### 1NC – Fairness

#### Our interpretation is that the resolution should define the division of affirmative and negative ground and offense. It was *negotiated* and *announced in advance*, providing both sides with a reasonable opportunity to prepare to engage one another’s arguments.

#### ‘Resolved’ preceding a colon indicates a legislative forum.

Blanche Ellsworth 81, English professor at SFSU and M.A. in English from UC Berkeley, 1/1/1981, *English Simplified*, 4th Edition, cc

A colon is also used to separate 3. THE SALUTATION OF A BUSINESS LETTER FROM THE BODY, Dear Sir Dear Ms. Weiner NOTE: In an informal letter, a comma follows the salutation: Dear Mary, Dear Uncle Jack 4. PARTS OF TITLES, REFERENCES, AND NUMERALS. TITLE: Principles of Mathematics: An Introduction REFERENCE: Luke 3:4—13 NUMERALS: 8:15 PM 5. PLACE OF PUBLICATION FROM PUBLISHER Indianapolis: Bobbs-Merrill 6. THE WORD RESOLVED FROM THE STATEMENT OF THE RESOLUTION. Resolved: That this committee go on record as favoring new legislation.

#### Ought means should

Merriam Webster, No Date – Merriam Webster’s Learner’s Dictionary, “ought”, <http://www.learnersdictionary.com/definition/ought>  
ought /ˈɑːt/ verb  
Learner's definition of OUGHT [modal verb] 1 ◊ Ought is almost always followed by to and the infinitive form of a verb. The phrase ought to has the same meaning as should and is used in the same ways, but it is less common and somewhat more formal. The negative forms ought not and oughtn't are often used without a following to. — used to indicate what is expected They ought to be here by now. You ought to be able to read this book. There ought to be a gas station on the way. 2 — used to say or suggest what should be done You ought to get some rest. That leak ought to be fixed. You ought to do your homework.

#### Should requires legal effect

Summers 94 (Justice – Oklahoma Supreme Court, “Kelsey v. Dollarsaver Food Warehouse of Durant”, 1994 OK 123, 11-8, http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker3fn13)

¶4 The legal question to be resolved by the court is whether the word "should"[13](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker3fn13) in the May 18 order connotes futurity or may be deemed a ruling *in praesenti*.[14](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker3fn14) The answer to this query is not to be divined from rules of grammar;[15](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker3fn15) it must be governed by the age-old practice culture of legal professionals and its immemorial language usage. To determine if the omission (from the critical May 18 entry) of the turgid phrase, "and the same hereby is", (1) makes it an in futuro ruling - i.e., an expression of what the judge will or would do at a later stage - or (2) constitutes an in in praesenti resolution of a disputed law issue, the trial judge's intent must be garnered from the four corners of the entire record. [CONTINUES – TO FOOTNOTE] [13](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker2fn13) "*Should*" not only is used as a "present indicative" synonymous with *ought* but also is the past tense of "shall" with various shades of meaning not always easy to analyze. See 57 C.J. Shall § 9, Judgments § 121 (1932). O. JESPERSEN, GROWTH AND STRUCTURE OF THE ENGLISH LANGUAGE (1984); St. Louis & S.F.R. Co. v. Brown, 45 Okl. 143, 144 P. 1075, 1080-81 (1914). For a more detailed explanation, see the Partridge quotation infra note 15. Certain contexts mandate a construction of the term "should" as more than merely indicating preference or desirability. Brown, supra at 1080-81 (jury instructions stating that jurors "should" reduce the amount of damages in proportion to the amount of contributory negligence of the plaintiff was held to imply an *obligation* *and to be more than advisory*); Carrigan v. California Horse Racing Board, 60 Wash. App. 79, [802 P.2d 813](http://www.oscn.net/applications/oscn/deliverdocument.asp?box1=802&box2=P.2D&box3=813) (1990) (one of the Rules of Appellate Procedure requiring that a party "should devote a section of the brief to the request for the fee or expenses" was interpreted to mean that a party is under an *obligation* to include the requested segment); State v. Rack, 318 S.W.2d 211, 215 (Mo. 1958) ("should" would mean the same as "shall" or "must" when used in an instruction to the jury which tells the triers they "should disregard false testimony"). [14](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker2fn14) *In praesenti* means literally "at the present time." BLACK'S LAW DICTIONARY 792 (6th Ed. 1990). In legal parlance the phrase denotes that which in law is *presently* or *immediately effective*, as opposed to something that *will* or *would* become effective *in the future [in futurol*]. See Van Wyck v. Knevals, [106 U.S. 360](http://www.oscn.net/applications/oscn/deliverdocument.asp?box1=106&box2=U.S.&box3=360), 365, 1 S.Ct. 336, 337, 27 L.Ed. 201 (1882).

#### Appropriation of outer space” by private entities refers to the exercise of exclusive control of space.

TIMOTHY JUSTIN TRAPP, JD Candidate @ UIUC Law, ’13, TAKING UP SPACE BY ANY OTHER MEANS: COMING TO TERMS WITH THE NONAPPROPRIATION ARTICLE OF THE OUTER SPACE TREATY UNIVERSITY OF ILLINOIS LAW REVIEW [Vol. 2013 No. 4]

The issues presented in relation to the nonappropriation article of the Outer Space Treaty should be clear.214 The ITU has, quite blatantly, created something akin to “property interests in outer space.”215 It allows nations to exclude others from their orbital slots, even when the nation is not currently using that slot.216 This is directly in line with at least one definition of outer-space appropriation.217 [\*\*Start Footnote 217\*\*Id. at 236 (“Appropriation of outer space, therefore, is ‘the exercise of exclusive control or exclusive use’ with a sense of permanence, which limits other nations’ access to it.”) (quoting Milton L. Smith, The Role of the ITU in the Development of Space Law, 17 ANNALS AIR & SPACE L. 157, 165 (1992)). \*\*End Footnote 217\*\*]The ITU even allows nations with unused slots to devise them to other entities, creating a market for the property rights set up by this regulation.218 In some aspects, this seems to effect exactly what those signatory nations of the Bogotá Declaration were trying to accomplish, albeit through different means.219

#### Outer Space is considered anything that sits above the Earth’s atmosphere

Betz 21 [(Eric Betz, Science & tech writer for @Discovermag, @Astronomymag and others), “The Kármán Line: Where does space begin?”, Astronomy, https://astronomy.com/news/2021/03/the-krmn-line-where-does-space-begin, March 5, 2021] SS

These days, spacecraft are venturing into the final frontier at a record pace. And a deluge of paying space tourists should soon follow. But to earn their astronaut wings, high-flying civilians will have to make it past the so-called Kármán line. This boundary sits some 62 miles (100 kilometers) above Earth's surface, and it's generally accepted as the place where Earth ends and outer space begins.

#### Private entities are non-governmental corporations

UpCounsel ND [(UpCounsel is an interactive online service that makes it faster and easier for businesses to find and hire legal help solely based on their preferences. “Private Entity: Everything You Need to Know”, UpCounsel, https://www.upcounsel.com/private-entity#importance-of-private-entities, No Date] SS

A private entity can be a partnership, corporation, individual, nonprofit organization, company, or any other organized group that is not government-affiliated. Indian tribes and foreign public entities are not considered private entities.

Unlike publicly traded companies, private companies do not have public stock offerings on Nasdaq, American Stock Exchange, or the New York Stock Exchange. Instead, they offer shares privately to interested investors, who may trade among themselves.

#### Unjust means unfair or characterized by injustice

Merriam Webster ND [(Merriam-Webster, Merriam-Webster, Inc. is an American company that publishes reference books and is especially known for its dictionaries.),“unjust”, https://www.merriam-webster.com/dictionary/unjust, No Date] SS

Definition of unjust

1: characterized by injustice : UNFAIR

#### Vote negative to preserve limits and equitable division of ground – the resolution is the most predictable stasis point for debates, anything outside of that ruins prep and clash by allowing the affirmative to pick any grounds for debate. That greenlights a race away from the core topic controversies that allow for robust contestation, which favors the aff by making neg ground inapplicable, susceptible to the perm, and concessionary. Two additional impacts:

#### Accessibility – Cutting negs to every possible aff wrecks small schools, which has a disparate impact on under-resourced and minority debaters. Counter-interpretations are arbitrary, unpredictable, and don’t solve the world of neg prep because there’s no grounding in the resolution

#### Link turns their education offense – getting to the third and fourth level of tactical engagement is only possible with refined and well-researched positions connected to the resolutional mechanism. Repeated debates over core issues incentivize innovative argument production and improved advocacy based on feedback and nuanced responses from opponents.

#### Prefer our impact: they’ve skewed the game which necessarily comes first because it makes evaluating the aff impossible. The role of individual debate rounds on broader subject formation is white noise – *can you remember what happened in round 1 of the berkeley tournament your sophomore year?* – individual rounds don’t affect our subjectivity, so fairness is the only impact your ballot can resolve. You should presume all their truth claims false because they have not been properly tested

#### They can’t get offense: we don’t exclude them, only persuade you that our methodology is best. Every debate requires a winner and loser, so voting negative doesn’t reject them from debate, it just says they should make a better argument next time.

### 1NC – Case

#### Vote neg on presumption---

#### ROJ: Frame the 1AC through solvency, not impacts – any attempt to filter offense through the RotB or the speech act of the aff is an arbitrary goalpost that only serves to insulate it from criticism and nuanced testing – forcing us to negate the efficacy of personal strategies is at best impossible and at worst violent – the aff can’t change the material structures that produce anti-queer violence – no warrant for how the aff spills up to impact structures of politics writ large or out of debate means you vote neg on presumption.

#### They don’t solve the aff – queer oppression doesn’t magically go away if we stop appropriating outer space

#### Negate on presumption---Inherency---scholars and activists already affirm the 1AC. Their affirmation does not change the impacts they described and has no mechanism to spill up.

#### **Discussing of theory does not preclude implementation --**

**We can talk about theorization and implementation of policy, this is how to have most fruitful discussion of theories, as we can discuss specific examples of your theory**

**We can contest that policy idea as a means of contesting broader theory**

**The standard is maximizing expected wellbeing**

**First, pleasure and pain are intrinsically valuable all other values can be explained with reference to pleasure; Occam’s razor requires us to treat these as instrumentally valuable.**

**Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

I think several things should be said in response to Moore’s challenge to hedonists. First, **I do not think the burden of proof lies on hedonists to explain why the additional values are not intrinsic values. If someone claims that X is intrinsically valuable, this is a substantive, positive claim, and it lies on him or her to explain why we should believe that X is in fact intrinsically valuable.** Possibly, this could be done through thought experiments analogous to those employed in the previous section. Second, **there is something peculiar about the list of additional intrinsic values** that counts in hedonism’s favor**: the listed values have a strong tendency to be well explained as things that help promote pleasure and avert pain.** To go through Frankena’s list, life and consciousness are necessary presuppositions for pleasure; activity, health, and strength bring about pleasure; and happiness, beatitude, and contentment are regarded by Frankena himself as “pleasures and satisfactions.” The same is arguably true of beauty, harmony, and “proportion in objects contemplated,” and also of affection, friendship, harmony, and proportion in life, experiences of achievement, adventure and novelty, self-expression, good reputation, honor and esteem. Other things on Frankena’s list, such as understanding, **wisdom, freedom, peace, and security, although they are perhaps not themselves pleasurable, are important means to achieve a happy life, and as such, they are things that hedonists would value highly.** **Morally good dispositions and virtues, cooperation, and just distribution of goods and evils, moreover, are things that, on a collective level, contribute a happy society, and thus the traits that would be promoted and cultivated if this were something sought after.** To a very large extent, the intrinsic values suggested by pluralists tend to be hedonic instrumental values. Indeed, pluralists’ suggested intrinsic values all point toward pleasure, for while the other values are reasonably explainable as a means toward pleasure, pleasure itself is not reasonably explainable as a means toward the other values. Some have noticed this. Moore himself, for example, writes that though his pluralistic theory of intrinsic value is opposed to hedonism, its application would, in practice, look very much like hedonism’s: “Hedonists,” he writes “do, in general, recommend a course of conduct which is very similar to that which I should recommend.”24 Ross writes that “[i]t is quite certain that by promoting virtue and knowledge we shall inevitably produce much more pleasant consciousness. These are, by general agreement, among the surest sources of happiness for their possessors.”25 Roger Crisp observes that “those goods cited by non-hedonists are goods we often, indeed usually, enjoy.”26 What Moore and Ross do not seem to notice is that their observations give rise to two reasons to reject pluralism and endorse hedonism. The first reason is that if **the suggested non-hedonic intrinsic values are potentially explainable by appeal to just pleasure and pain** (which, following my argument in the previous chapter, we should accept as intrinsically valuable and disvaluable), **then—by appeal to Occam’s razor—we have at least a pro tanto reason to resist the introduction of any further intrinsic values and disvalues. It is ontologically more costly to posit a plurality of intrinsic values and disvalues, so in case all values admit of explanation by reference to a single intrinsic value and a single intrinsic disvalue, we have reason to reject more complicated accounts.** **The fact that suggested non-hedonic intrinsic values tend to be hedonistic instrumental values does not, however, count in favor of hedonism solely in virtue of being most elegantly explained by hedonism; it also does so in virtue of creating an explanatory challenge for pluralists.** The challenge can be phrased as the following question: **If the non-hedonic values suggested by pluralists are truly intrinsic values in their own right, then why do they tend to point toward pleasure and away from pain?**27

**Moral uncertainty means preventing extinction should be our highest priority.  
Bostrom 12** [Nick Bostrom. Faculty of Philosophy & Oxford Martin School University of Oxford. “Existential Risk Prevention as Global Priority.” Global Policy (2012)]  
These reflections on **moral uncertainty suggest** an alternative, complementary way of looking at existential risk; they also suggest a new way of thinking about the ideal of sustainability. Let me elaborate.¶ **Our present understanding of axiology might** well **be confused. We may not** nowknow — at least not in concrete detail — what outcomes would count as a big win for humanity; we might not even yet **be able to imagine the best ends** of our journey. **If we are** indeedprofoundly **uncertain** about our ultimate aims,then we should recognize that **there is a great** option **value in preserving** — and ideally improving — **our ability to recognize value and** to **steer the future accordingly. Ensuring** that **there will be a future** version of **humanity** with great powers and a propensity to use them wisely **is** plausibly **the best way** available to us **to increase the probability that the future will contain** a lot of **value.** To do this, we must prevent any existential catastrophe.

### Innovation

#### Space innovation solves extinction – generates ecological survival mechanisms.

Sadedin 17 (Suzanne, PhD in Evolutionary Biology, 10-9, "Will Human Innovation Save Us From Future Extinction?," Forbes, https://www.forbes.com/sites/quora/2017/10/09/will-human-innovation-save-us-from-future-extinction/?sh=773a4f276c65) TDI

Does the human ability to innovate suggest an immunity to total extinction? Yes and no. Currently, innovation reduces our chance of extinction in some ways, and increases it in others. But if we innovate cleverly, we could become just about immune to extinction. The species that survive mass extinctions tend to share three characteristics. They're widespread. This means local disasters don't wipe out the entire species, and some small areas, called refugia, tend to be unaffected by global disasters. If you're widespread, it's more likely that you have a population that happens to live in a refugium. They're ecological generalists. They can cope with widely varying physical conditions, and they're not fussy about food. They're r-selected. This means that they breed fast and have short generation times, which allows them to rapidly grow their populations and adapt genetically to new conditions. Innovation gives humans the ability to be widespread ecological generalists. With technology, we can live in more diverse conditions and places than any other species. And while we can't (currently) grow our populations rapidly like an r-selected species, innovation does allow us to adapt quickly at the cultural level. Technology also increases our connections to one another and connectivity is a two-edged sword. Many species consist of a network of small, local populations, each of which is somewhat isolated from the others. We call this a metapopulation. The local populations often go extinct, but they are later re-seeded by others, so the metapopulation as a whole survives. Humans used to be a metapopulation, but thanks to innovation, we're now globally connected. Archaeologists believe that many past civilizations, such as the Easter Islanders, fell because of unsustainable ecological and cultural innovations. The impact of these disasters was limited because these civilizations were small and disconnected from other such civilizations. These days, a useful innovation can spread around the world in weeks. So can a lethal one. With many of the technologies and chemicals we're currently inventing, we can't be certain about their long-term effects; human biology is complex enough that we often can't be absolutely certain something won't kill us in a decade until we've waited a decade to see. We try to be careful and test things before they're released, and the probability that any particular invention could kill us all is tiny, but since we're constantly innovating, it's a real possibility. Pandemics pose the same problem for a well-connected species. There are certain possibilities where species extinction is really hard to avoid; fortunately, they're also very unlikely, but we are definitely not immune from this. The most likely cause of our extinction, in my opinion, is innovation in machine learning/AI. This could destroy the planet, but even if it doesn't, humans will be ultimately redundant to the dominant systems. They might keep us alive in a zoo somewhere, but I doubt it. A happier scenario (to me at least) is transhumanism, where humans become extinct in a sense because we've managed to liberate ourselves from biology. So how could innovation prevent our extinction? We seed the galaxy with independently evolving human populations to create a new metapopulation. These local populations would hopefully be sufficiently isolated that some would survive an innovation or disaster that wipes out the rest. They would, of course, evolve in response to local conditions, perhaps creating several new species. So you could say this is still extinction, but it's as close as we'll come to persistence in our ever-changing universe.

### Disease

#### Space colonization encourages healthcare innovations- solves diseases

Donoviel 19 (Dorit Donoviel, 7-19-2019, "Space exploration is reinventing healthcare," [20+ years leadership experience as executive director of R&D overseeing diverse areas of biomedical research from basic to applied science, drug discovery, and technology development. Executing a multi-million dollar national research portfolio of grants addressing the plethora of physiological and behavioral challenges of humans in space. Executive Director, Translational Research Institute for Space Health at Baylor College of Medicine] The Hill, https://thehill.com/opinion/technology/453853-space-exploration-is-reinventing-healthcare) TDI

Though many do not realize it, humans have been living and working in space continuously for the past two decades. The conditions of spaceflight have accelerated our ability to study progressive degenerative diseases. This novel paradigm of understanding human physiology under the stresses of living in space holds great promise for new sources of medical breakthroughs for Earth.

Although astronauts are carefully selected to be exceptionally healthy and exhibit peak physical and mental performance, after only four to six months in space, they can develop numerous medical conditions. Without appropriate exercise, they lose bone and muscle mass. They become prone to developing kidney stones. Their hearts become deconditioned. Their blood vessels stiffen. A subset of astronauts develop a swelling of the optic nerve and possibly an increase in pressure on the brain. Even dormant viruses become activated, alongside changes to the immune system. There is a sense of urgency to solve these problems if we are to send humans to Mars and return them safely in the next decade or two.

This is why NASA is investing in cutting-edge research for human health and performance including high-risk high-reward approaches funded through the Translational Research institute for Space Health (TRISH). Supporting potentially ground-breaking innovations requires a leap of faith in the right direction.

Keeping astronauts healthy during deep space exploration missions — where there are no hospitals and no medical specialists — requires a different paradigm for healthcare. Astronauts are typically engineers and scientists, and only occasionally physicians. On the way to Mars, when communications with Earth will be limited, they could be forced to act as both patients and healthcare providers. If a medical condition is allowed to progress when they are millions of miles away from Earth, the situation could become catastrophic.

Therefore, astronauts will need to detect even the most subtle changes in their own health status early enough to prevent disease. This requires a healthcare paradigm of predicting, preventing and mitigating ailments by intervening early.

This means enabling monitoring, diagnostic and therapeutic medical capabilities that are simple to use, safe, robust and miniaturized. Additionally, what will work in a small spacecraft in the hands of an engineer is also likely to work in a community clinic with limited resources. Or even in our homes. This different approach to healthcare can help save lives and reduce costs — at a global level.

Space demands the best in healthcare innovations, focusing on prevention and early intervention using smart, creative solutions. On a mission to Mars, blood tests will be done in a matter of minutes, by the patient, on a single drop of blood. A trained and adaptive computer algorithm will track health status based on a variety of physiological parameters and alert astronauts when important deviations from normal become evident.

Automated eye exams will be performed by the astronauts on themselves and images will be analyzed by a computer for changes. Customized medications will be tailor-made for the patient on the spot. If a minor medical procedure is required, the caregiver will learn and practice beforehand using augmented reality tools and software simulations adjusted for zero-gravity.

Kidney stones will be found early and treated quickly and painlessly using ultrasound to “push” them out of the kidney so they can be cleared naturally with urination. Sleep and mood will be improved using sound stimulation and health will be improved by individualized diets which will be enriched with high-nutrient plants grown efficiently within a small footprint. Most importantly, all these advances have clear and important applications on Earth.

Space exploration has already yielded hundreds of inventions that filled our arsenal for fighting diseases. To land women and men on Mars and return them healthy, we must reinvent healthcare. The positive consequences of this work will impact all of humanity. The spirit of Apollo is alive and well in space health research today. And for science, medicine and technology pioneers, our most important work is still ahead.

#### Diseases cause extinction – they’ll start in the U.S., which avoids burnout

Bar-Yam, 16 - SB and PhD in physics from MIT, president of the New England Complex Systems Institute (Yaneer Bar-Yam, "Transition to extinction: Pandemics in a connected world," *Medium*, 7-3-2016, https://medium.com/complex-systems-channel/transition-to-extinction-pandemics-in-a-connected-world-153867fe98f4#.2bxv2alfc)

When we introduce long range transportation into the model, the success of more aggressive strains changes. They can use the long range transportation to find new hosts and escape local extinction. Figure 3 shows that the more transportation routes introduced into the model, the more higher aggressive pathogens are able to survive and spread.

As we add more long range transportation, there is a critical point at which pathogens become so aggressive that the entire host population dies. The pathogens die at the same time, but that is not exactly a consolation to the hosts. We call this the phase transition to extinction (Figure 4). With increasing levels of global transportation, human civilization may be approaching such a critical threshold.

In the paper we wrote in 2006 about the dangers of global transportation for pathogen evolution and pandemics [8], we mentioned the risk from Ebola. Ebola is a horrendous disease that was present only in isolated villages in Africa. It was far away from the rest of the world only because of that isolation. Since Africa was developing, it was only a matter of time before it reached population centers and airports. While the model is about evolution, it is really about which pathogens will be found in a system that is highly connected, and Ebola can spread in a highly connected world.

The traditional approach to public health uses historical evidence analyzed statistically to assess the potential impacts of a disease. As a result, many were surprised by the spread of Ebola through West Africa in 2014. As the connectivity of the world increases, past experience is not a good guide to future events.

A key point about the phase transition to extinction is its suddenness. Even a system that seems stable, can be destabilized by a few more long-range connections, and connectivity is continuing to increase.

So how close are we to the tipping point? We don’t know but it would be good to find out before it happens.

While Ebola ravaged three countries in West Africa, it only resulted in a handful of cases outside that region. One possible reason is that many of the airlines that fly to west Africa stopped or reduced flights during the epidemic [9]. In the absence of a clear connection, public health authorities who downplayed the dangers of the epidemic spreading to the West might seem to be vindicated.

As with the choice of airlines to stop flying to west Africa, our analysis didn’t take into consideration how people respond to epidemics. It does tell us what the outcome will be unless we respond fast enough and well enough to stop the spread of future diseases, which may not be the same as the ones we saw in the past. As the world becomes more connected, the dangers increase.

Are people in western countries safe because of higher quality health systems? Countries like the U.S. have highly skewed networks of social interactions with some very highly connected individuals that can be “superspreaders.” The chances of such an individual becoming infected may be low but events like a mass outbreak pose a much greater risk if they do happen. If a sick food service worker in an airport infects 100 passengers, or a contagion event happens in mass transportation, an outbreak could very well prove unstoppable.

Watch this mock video of a pathogen spreading globally through land and air transportation. Long range transportation will continue to pose a threat of pandemic if its impacts cannot be contained.

#### Extinction – defense is wrong

Piers Millett 17, Consultant for the World Health Organization, PhD in International Relations and Affairs, University of Bradford, Andrew Snyder-Beattie, “Existential Risk and Cost-Effective Biosecurity”, Health Security, Vol 15(4), http://online.liebertpub.com/doi/pdfplus/10.1089/hs.2017.0028

Historically, disease events have been responsible for the greatest death tolls on humanity. The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone.2 The Black Death was responsible for killing over 25% of the European population,3 while other pandemics, such as the plague of Justinian, are thought to have killed 25 million in the 6th century—constituting over 10% of the world’s population at the time.4 It is an open question whether a future pandemic could result in outright human extinction or the irreversible collapse of civilization.

A skeptic would have many good reasons to think that existential risk from disease is unlikely. Such a disease would need to spread worldwide to remote populations, overcome rare genetic resistances, and evade detection, cures, and countermeasures. Even evolution itself may work in humanity’s favor: Virulence and transmission is often a trade-off, and so evolutionary pressures could push against maximally lethal wild-type pathogens.5,6

While these arguments point to a very small risk of human extinction, they do not rule the possibility out entirely. Although rare, there are recorded instances of species going extinct due to disease—primarily in amphibians, but also in 1 mammalian species of rat on Christmas Island.7,8 There are also historical examples of large human populations being almost entirely wiped out by disease, especially when multiple diseases were simultaneously introduced into a population without immunity. The most striking examples of total population collapse include native American tribes exposed to European diseases, such as the Massachusett (86% loss of population), Quiripi-Unquachog (95% loss of population), and theWestern Abenaki (which suffered a staggering 98% loss of population).

In the modern context, no single disease currently exists that combines the worst-case levels of transmissibility, lethality, resistance to countermeasures, and global reach. But many diseases are proof of principle that each worst-case attribute can be realized independently. For example, some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment, such as rabies or septicemic plague. Other diseases have a track record of spreading to virtually every human community worldwide, such as the 1918 flu,10 and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population.11,12 Under optimal virulence theory, natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. But advances in biotechnology might allow the creation of diseases that combine such traits. Recent controversy has already emerged over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics.13-17 Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective.18 In addition to transmissibility and lethality, studies have shown that other disease traits, such as incubation time, environmental survival, and available vectors, could be modified as well.19-2

#### Earth is dying

Arora 19 (Naveen Kumar Arora, Professor in the Department of Environmental Science, Ex-Head Department of Env. Microbiology, Babasaheb Bhimrao Ambedkar University.)(“Earth: 50 years challenge”, Environmental Sustainability, March 2019, Volume 2, Issue 1, pp 1–3)//ASMITH

The life of earth is estimated to be 4.54 billion years with an error range of 50 million years. Life appeared on earth around 3.5 billion years ago. Around 200,000 years ago, Homo sapiens evolved and started the great civilizations on the planet. Study suggests that human population is only 0.01% of all the life forms on Earth. This shows how existence of humans is just a miniscule part if we compare it with the existence of our planet or of the presence of life on earth. But if we go through the events particularly in last 10,000 years (of recorded history of mankind), it becomes clear that the presence of humans on earth brought several changes in both the biological and non-biological components. Most of the striking changes have appeared in last 50 years or so. According to reports, humans have destroyed about 83% of wild mammals and half the species of plants till date. On the whole, humans have consumed 30% of the known resources resulting into scarcer ecosystem services for future generations. If these trends continue, the Earth will soon be experiencing mass extinctions and we will be left with an even more degraded planet.

Humans in last 50 years, because of ever-increasing population associated with pollution and destruction of natural ecosystems have completely changed the face of the Earth. The exponential increase in human population in last few decades brought about many drastic changes on Earth making it look much degraded and bruised. One such phenomenon is Earth’s present carbon dioxide (a potent green house gas) level in the atmosphere which has exceeded 411 parts per million (ppm), much higher as compared to about 323 ppm about 50 years ago, resulting in major environmental issues such as global warming and climate change. According to the Fifth Assessment Report of Intergovernmental Panel on Climate Change, anthropogenic activities have been described as the main cause of increased green house gases level, of which 2/3rd come from burning of fossil fuels and 1/3rd is from land use changes. The increased clearing of forests and vegetated lands, due to overgrazing and industrial transformation, in the 1970s showed disturbed albedo and evapotranspiration leading to warming of earth, change in carbon cycle and global catastrophic events of biodiversity extinction. NASA’s Goddard Institute for Space Studies (GISS) analyzed that the average global temperature of earth has increased by about 0.8 °C since 1880 and two-thirds of this warming has been reported since 1975. The nexus of responses and catastrophic events also point towards the accelerated rate of melting of glaciers with the loss of 226 gigatons/year of ice between 1971 and 2009. The highest impacted glacier loss was reported from Greenland Ice Sheet (about sixfold higher) and Antarctic ice (almost quadrupled) in merely 20 years. Correspondingly, the sea level rise has almost doubled in last 20 years, with increment being 3.1 mm/year since 1993. Chemical and pesticide pollution is another menace to the ecosystems. According to reports, more than 1,40,000 chemicals including pesticides, plastics, etc. have been synthesized till date since 1950 and each year 10 millions tons of toxic compounds are being dumped into the environment leading to land degradation, soil salinization and contamination of water resources. This has resulted in the problem of safe drinking water around the globe. As per reports of CNN, about 500 million tons of heavy metals, toxic sludge and hazardous solvents were estimated to be released in global water supply in 2007 making it unsafe to consume. Plastic pollution is also a big nuisance caused by humans on Earth. The stats show that annual production of plastics during 1970s was about 50 million metric tons and it has increased to over 348 million metric tons at present. In terms of biodiversity losses, WWF’s Living Planet Report highlights that humans have eradicated 60% of the Earth’s wildlife in less than 50 years. About 20% of Amazon forests are lost in the last half century. A recent study revealed that of total global tree cover loss between 2001 and 2015, 27% depreciation came from commodity driven deforestation i.e. conversion of forests permanently in order to expand commodities such as meat, minerals, oils and gas. Other drivers are forestry i.e. loss within the managed forests or tree plantations (26%), shifting agricultural practices (24%), wildfires (23%), and urbanization (0.6%). Half of the shallow-water corals have also been leached out by anthropogenic activities polluting the oceans and seas in last 30 years. The recent analysis shows that the population of freshwater animals has plummeted by 75% since 1970s. Reports say that the damage done is so rapid that even if we end it now, it will take centuries to replenish the natural world.

The global human footprints over the past 50 years are so dominating that even the view of the planet from space shows the modification of various critical ecosystems and the demography. The complementing series of aerial pictures taken through satellites show that many hotspot ecosystems and areas have been tremendously degraded. Focusing on what all we have lost over the past half century, the red list is so long that it cannot be confined in few pages. The Great Barrier Reef visible even from space has shown 50% loss due to severe bleaching by increased temperature of the oceans in just 30 years and is predicted that up to 90% may die within next century. Shrinking of the Dead Sea has shown an alarming rate of around four feet a year and the sea has already lost one-third of its surface area. The increasing temperature has caused high rate of snow melting in the European mountain range The Alps, and the most unsettling event reported in 2017 was that the winter season was 38 days shorter in comparison to that in 1960. The human oriented massive irrigation project over past 50 years has shrunk the fourth largest lake Aral Sea, to only 10% and it will soon be a thing of the past. NASA’s monitoring of Arctic Sea ice since 1978 have detected a steep decline in overall ice content. The polar ice thawing stories over the past half centuries have been highly alarming and Antarctic alone has lost 40 billion tons of ice each year from 1979 to 1989 and this trend rose to 252 billion tons per year in 2009 and today Antarctic has already lost 6 times the ice it had 40 years ago. The ‘Third Pole’ i.e. The Himalayan- Hindu Kush mountain range and the Tibetan Plateau in Central Asia is also impacted by the negative trends of global warming and in the past 50 years this remote region has lost 509 glaciers resulting in the local temperature rise by 1.5 °C. Recently in 2018, a huge chunk of ice in Helheim Glacier in Greenland, about the size of Manhattan, with 10 billion tons of ice, split out and tumbled into sea; this loss was indicated as the most disturbing irreversible loss. The record breaking heat waves in Australia and Europe are already the hard and fast evidences to how much humans have changed the face of Earth. Australia witnessed the hottest summer in the recorded history in the year 2018–2019. The high melting of glaciers and warming of the poles led to the extreme freezing of Chicago, which became colder than Mount Everest, Siberia and the poles. The summers in Iran shockingly changed the size and color of Lake Urmia from green to brown due to blooming of algae and bacteria. Similarly, there are numerous reports which show the decline of fertile lands, increased soil salinity, loss of forests and so on, clearly visible by the satellite images.

A team of researchers’ from several countries including Sweden, Australia, Denmark, USA, England, Canada, Germany and Holland declared climate change and biodiversity loss as the “core boundaries” which if breached can transform Earth to inhabitable state. Stephen Hawking in his recently published book “Brief Answers to the Big Questions” stated that the biggest threat to mankind on Earth is the human induced climate change. Although the technology has advanced at an unprecedented rate and this has improved the living standards a lot but the cost of this development in terms of damage to the planet as a whole is also extraordinary. We share the planet with millions of other species but have almost single handedly exploited it to the extent that every specie is affected one way or the other. The industrial, agricultural and the infrastructural revolution have resulted in over exploitation of resources and pollution of every nook and corner of the planet. The technologies which were developed to adorn and ease our routines has brought antonymic effect threatening the survival and has made it very clear that no human science can replace “nature’s perfect systems” which have been carving the environment and ecosystems of earth to balance it in the zone of habitability.

### Col Good

#### Space colonization is key to ensure human survival – pursuing it as soon as possible is crucial

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Why, you might wonder, does space colonization matter, possibly more than anything else, as the title of this article claims? Because the future of humankind directly and completely dependent on whether and how we manage to colonize space.

Space colonization is a double-edged sword. On one hand, the creation of permanent and self-sustainable human habitats beyond Earth is unavoidable if humankind is to exist in the long-term future. On the other hand, however, space colonization could bring about a catastrophically bad future if we colonize space in a bad way. That future that might be worse than one in which humankind does not exist.

Space or bust: Why we must reach for the stars

Why should we pursue space colonization in the first place? Don’t we have more pressing problems today, on Earth?

Yes, we do have many problems on Earth today, and we should try to solve them. But space colonization is just that: A strategy for dealing with certain problems. An the problems that space colonization would be dealing with are, arguably, among the greatest problems of them all: Existential risks; risks that might lead to the extinction of humankind [1]. Currently, all of our proverbial existential eggs are in the same basket. If a natural existential risk strikes (for example, a large asteroid colliding with Earth) or if a man-made existential risk results in a catastrophic outcome (for example, runaway global warming [2, 3]), all of humankind is at risk because humankind is currently limited to planet Earth. If, however, there are self-sustainable human habitats beyond Earth, then the probability of an irreversibly catastrophic outcome for all of humankind is drastically reduced.

Investing in space colonization today could therefore have immense future benefits. Using resources today in order to make space colonization possible in the medium-term future is not a waste, but a very profitable investment. If humankind stays limited to Earth and if we go extinct as a consequence of doing so, then we will all the billions of life years and billions of humans who might have come to exist — and who would have experienced happiness and contributed to humankind’s continued epistemic and moral progress.

Taking space colonization more seriously today does not, of course, mean that we should only pursue space colonization and ignore everything else that is bad in the world. We should continue dealing with current global problems and, at the same time, invest greater resources into space colonization. At this point in our history and our technological development, even modest amounts of resources directed at space colonization would go a long way, such as public funding of basic research. Additionally, it is very likely that technological advances in the domain of space colonization would improve our lives in other ways as well thanks to technology transfer [4] — investing in space colonization today would probably be a win-win situation.

So the situation seems clear: We must pursue space colonization and try to spread beyond Earth as fast as possible. Unfortunately, there is a catch: Yes, we must colonize space if humankind is to survive, but space colonization itself is very risky. So much so that bad outcomes of space colonization might be even worse for humankind than “merely” going extinct.

#### Every second of delayed colonization kills 10^29 potential human lives

Bostrom 3 Nick Bostrom, philosopher at the University of Oxford, a Ph.D. degree in philosophy from the London School of Economics, and was a British Academy Postdoctoral Fellow at the University of Oxford, 2003, “Astronomical Waste: The Opportunity Cost of Delayed Technological Development”, Utilitas Vol. 15, No. 3, https://nickbostrom.com/astronomical/waste.html#\_edn8, EO

As I write these words, suns are illuminating and heating empty rooms, unused energy is being flushed down black holes, and our great common endowment of negentropy is being irreversibly degraded into entropy on a cosmic scale. These are resources that an advanced civilization could have used to create value-structures, such as sentient beings living worthwhile lives.

The rate of this loss boggles the mind. One recent paper speculates, using loose theoretical considerations based on the rate of increase of entropy, that the loss of potential human lives in our own galactic supercluster is at least ~10^46 per century of delayed colonization.[1] This estimate assumes that all the lost entropy could have been used for productive purposes, although no currently known technological mechanisms are even remotely capable of doing that. Since the estimate is meant to be a lower bound, this radically unconservative assumption is undesirable.

We can, however, get a lower bound more straightforwardly by simply counting the number or stars in our galactic supercluster and multiplying this number with the amount of computing power that the resources of each star could be used to generate using technologies for whose feasibility a strong case has already been made. We can then divide this total with the estimated amount of computing power needed to simulate one human life.

As a rough approximation, let us say the Virgo Supercluster contains 10^13 stars. One estimate of the computing power extractable from a star and with an associated planet-sized computational structure, using advanced molecular nanotechnology[2], is 10^42 operations per second.[3] A typical estimate of the human brain’s processing power is roughly 10^17 operations per second or less.[4] Not much more seems to be needed to simulate the relevant parts of the environment in sufficient detail to enable the simulated minds to have experiences indistinguishable from typical current human experiences.[5] Given these estimates, it follows that the potential for approximately 10^38 human lives is lost every century that colonization of our local supercluster is delayed; or equivalently, about 10^29 potential human lives per second.

While this estimate is conservative in that it assumes only computational mechanisms whose implementation has been at least outlined in the literature, it is useful to have an even more conservative estimate that does not assume a non-biological instantiation of the potential persons. Suppose that about 10^10 biological humans could be sustained around an average star. Then the Virgo Supercluster could contain 10^23 biological humans. This corresponds to a loss of potential equal to about 10^14 potential human lives per second of delayed colonization.

What matters for present purposes is not the exact numbers but the fact that they are huge. Even with the most conservative estimate, assuming a biological implementation of all persons, the potential for one hundred trillion potential human beings is lost for every second of postponement of colonization of our supercluster.[6]

II. THE OPPORTUNITY COST OF DELAYED COLONIZATION

From a utilitarian perspective, this huge loss of potential human lives constitutes a correspondingly huge loss of potential value. I am assuming here that the human lives that could have been created would have been worthwhile ones. Since it is commonly supposed that even current human lives are typically worthwhile, this is a weak assumption. Any civilization advanced enough to colonize the local supercluster would likely also have the ability to establish at least the minimally favorable conditions required for future lives to be worth living.

The effect on total value, then, seems greater for actions that accelerate technological development than for practically any other possible action. Advancing technology (or its enabling factors, such as economic productivity) even by such a tiny amount that it leads to colonization of the local supercluster just one second earlier than would otherwise have happened amounts to bringing about more than 10^29 human lives (or 10^14 human lives if we use the most conservative lower bound) that would not otherwise have existed. Few other philanthropic causes could hope to match that level of utilitarian payoff.