local cosmos.

12. ***Even single-solar-system species still face unacceptable extinction risks***
Some of the risks indicated in P11 are only partially mitigated by spreading to nearby locales, like Mars (or elsewhere in our solar system). For example, some natural risks are broad enough to strike the solar system all at once, such as gamma-ray bursts and to a lesser extent coronal mass ejections. Alternatively, a much greater concern is anthropogenic risks. An Earth-Mars civilization would be only slightly more protected against such hazards than an Earth-only civilization. Self-destructive ideas easily spread memetically between societies that maintain regular contact and/or travel. One example is stultifying or openly self-harmful religious ideologies. Another example is various forms of socio-political strife, in which factions on various sides of a disagreement may be spread throughout the solar system such that a large conflict could encompass the entire system.

13. ***We must spread out on interstellar scales to alleviate the single point of failure aspect of extinction risks***
From P11 and C12 we conclude: that we must embark on interstellar colonization to set up relatively isolated interstellar societies. The more such colonies we establish, and the further they are spread throughout the galaxy, the better will be our protection against extinction over cosmological timescales.

14. ***We must develop computerized intelligence to enable interstellar colonization to avoid extinction to preserve metaphysical purpose***
From C5, C6, C10, and C13 we ultimately conclude: that we must therefore pursue CI, so as to facilitate interstellar travel, in order to protect against extinction, thereby guaranteeing that humanity (or consciousness in general) survives in the galaxy and grants the galaxy conscious metaphysical purpose, specifically purpose of the sort that a galaxy lacking conscious beings could never express.

15. ***Developing computerized intelligence is amongst the most important goals of our civilization***
    From P1 and C14 weI conclude: that developing CI is the one of the highest priorities of our civilization.

Summary

Developing the technologies of CI, preferably MU although perhaps AI or AugI as well, is nearly the most important goal of our civilization. Notably, this line of reasoning makes no mention of the more common and unrelated reason for pursuing MU, that of extending individual lifespans. That is a personal goal, not a grand universal goal. We are concerned with insuring that the universe, reality, and existence preserve fundamental purpose. This goal is met by maintaining consciousness in the form of conscious beings who escape extinction and maximize their conscious experiences. We are further concerned with insuring that humanity retains its share of that purpose by preserving our species against extinction. The alternatives, that the universe and existence could lose ultimate purpose at a needlessly early cosmic hour, or that humanity might fade into obscurity, are too horrible to bare and cannot be allowed to transpire.

Possible Challenges to the Argument

We have presented an argument which suggests that humanity should take responsibility for the metaphysical purpose of the universe and even for the purpose of existence itself. From that argument, we have concluded that developing CI is essentially the premiere goal of our civilization since it directly facilitates, and furthermore is a veritable prerequisite for, that responsibility. We now consider possible challenges to the argument, as well as the implications for the final conclusion should any individual steps and their lines of reasoning be successfully weakened or negated.

C3: Implications if Interstellar Travel Precedes Computerized Intelligence

C3 is an important early step of the argument. We have presented it with only a weak relation to P2, relying primarily on external references for its support, namely our previous article on the central topic of C3. Furthermore, its line of reasoning follows multiple paths to the conclusion in C14, and therefore its diminishment could significantly weaken the overall argument.

If interstellar technology (propulsion, navigation, component maintenance over long mission lifetimes, etc.) matures before CI, then we are unlikely to postpone our initial interstellar voyages on the expectation of eventual CI. Given the opportunity, we would likely embark in biological form without waiting for CI.

For brevity, we cannot present our argument on C3 in the same depth as our existing publication on the same topic (Wiley 2011a). We encourage curious readers to see that paper for our full analysis.

P4, C6: Implications If Biological Interstellar Travel is Feasible

There is a history of agreement with aspects of P2 through C6. For example, Bradbury, Cirkovic, Dvorsky, Shostak, Dick, Davies, Rees, and Schneider have all expressed the idea that most intelligent species will transition from biological to computerized and robotic form before venturing into the galaxy (Bradbury et al. 2011, Davies 2010, Dick 2006, Rees 2015, Schneider 2015 (forthcoming), Shostak 2009). However, it remains a minority viewpoint in the public eye, as evidenced by the majority of science fiction and general speculation on extraterrestrial encounters. Even the DARPA/NASA *100 Year Starship* project, an ongoing series of grants, conferences and symposia, prominently features human interstellar travel (DARPA & NASA 2011-2015 (ongoing)), although one might credit them for simply leaving all options on the table.

What if human interstellar travel is ultimately feasible? For example, what if P4 is somehow alleviated and if C6 is consequently weakened due to its reliance on P4? A diminished C6 might enable us to pursue later conclusions (P10 and P13) without the need for CI.

Notice that while weakening P4 does influence C5, C5 remains compelling from its other dependency on C3. Even if biological interstellar travel is feasible, the computerized alternative presented in C5 is still likely to be a net gain. Put differently, it is hard to imagine how interstellar travel could be explicitly *harder* in computerized form than in biological form. So, if CI arrives first, ala C3, biological methods remain economically impractical.

In order to fully obviate C6 we must weaken both C3 and C5 and do so enough to actually *undermine* the claim in C6, not just weaken it. We would have to conclude that biological travel is still viable *even in the presence of CI*. Consequently, assuming both methods are available, merely weakening P4 or C6 a little bit shouldn't impact the overall argument.

C7, C8: Implications If Intelligence is Actually Common

People frequently disagree with C7 and C8, the stance on the Fermi Paradox that intelligence is astoundingly rare in our galaxy (and the cosmos in general). To be clear, we are not making the strong claim that humanity is unique in the universe—merely that minds with human levels of versatility are far less common than is frequently assumed (others have reached similar conclusions similar, e.g. (Crawford 2000, Hart 1975, Kurzweil 2005, Paul & Cox 1996, Tipler 1980, Ward & Brownlee 2000, Webb 2002); see also our (Wiley 2011b) technical paper for a deeper analysis.

Nevertheless, what if this claim is in error and there are reasonable solutions to the Fermi Paradox which permit a veritable cornucopia of intelligent and conscious species? Although few intelligence-optimistic responses to the paradox withstand critical scrutiny (Webb 2002), some responses are better than others. The transcension hypothesis (Smart 2012) is a tantalizing example (although like essentially all intelligence-optimistic responses, it faces the non-

exclusivity problem (Dvorsky 2007), namely that it must apply to practically every intelligent species to arise in the cosmos—or at least in our galaxy—to resolve the paradox).

How might an intelligence-abundant cosmic state impact the overall argument? It would admittedly salvage metaphysical purpose on universal scales, since it would provide a plethora of conscious beings, civilizations, and species to carry the torch of purpose, thereby lessening our burden in that respect—but perhaps we have additional goals. Perhaps our desire should not merely be that purpose survive *at all*, but furthermore that humanity have the opportunity to play an active role in that purpose. Thus, not only might the universe preserve purpose through consciousness, but so may humanity preserve its little slice of purpose as well.

Assuming one agrees that purpose should survive, it is entirely reasonable that humanity have some influence over that grand purpose. We can extend this reasoning to individuals. Although our primary goal is to offer an alternative to individual life extension as the common motive for mind uploading, one reason a person might nevertheless wish to remain alive is to claim his or her metaphysical purpose, to put his or her stake in the sand and proclaim "*I was here, and my life had a nonzero impact on the fate of the universe!*" In this way, each person can play a causal role in cosmic destiny.

P11, C12: Implications if Extinction Risks Are Exaggerated

Some people might claim that P11 and C12 are based on an unfounded premise, that human extinction or obsolescence is not a serious risk in the first place. Of those who do agree it is unacceptably risky, many may not feel that settling Mars offers sufficient protection. While some risks could not easily spread beyond Earth (e.g., asteroid impacts, climate change, etc.), other natural risks could threaten the entire solar system in one fell swoop, such as gamma-ray bursts, nearby supernovae, or unfortunately aimed and spectacularly energetic coronal mass ejections. Admittedly, these risks present fairly low probabilities, and one might argue that we can dismiss them—but only to an approximation.

The most dangerous extinction risks may be anthropogenic. A war on Earth could easily spread to other sites where the local population might take sides over the same disagreements. Self-destructive or stagnating memes, such as fundamentalism, disenfranchisement, or xenophobia could infect nearby societies. In fact, doing so would be the hallmark of an effective meme as Dawkins originally coined the term (Dawkins 1976). Some risks might even explicitly attempt to spread. For example, and with an irony that is not lost in the context of this article, a malevolent AI might intentionally attack targets not only on Earth but elsewhere in the readily accessible solar system. We address this later. These risks, which could infect the entire solar system, heighten the need to spread on interstellar scales. And lest the reader extend this reasoning to the risk of interstellar invasions, thereby undermining the point of interstellar dispersal, we have argued elsewhere that this is unlikely with our theory of *interstellar transportation bandwidth* (Wiley 2011b), which claims that there are significant resource and capability bounds on the ability of cosmically distant societies to affect one another.

However, perhaps none of these dangers truly pose existential risks in the first place and P11 and C12 are just fear-mongering over mere nuisances, not serious risks. In response, we must consider cosmological timescales. The issue of concern is not limited to the next century or even the next millennium. This article is about protecting *universal* metaphysical purpose. We must insure the maintenance of consciousness for as long as the universe can physically support: millions, billions, or potentially even trillions of years. Many readers will simply balk at such spans of time; the concerns of a future so distant can seem totally impenetrable. But that is the nature of universal purpose. To take it seriously, we either embrace it in its full extent or we miss the point entirely. As a popular adage says, extinction is forever.

Some might claim that the obscure concerns of a far flung future are not our problem. While we certainly would not presume to advise those sages who will arise in the adolescence of the universe; our present time nevertheless represents a critical bottleneck, quite possibly one of Robin Hanson's popularized *great filters* (Hanson 1998). Our current single-planet era is terrifyingly precarious. Our time has one responsibility to the future above all others: solving the single point of failure problem to insure there *is* a future at all. We do not have to worry about how civilization will pass its time in a billion years, but we do have to give that future the best possible chance of actually coming to pass.

With the realization that cosmological spans of time are central to the issue, the only conclusion is that we must take minuscule extinction risks seriously. From this realization, it follows that we cannot dismiss P11 and C12 unless we can essentially erase their associated risks. The best way to thoroughly mitigate existential risks is to spatially spread apart as far as possible. Remaining in a single solar system, much less confined to a single planet, is a recipe for extinction on sufficiently long timescales.

P11, C14: Additional Existential Risks Introduced by Pursuing Computerized Intelligence

A popular concern is that AI (and perhaps MU and AugI although they are discussed less frequently with respect to this particular threat) could itself pose a significant existential risk. This concern has received considerable attention in Hollywood depictions and has enjoyed a recent resurgence from futurists such as Joy, Musk, Hawking, Gates, Bostrom, and Russell (Bohannon 2015, Bostrom 2002, Bostrom 2014, Joy 2000, Mamiit 2015). By such reasoning, pursuing the prescription in C15 (a call for the development of CI), could actually exacerbate P11, or possibly even C12. Despite the advantage of alleviating single-planet and single-solar-system extinction via interstellar colonization, might we be better advised to avoid the risks associated with CI?

A capitalistic, if somewhat cynical, response is that any state or nation that foregoes CI positions itself badly in the global market. Short of a world-spanning hegemony to enforce a prohibition against such work, it seems futile for one society to voluntarily cede that work to another. Some degree of vigilance is to be encouraged of course. Our argument is not against any reasonable caution, but rather against giving into petrifying fears. Since CI is critical to long term survival

for the reasons we have presented, we must move forward, even as we acknowledge and take account of the challenges CI may pose.

Another response to fears that CI actually increases existential risk emphasizes the primary motive of this article: to protect against all the *other* existential risks. CI abstinence will actually imperil us in the long run. Sequestering ourselves on a single planet or within a single solar system out of fear of CI doesn't just fail to address all the other risks, it explicitly exacerbates them by compounding the single riskiest factor: our single point of failure. Eventually, calamity will strike any localized civilization. If CI is a prerequisite for interstellar travel, then it must be given sincere consideration despite its risks.

The reasonable prudence recommended by most of the speakers listed in the first paragraph of this section is usually overlooked in editorial summaries (as evidenced by the fact that Cameron and Hurd's Terminator is the prevailing accompanying image for such editorials). Having realized that his own words were being used in arguments against CI progress, Bostrom has clarified that he does in fact intend that CI be pursued (Cuthbertson 2015). Considerations of the future over spans not only of decades or centuries, but of millennia or even millions or years, require a recalibration of risk assessments. We propose that CI is our *only* chance at attaining long term survival. A single point of failure will eventually fail, P4 and C6 argue that biological interstellar travel is an unlikely alternative. Even if the biological options are barely possible, they will likely take much longer to develop, allowing additional time for other disasters to strike.

P1, C14: Failure to Solve Existential Nihilism

Existential Nihilism

Existential nihilism is the philosophical stance that life or the world has no objective fundamental purpose, precisely the kind of metaphysical purpose that is the central focus of this article. Sometimes existentialism (or nihilism) distinguishes between applications to an individual person's life (the purpose of *my* life) and broader universal issues (the purpose of the universe or existence). Where such distinctions arise, this article concerns the latter, grander meaning of existence.

The End of the Universe, Consciousness, and Purpose

Admittedly, attempting to preserve fundamental purpose might seem like a fruitless endeavor upon an all-encompassing analysis. After all, the universe is doomed—eventually, along with everything in it of course. We don't have room here to consider theories of how life might survive the end of the universe, so we will proceed with the more conventional view that it won't.

We can therefore consider the actual moment in the far flung future when the last conscious being in the entire universe dies. This is not hypothetical, but rather an actual event that will

inevitably occur by our current understanding. There is some specific instant carved into time itself when the last conscious being will physically die. When this final conscious event occurs, will the universe, reality, and existence then cease to have purpose since it will mark the end of the era of consciousness from which purpose could derive?

Solutions

Humanity has handled existential nihilism in a variety of ways. By far the most popular solution is to invent supernatural escape hatches, such as eternal gods and eternal afterlives in which to forever perpetuate consciousness for reasons very similar to step P1, namely that consciousness is preeminent in the establishment and maintenance of purpose. Those for whom supernaturalism fails to withstand logical scrutiny must find other solutions. One common secular solution is to essentially ignore the problem by focusing on individual purpose, i.e., to all but deny the universal problem and emphasize individual purpose.

We have nothing to say about the religious solution here. We prefer solutions that avoid supernaturalism. Alternatively, while we sympathize with the secular intent behind focusing on individual purpose to the demotion of universal purpose, such an approach honestly does not solve the greater problem; it merely avoids it (probably out of angst), and avoidance is not a solution, it is a denial. Denial is a violation against one's own realizations and is therefore deplorable. To thine own self be true.

Sartre's Solution and a Proposed Universal Extrapolation

John-Paul Sartre said that *existence precedes essence*, i.e., that people are born with no preordained purpose and then are responsible for discovering or creating their individual purpose in the world, the *meaning* of their individual lives (Sartre 1957).

We can extend Sartre's dictum beyond the individual. Our concern is with *fundamental purpose*, any purpose that we might conceive at the level of the universe, reality, or existence. Extended thusly, and if consciousness underlies purpose, the universe and reality are then necessarily born without purpose since at the outset they lack conscious members: Sartre would say the universe's existence precedes its essence. With the evolutionary arrival of consciousness, the universe then moves to the next stage, in which its purpose is discovered or created from within. We depart from Sartre at this point since the universe isn't conscious itself, so as to could take Sartre-like responsibility for its *own* purpose. Rather, with the arrival of conscious beings, *we* are then granted (or perhaps condemned as Sartre put it!) to determine the purpose of the universe, reality, and existence. This is a condemned freedom far beyond Sartre's initial intent at the level of the individual. We are so astoundingly, shockingly, horrifyingly *responsible* for the universe. Humanity, and you the reader in your small part, are directly responsible for universal metaphysical purpose.

Camus' Solution and a Proposed Universal Extrapolation

Albert Camus concluded that there is no fundamental meaning of life, but offered a solution to the problems this conclusion poses. We first honestly accept life's meaninglessness. He called this *the absurd* realization, later formalized as Camus' *philosophy of the absurd* (Camus 1961). Camus' offered a two-part approach to handling life in the face of the absurd conclusion that there is no fundamental purpose. The first part is to fully embrace the truth of the absurdity. In Camus' philosophy, this resignation is the ultimate triumph over the lack of fundamental purpose, where a failure would consist or refusing the absurd stance to begin with (see where we scorned denial a few paragraphs back?). This idea might be recast as celebrating rational acceptance of an undesirable truth over the preferable alternative of irrational denial and self-delusion. The second part of Camus' solution to the absurd is to revolt against it: to accept cosmic futility while refusing to accept the expected despair, or in his own words: "*That revolt is the certainty of a crushing fate, without the resignation that ought to accompany it.*"

Like Sartre, Camus contemplates the matter at the level of the individual. In response to the possibility that there can be no eternal metaphysical purpose we propose a similar approach, but extended to universal scale. This approach is similar to how we extended Sartre from the individual to the broader universe. We first admit that the only rational, if *absurd*, conclusion is that metaphysical purpose cannot exist in an eternal sense. But at the same time, we apply Camus' second step and revolt against despondency. We should strive for the greatest conceivable level of universal accomplishment, and in our current cosmic infancy there is so incredibly much to aspire to. Virtually all the possibilities and conscious experience lie ahead of us, not behind. Tremendous adventures lie in wait for those species that survive their fragile youth. This article offers the goal that underlies all other goals: the preservation of consciousness for as long as the universe can physically sustain. That is the highest existential calling for it enables all other desires, dreams, and actions. We hope we have impressed upon the reader that we are duty-bound by our own consciousness to undertake this quest with the greatest commitment and urgency.

Conclusion

In some sense, we have not really resolved the problem of universal metaphysical purpose, specifically for the following reason. On the premise that purpose derives from consciousness, and on the fact that consciousness will inevitably eventually end, it would seem that eternal purpose cannot be salvaged. Our response is the only rational response we have found: to punt the question to future thinkers. This is not the same as the denial we railed against above. Denial is to refuse to acknowledge the validity of the question or the problem, or to substitute an easier but separate problem (such as disregarding universal purpose in favor of individual purpose). We don't deny the problem of eternal metaphysical purpose because we believe it is a real and currently unsolved question. However, we choose to focus on what can be done about it here and now. We exist at an inflection point. Earlier in Earth's history there was no consciousness on our planet of the sort we are considering here. Far in the future, assuming we survive, the risk of

extinction (namely the risk of the vanishment of consciousness) will have been alleviated by spreading over vast cosmic expanses. Right now, we exist during the intermediate era, when Earthly consciousness exists, but tenuously so.

We can be more temporally specific. While human consciousness has been around for millennia, it was only in the last century that we gained a sufficient understanding of cosmology to properly comprehend the potential for spreading out over cosmic distances. We refer to the discovery of the stellar main sequence, the nuclear fusion that powers stars, other galaxies and galactic group structure, galactic redshift (which characterizes how the universe evolves over time as well as informing us of the age of the universe), and many other factors salient to our modern understanding of the makeup of the cosmos. We often take our remarkable understanding of our place in the cosmos for granted, but none of these crucial properties the universe were known a mere hundred years ago. Many of the readers' own grandparents were born in a universe no larger than our galaxy.

Likewise we are approaching that incredible historical juncture when interstellar travel will become technically feasible and *we could therefore actually do something about it*. Past generations could be said to have had the priority of avoiding extinction long enough to enable the great cosmic dispersal. In the same way, the priority of our time (or the very near future) is to act on that opportunity so as to insure the unimaginably long future that lies in wait. This is our highest priority since it determines whether there will even *be* any such future.

We stand at the cusp of solving the extinction problem and thereby guaranteeing the fundamental purpose of the universe, reality, and existence by insuring the continuation of consciousness. This is a far grander calling than merely enabling individual life extension. Existential metaphysical purpose is our foremost responsibility as conscious beings, and CI is the method of achieving it.

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