**RWG – AT: HEMPs Ignore MAD**

**HEMPs ignore MAD**

**Broughel 22**, 4-21-2022, James Broughel is a senior research fellow at the Mercatus Center "Cascading Risks: The U.S. Is Vulnerable To An Electromagnetic Pulse Attack," <https://www.forbes.com/sites/jamesbroughel/2022/04/21/cascading-risks-the-us-is-vulnerable-to-an-electromagnetic-pulse-attack/?sh=5734f22be17b> //barn-parks

Of further concern is that with EMP warfare, there is a strong incentive to attack first. Because the initial blow can be crippling, the first striker has a huge advantage. This makes EMP strategy more like cyber warfare than Cold War nuclear strategy. During the Cold War, the U.S. and U.S.S.R. relied on the principle of mutual assured destruction. Neither was reckless enough to launch a nuclear attack on the other because it would result in a devastating counterattack. This logic may not work with EMP attacks if the initial strike is sufficiently ruinous.

**RWG – AT: Ukraine**

**Ukraine guarantees HEMPs**

Paul **Bedard 22**, 2-24-2022, "Russia **threatens power grids if Biden moves in Ukraine**," Washington Examiner, <https://www.washingtonexaminer.com/opinion/washington-secrets/russia-threatens-power-grids-if-biden-moves-in-ukraine> //barn

In a new alert, Peter Vincent Pry, the executive director of the EMP Task Force on National and Homeland Security, said concerns are growing that Russia, North Korea, and Iran are inching closer to testing an **electromagnetic attack on the U.S. grid**, or parts of it. He noted the current crisis in **Ukraine could spark a Russian attack**, and he cited state media making the threat in the past. “In April 2021, during the previous big crisis between Russia versus the U.S. and NATO over Ukraine, Moscow’s state-run TV broadcast to the world that: ‘War is inevitable…**it will be a Cyber War,**’” Pry said in his note, shown below. He said Florida has been threatened “**to deter the U.S. from helping Ukraine.”**

**It’s the brink not defense**

**Petitat 22**, 3-8-2022, Manuel Hugo Petitat author "Electromagnetic pulse attack: Is Russia about to nuke space to launch massive EMP attacks to destroy the US and its Western allies?," <https://strangesounds.org/2022/03/electromagnetic-pulse-attack-is-russia-about-to-nuke-space-to-launch-massive-emp-attacks-to-destroy-the-us-and-its-western-allies.html> //barn-parks

What if his endgame of the Ukraine-Russia conflic is western collapse? What if Ukraine is just the bait so the West (NATO) is dragged into war and then Putin has the opportunity to use nukes, not like we’ve seen before, but as an EMP?

**RWG – Mindset Shift + no ext!**

**Nuclear war causes a mindset shift that causes the restructuring of society.**

**Madrigal 18** ( Alexis C; staff writer at The Atlantic and the author of Powering the Dream: The History and Promise of Green Technology; “The People Who Would Survive Nuclear War”; *The Atlantic*; Jan 25; <https://www.theatlantic.com/technology/archive/2018/01/that-time-the-government-commission-fiction-about-nuclear-war/551303/>; Accessed 10/10/19, EB)

In the last scenario, the authors propose that there would be some structure to the days and months after the war. There’d be the first few days when people were seeking shelter and trying to deal with what had happened, however, the report predicts, “boredom will gradually replace panic, but will be no easier to cope with.” Then there would be the “shelter period” followed by the “recuperation period.” “**Major changes should be anticipated in the societal structure** as survivors attempt to adapt to a severe and desponding environment never before experienced,” the report states. “The loss of 100 million people, mostly in the larger cities, could raise a question on the advisability of rebuilding the cities ... The surviving population could seek to alter the social and geopolitical structure of the rebuilding nation in hopes of **minimizing the effects of any future conflicts**.”

**Limited nuclear war is key.**

Magdi **Ragheb 18**. Prof. @ Department of Nuclear, Plasma, and Radiological Engineering, University of Illinois at Urbana-Champaign. 08-08-18. “Safeguards, Non-Proliferation, and Peaceful Nuclear Energy.” <http://mragheb.com/NPRE%20402%20ME%20405%20Nuclear%20Power%20Engineering/Safeguards%20Non%20Proliferation%20and%20Peaceful%20Nuclear%20Energy.pdf> //reem

The “axiom of proliferation” states that as long as some states cling to the possession of nuclear weapons, others will also seek to acquire them. According to “catastrophe theory,” **serious nuclear disarmament** is apparently **waiting** for some **event** that would **stir action** toward the **eventual goal of humanity to eliminate nuclear weapons**. An analogy is advanced of a village fully aware about the need to build gates along railroad tracks that pass through it, remaining **inactive** then **spring into action** until the time that one of its residents is **hit by a passing train**.

**1 in 100000 chance of extinction from nuke war---their own authors admit it isn’t existential**

**Ladish 20**, 11-6-2020, [Jeffrey Ladish](https://www.lesswrong.com/users/landfish) author who has extensively studied the effects of nuclear war on human populations "Nuclear war is unlikely to cause human extinction," https://www.lesswrong.com/posts/sT6NxFxso6Z9xjS7o/nuclear-war-is-unlikely-to-cause-human-extinction

A number of people have claimed that a full-scale nuclear war is likely to cause human extinction. I have investigated this issue in depth and concluded that even a full scale nuclear exchange is unlikely (<1%) to cause human extinction.

By a full-scale war, I mean a nuclear exchange between major world powers, such as the US, Russia, and China, using the complete arsenals of each country. The total number of warheads today (14,000) is significantly smaller than during the height of the cold war (70,000). While extinction from nuclear war is unlikely today, it may become more likely if significantly more warheads are deployed or if designs of weapons change significantly.

There are three potential mechanisms of human extinction from nuclear war:

1) Kinetic destruction

2) Radiation

3) Climate alteration

Only 3) is remotely plausible with existing weapons, but let's go through them all.

1) Kinetic destruction

There simply aren't enough nuclear warheads to kill everyone directly with kinetic force, and there likely never will be. There are ~14,000 nuclear weapons in the world, and let’s suppose they have an average yield of something like 1 megaton. This is a conservative guess, the actual average is probably closer to 100 kilotons. With a 1 megaton warhead, you can create a fireball covering 3 km², and a moderate pressure wave that knocks down most residential houses covering 155 km². The former kills nearly everyone and the latter kills a decent percentage of people but not everyone. Let's be conservative and assume the pressure wave kills everyone in its radius. 14,000 \* 155 = 2.17 million km². The New York Metro area is 8,683 km². So all the nuclear weapons in the world could destroy about 250 New York Metro areas. This is a lot! But not near enough, even if someone intentionally tried to hit all the populations at once. Total land surface of earth is: 510.1 million km². Urban area, by one estimate, is about 2%, or 10.2 million km.² Since the total possible area destroyed from nuclear weapons is ~2.17 million km² is considerably less than a lower bound on the area of human habitation, 10.2 million km², there should be basically no risk of human extinction from kinetic destruction.

If you want to check my work there, I was using [nuke map](https://nuclearsecrecy.com/nukemap/?&kt=1000&lat=40.7648&lng=-73.9808&hob_psi=5&hob_ft=10245&psi=20,5,1&zm=11).

The even more obvious reason why kinetic damage wouldn't lead to human extinction is that nuclear states only threaten one or several countries at a time, and never the population centers of the entire world. Even if NATO countries and Russia and China all went to war at the same time, Africa, South America, and other neutral regions would be spared any kinetic damage.

2) Radiation

Radiation won't kill everyone because there aren't enough weapons, and radiation from them would be concentrated in some areas and wholly absent from other areas. Even in the worst affected areas, lethal radiation from fallout would drop to survivable levels within weeks.

Here it's worth noting that there is an inherent tradeoff between length of halflife and energy released by radionuclides. The shorter the half life the more energy will be released, and the longer the half life the less energy. The fallout products from modern nuclear weapons are very lethal, but only for days to several weeks.

Let's try the same calculation we used with kinetic damage, and see if an attack aimed at optimizing fallout for killing everyone could succeed. Using [Nukemap](https://nuclearsecrecy.com/nukemap/?&kt=1000&lat=40.7648&lng=-73.9808&airburst=0&hob_ft=0&fallout=1&psi=20,5,1&zm=8) again, I'll go with the fallout contour for 100 rads per hour. 400 rads is thought too be enough to kill 50% of people, so 100 rads per hour is likely to kill most all people not in some kind of shelter. We need to switch to using a groundburst detonation rather than an airburst detonation, because groundbursts create far more fallout. A 1mt ground burst would create an area of about 8,000 km²  of >100 rads per hour. Okay, multiple that by 14,000 warheads, and we get 112 million km². That's a lot! It's still less than the  510.1 million km² of earth's land mass, but it's a lot more than the ~10.2 million km² of urban space. Presumably this is enough to cover every human habitation, so in principle, it might be possible to kill everyone with radiation from existing nuclear weapons.

In practice, it would be almost impossible to kill every human via radiation with the existing nuclear arsenals, even if they were targeted explicitly for this purpose. The first reason is that fallout patterns are very uneven. After a ground burst, fallout is carried by the wind. Some areas will be hit bad and some areas will be hardly affected by fallout. Even if most human population centers were covered, a few areas would almost certainly escape.

Two other things make extinction by radiation unlikely. Many countries, especially in the southern hemisphere, are unlikely to be affected by fallout much at all. Since most of these countries are likely to be neutral in a conflict, and not near combatant countries, they should be relatively safe from fallout. While fallout might travel hundreds of kms, it still won't reach places separated by greater distances. Fallout that reaches the upper atmosphere will eventually fall back down, but usually after the period of lethal radioactivity.  The other mitigating factor is that in typical nuclear war plans, ground bursts are usually restricted to hardened targets, and air bursts are favored for population and industry centers. This is because air bursts maximize the size of the destructive pressure wave. Air burst detonations result in little lethal fallout reaching the ground, so populations not downwind of military targets would likely be safe from the worst of the radiological effects in a war scenario.

The final protection from extinction by radiation is simply large amounts of mass between people and the radiation source, in other words, fallout shelters. After several weeks, the radionuclides in fallout from ground burst detonations will have decayed to the point where humans can survive outside of shelters. Many fallout shelters exist in the world, and many more could be made easily in a day or two with a shovel, some ground, and some boards.  Even if lethally radioactive fallout from ground bursts covered all population centers, many humans would still survive in shelters.

The risks of extinction from nuclear-weapon-induced-radiation wouldn't be complete without discussing two factors: nuclear power plants and radiological weapons. I'm only going to cover these briefly, but they both don't change the conclusions much.

Nuclear power plants could be targeted by nuclear weapons to create large amounts of fallout with a longer half-life but less energy per unit time. The main concern here is that nuclear power plants and spent fuel sites contain a much greater \*mass\* of radioactive material than nuclear missiles can carry. The danger comes primarily from spreading the already very radiative spent or unspent nuclear fuel. The risk this poses requires a longer analysis, but the short version is that while nuking a nuclear power plant or stored fuel site would indeed create some pretty long-lived fallout it would still be concentrated in a relatively small area. Fortunately, even a nuclear detonation wouldn't spread the nuclear fuel more than several hundred km at most. Having regions of countries covered in spent nuclear fuel would be awful, but it doesn't much raise the risk of extinction.

[Radiological weapons](https://en.wikipedia.org/wiki/Radiological_warfare) are nuclear weapons designed to maximize the spread of lethal fallout rather than destructive yield. The particular concern from the extinction perspective is that they can be designed to create fallout that continues to emit levels of radiation that can make an area uninhabitable for months to years. These kind of radiological weapons kill more slowly, but they still kill. In principle, radiological weapons could be used to kill everyone on earth. However, in practice, the same constraints that apply to standard nuclear weapons apply to weapons optimized for long-lasting fallout, as well as some additional constraints.

Radiological weapons wouldn't produce more fallout than standard warheads, they would just produce fallout with different characteristics. As a result the amount of radiological weapons required to cover every part of earth's surface would be massively expensive (likely as expensive as the largest existing nuclear arsenals), and serve no military purpose. Their inefficiency in destruction and death compared to standard nuclear weapons is probably why radiological weapons have never been developed or deployed in large numbers. This makes them an ongoing theoretical concern, but not an existential risk in the immediate future. A [concerning development](https://en.wikipedia.org/wiki/Status-6_Oceanic_Multipurpose_System) is Russia's claim to have developed a large-yield (100mt) submersible nuclear weapon with the suggestion that it could be used as a radiological weapon, but even if this is true, it's unlikely to be deployed in large numbers.

3) Climate alteration

The bulk of the risk of human extinction from nuclear weapons come from risks of catastrophic climate change, nuclear winter, due to secondary effects from nuclear detonations. However, even in most full-scale nuclear exchange scenarios, the resulting climate effects are unlikely to cause human extinction.

Reasons for this:

a) Under scenarios where a severe nuclear winter occurs as described by Robock et al, some human populations would likely survive.  
b) The Robock group’s models are probably overestimating the risk  
c) Nuclear war planners are aware of nuclear winter risks and can incorporate these risks into their targeting plans

Before diving into each subject, it’s worth understanding the background of nuclear winter research. In the 1980s a group of atmospheric scientists proposed the hypothesis that a nuclear war would result in massive firestorms in burning cities, which would loft particles high into the atmosphere and cause catastrophic cooling that would last for years. Many found it alarming that such an effect could be possible and go unnoticed for decades while the risk existed. Some scientists also thought the proposed effect was too strong, or unlikely to occur at all. Until a few years ago, if you looked only at peer reviewed literature you would only find papers forecasting severe nuclear winter effects in the event of a nuclear war. Understandably, many people assumed that this was the scientific consensus. Unfortunately, this misrepresented the scientific community’s state of uncertainty about the risks of nuclear war. There have only ever been a small numbers of papers published about this topic (<15 probably), mostly from one group of researchers, despite the topic being one of existential importance.  
  
I’m very glad Robock, Toon, and others have spent much of their careers studying nuclear winter effects, and their models are useful in estimating potential climate change caused by nuclear war. However, I’ve become less convinced over time the Robock model is largely correct. See section B below for why I’ve changed my mind. However, I’m quite uncertain the probability of strong cooling effects from nuclear war, and am still quite concerned about the potential for severe cooling, even if the risk of extinction from such events is small.

A:  Under scenarios where a severe nuclear winter occurs as described by Robock et al, some human populations would likely survive.

The latest and most detailed model of potential cooling effects from a fullscale nuclear exchange comes from, Robock et al.,  “Nuclear winter revisited with a modern climate model and current nuclear arsenals: Still catastrophic consequences” found [here](http://climate.envsci.rutgers.edu/pdf/RobockNW2006JD008235.pdf).  
  
The effects from this model are severe. In the 150Tg case, after a year, summer temperatures in the Northern hemisphere are 10-30 degrees C cooler. The effects are less severe at the equator (5 degrees C), but basically all places in the world are affected. The most likely outcome is that most people starve to death. Many would freeze too, but starvation is likely the greatest risk. Even in this model, it appears that in equatorial regions, some farming would still be possible, enough for some populations to survive. After a 10-15 years, agriculture in most of the world would be possible at reduced capacity.

Carl Shulman asked one of the authors of this paper, Luke Oman, his probability that the 150Tg nuclear winter scenario discussed in the paper would result in human extinction, [the answer he gave](https://www.overcomingbias.com/2012/11/nuclear-winter-and-human-extinction-qa-with-luke-oman.html) was “in the range of 1 in 10,000 to 1 in 100,000.” This strikes me as quite plausible, though one expert opinion is no substitute for a deep analysis. The [Q&A with Oman](https://www.overcomingbias.com/2012/11/nuclear-winter-and-human-extinction-qa-with-luke-oman.html) contains his reasoning for this assessment.

Two different analyses are required to calculate the chances of human extinction from nuclear winter. The first is the analysis of the climate change that could result from a nuclear war, and the second is the adaptive capacity of human groups to these climate changes. I have not seen an in depth analysis of the latter, but I believe such an assessment would be worthwhile.    
  
My own guess is that humans are capable of surviving far more severe climate shifts than those projected in nuclear winter scenarios. Humans are more robust than most any other mammal to drastic changes in temperature, as evidenced by our global range, even in pre-historic times. While a loss of most agriculture would likely kill most people on earth, modern technology would enable some populations to survive. Great stores of food currently exist in the world, and it is l likely that some of these would be seized and protected by small groups, providing enough food to last for years. While even such populations with food stores wouldn’t have enough to survive for 10-15 years, such food stores would give groups time to adapt to new food sources. The organization [ALLFED](https://allfed.info/) has explored a number of alternative food sources that could keep populations alive in the event of a nuclear war or other large solar disruption, and I expect great necessity to drive the discovery of even more in the event of such a disaster.

B: The Robock group’s models are probably overestimating the risk

The nuclear winter model at its simplest: Nuclear detonations → Fires in cities → Firestorms in cities → Lofted black carbon into the upper atmosphere → black carbon persists in upper atmosphere, reflecting sunlight and causes massive cooling

Each step is required in order for the effect to occur. If nuclear war causes massive fires in cities but does not lead to firestorms that loft particles, then no long term cooling is going to occur. Some of these steps are easier to model than others. Based on my reading of the literature, the greatest uncertainties involve the dynamics of cities burning after a nuclear attack, and whether the conditions would produce firestorms sufficient to loft large numbers of particles high enough in the atmosphere to persist for years.

We’re finally beginning to see some healthy debate about some of these questions in the scientific literature. Alan Robock’s group published a paper in 2007 that found significant cooling effects even from a relatively limited regional war. A group from Los Alamos, Reisner et al, [published a paper](https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2017JD027331) in 2018 that reexamined some of the assumptions that went into [Robock et al](https://www.atmos-chem-phys.net/7/2003/2007/acp-7-2003-2007.pdf)’s model, and concluded that global cooling was unlikely in such a scenario. Robock et al. [responded](https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2019JD030777), and Reisner et al responded to the [response](https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2019JD031281). Both authors bring up good points, but I find Reisner’s position more compelling. This back and forth is worth reading for those who want to investigate deeper. Unfortunately Reisner’s group has not published an analysis on potential cooling effects from a modern full scale nuclear exchange, rather than a limited regional exchange. Even so, it’s not hard to extrapolate that Reisner’s model would result in far less cooling than Robock’s model in the equivalent situation.

**RWG – Climate !**

**Climate change causes extinction and turns every impact---no defense other models lie and don’t begin to comprehend the threat**

**Wallace-Wells 17**, 7-9-2017, David Wallace-Wells is an American journalist known for his writings on climate change. He wrote the 2017 essay "The Uninhabitable Earth;""When Will the Planet Be Too Hot for Humans? Much, Much Sooner Than You Imagine.," https://nymag.com/intelligencer/2017/07/climate-change-earth-too-hot-for-humans.html

**I. ‘Doomsday’**

Peering beyond scientific reticence.

It is, I promise, worse than you think. If your anxiety about global warming is dominated by fears of sea-level rise, you are barely scratching the surface of what terrors are possible, even within the lifetime of a teenager today. And yet the swelling seas — and the cities they will drown — have so dominated the picture of global warming, and so overwhelmed our capacity for climate panic, that they have occluded our perception of other threats, many much closer at hand. Rising oceans are bad, in fact very bad; but fleeing the coastline will not be enough.

Indeed, absent a significant adjustment to how billions of humans conduct their lives, parts of the Earth will likely become close to uninhabitable, and other parts horrifically inhospitable, as soon as the end of this century.

Even when we train our eyes on climate change, we are unable to comprehend its scope. This past winter, a string of days 60 and 70 degrees warmer than normal baked the North Pole, melting the permafrost that encased Norway’s Svalbard seed vault — a global food bank nicknamed “Doomsday,” designed to ensure that our agriculture survives any catastrophe, and which appeared to have been flooded by climate change less than ten years after being built.

The Doomsday vault is fine, for now: The structure has been secured and the seeds are safe. But treating the episode as a parable of impending flooding missed the more important news. Until recently, permafrost was not a major concern of climate scientists, because, as the name suggests, it was soil that stayed permanently frozen. But Arctic permafrost contains 1.8 trillion tons of carbon, more than twice as much as is currently suspended in the Earth’s atmosphere. When it thaws and is released, that carbon may evaporate as methane, which is 34 times as powerful a greenhouse-gas warming blanket as carbon dioxide when judged on the timescale of a century; when judged on the timescale of two decades, it is 86 times as powerful. In other words, we have, trapped in Arctic permafrost, twice as much carbon as is currently wrecking the atmosphere of the planet, all of it scheduled to be released at a date that keeps getting moved up, partially in the form of a gas that multiplies its warming power 86 times over.

Maybe you know that already — there are alarming stories in the news every day, like those, last month, that seemed to suggest satellite data [showed](https://www.carbonbrief.org/major-correction-to-satellite-data-shows-140-faster-warming-since-1998)the globe warming since 1998 more than twice as fast as scientists had thought (in fact, the underlying story was considerably less alarming than the headlines). Or the news from Antarctica this past May, when a [crack](http://www.newsweek.com/antarctica-ice-shelf-larsen-c-crack-grown-618676)in an ice shelf grew 11 miles in six days, then kept going; the break now has just three miles to go — by the time you read this, [it may already have met the open water](http://nymag.com/daily/intelligencer/2017/07/trillion-ton-iceberg-breaks-off-antarctic-ice-shelf.html), where it will drop into the sea one of the biggest icebergs ever, a process known poetically as “calving.”

But no matter how well-informed you are, you are surely not alarmed enough. Over the past decades, our culture has gone apocalyptic with zombie movies and [Mad Max dystopias](http://www.vulture.com/2016/07/the-present-worse-than-fictional-dystopias.html), perhaps the collective result of displaced climate anxiety, and yet when it comes to contemplating real-world warming dangers, we suffer from an incredible failure of imagination. The reasons for that are many: the timid language of scientific probabilities, which the climatologist James Hansen once called **“scientific reticence”** in a paper chastising scientists for editing their own observations so conscientiously that they failed to communicate how dire the threat really was; the fact that the country is dominated by a group of **technocrats** who believe any problem can be solved and an opposing culture that doesn’t even see warming as a problem worth addressing; the way that climate denialism has made scientists even more cautious in offering speculative warnings; the simple speed of change and, also, its slowness, such that we are only seeing effects now of warming from decades past; our **uncertainty about uncertainty**, which the climate writer Naomi Oreskes in particular has suggested stops us from preparing as though anything worse than a median outcome were even possible; the way we assume climate change will hit **hardest elsewhere, not everywhere**; the smallness (two degrees) and largeness (1.8 trillion tons) and abstractness (400 parts per million) of the numbers; the discomfort of considering a problem that is very difficult, if not impossible, to solve; the altogether incomprehensible scale of that problem, which amounts to the prospect of **our own annihilation;** simple fear. But aversion arising from fear is a form of denial, too.

In between scientific reticence and science fiction is science itself. This article is the result of dozens of interviews and exchanges with climatologists and researchers in related fields and reflects **hundreds of scientific papers** on the subject of climate change. What follows is not a series of predictions of what will happen — that will be determined in large part by the much-less-certain science of human response. Instead, it is a portrait of our best understanding of where the planet is heading absent aggressive action. It is unlikely that all of these warming scenarios will be fully realized, largely because the devastation along the way will shake our complacency. But those scenarios, and not the present climate, are the baseline. In fact, they are **our schedule.**

The present tense of climate change — the destruction we’ve already baked into our future — is horrifying enough. Most people talk as if Miami and Bangladesh still have a chance of surviving; most of the scientists I spoke with assume we’ll lose them within the century, even if we stop burning fossil fuel in the next decade. Two degrees of warming used to be considered the threshold of catastrophe: tens of millions of climate refugees unleashed upon an unprepared world. Now two degrees is our goal, per the Paris climate accords, and experts give us only slim odds of hitting it. The U.N. Intergovernmental Panel on Climate Change issues serial reports, often called the “gold standard” of climate research; the most recent one projects us to hit four degrees of warming by the beginning of the next century, should we stay the present course. But that’s just a median projection. The upper end of the probability curve runs as high as **eight degrees** — and the authors still haven’t figured out how to deal with that permafrost melt. The IPCC reports also **don’t fully account for** the albedo effect (less ice means less reflected and more absorbed sunlight, hence more warming); more cloud cover (which traps heat); or the dieback of forests and other flora (which extract carbon from the atmosphere). Each of these promises to **accelerate warming**, and the history of the planet shows that temperature can shift as much as five degrees Celsius within thirteen years. The last time the planet was even four degrees warmer, Peter Brannen points out in [The Ends of the World](https://www.amazon.com/Ends-World-Apocalypses-Understand-Extinctions/dp/0062364804?ots=1&slotNum=0&imprToken=cac0faa7-65fb-2f9d-d60&ascsubtag=%5b%5din%5bp%5dcj4u5jzvo0000osy64knayino%5bi%5dZZzYuL%5bu%5d1%5bt%5dw%5bd%5dD%5bz%5dm), his new history of the planet’s major extinction events, the oceans were hundreds of feet higher.\*

The Earth has experienced five mass extinctions before the one we are living through now, each so complete a slate-wiping of the evolutionary record it functioned as a resetting of the planetary clock, and many climate scientists will tell you they are the best analog for the ecological future we are diving headlong into. Unless you are a teenager, you probably read in your high-school textbooks that these extinctions were the result of asteroids. In fact, all but the one that killed the dinosaurs were caused by climate change produced by greenhouse gas. The most notorious was 252 million years ago; it began when carbon warmed the planet by five degrees, accelerated when that warming triggered the release of methane in the Arctic, and ended with 97 percent of all life on Earth dead. We are currently adding carbon to the atmosphere at a **considerably faster rate**; by most estimates, **at least ten times** faster. The rate is accelerating. This is what Stephen Hawking had in mind when [he said](http://www.telegraph.co.uk/science/2017/05/02/tomorrows-world-returns-bbc-startling-warning-stephen-hawking/), this spring, that the species needs to colonize other planets in the next century to survive, and what drove Elon Musk, last month, to [unveil](http://www.newsweek.com/elon-musk-mars-spacex-martian-city-625994)his plans to build a Mars habitat in 40 to 100 years. These are nonspecialists, of course, and probably as inclined to irrational panic as you or I. But the many sober-minded scientists I interviewed over the past several months — the most credentialed and tenured in the field, few of them inclined to alarmism and many advisers to the IPCC who nevertheless criticize its conservatism — have quietly reached an apocalyptic conclusion, too: **No plausible program of emissions reductions** alone can prevent climate disaster.

Over the past few decades, the term [“Anthropocene” has climbed out of academic discourse and into the popular imagination](http://nymag.com/scienceofus/2015/06/anthropocene-debate.html) — a name given to the geologic era we live in now, and a way to signal that it is a new era, defined on the wall chart of deep history by human intervention. One problem with the term is that it implies a conquest of nature (and even echoes the biblical “dominion”). And however sanguine you might be about the proposition that we have already ravaged the **natural world**, which we surely have, it is another thing entirely to consider the possibility that we have only provoked it, engineering first in ignorance and then in denial a climate system that will now **go to war with us** for many centuries, perhaps until **it destroys us**. That is what Wallace Smith Broecker, the avuncular oceanographer who coined the term “global warming,” means when he calls the planet an “angry beast.” You could also go with “war machine.” Each day we arm it more.

**II. Heat Death**

The bahraining of New York.

Humans, like all mammals, are heat engines; surviving means having to continually cool off, like panting dogs. For that, the temperature needs to be low enough for the air to act as a kind of refrigerant, drawing heat off the skin so the engine can keep pumping. At seven degrees of warming, that would become impossible for large portions of the planet’s equatorial band, and especially the tropics, where humidity adds to the problem; in the jungles of Costa Rica, for instance, where humidity routinely tops 90 percent, simply moving around outside when it’s over **105 degrees Fahrenheit** would be lethal. And the effect would be fast: Within a few hours, a human body would be cooked to death from both inside and out.

Climate-change skeptics point out that the planet has warmed and cooled many times before, but the climate window that has allowed for human life is very narrow, even by the standards of planetary history. At **11 or 12** degrees of warming, more than half the world’s population, as distributed today, would **die of direct heat.** Things almost certainly won’t get that hot this century, though models of unabated emissions do bring us that far eventually. This century, and especially in the tropics, the pain points will pinch much more quickly even than an increase of seven degrees. The key factor is something called wet-bulb temperature, which is a term of measurement as home-laboratory-kit as it sounds: the heat registered on a thermometer wrapped in a damp sock as it’s swung around in the air (since the moisture evaporates from a sock more quickly in dry air, this single number reflects both heat and humidity). At present, most regions reach a wet-bulb maximum of 26 or 27 degrees Celsius; the true red line for habitability is 35 degrees. What is called heat stress comes much sooner.

Actually, we’re about there already. Since 1980, the planet has experienced a 50-fold increase in the number of places experiencing dangerous or extreme heat; a bigger increase is to come. The five warmest summers in Europe since 1500 have all occurred since 2002, and soon, the IPCC warns, simply being outdoors that time of year will be unhealthy for much of the globe. Even if we meet the Paris goals of two degrees warming, cities like Karachi and Kolkata will become close to uninhabitable, annually encountering deadly heat waves like those that crippled them in 2015. At four degrees, the deadly European heat wave of 2003, which killed as many as 2,000 people a day, will be a normal summer. At six, according to an assessment focused only on effects within the U.S. from the National Oceanic and Atmospheric Administration, summer labor of any kind would become impossible in the lower Mississippi Valley, and everybody in the country east of the Rockies would be under more heat stress than anyone, anywhere, in the world today. As Joseph Romm has put it in his authoritative primer [Climate Change: What Everyone Needs to Know](https://www.amazon.com/Climate-Change-Everyone-Needs-Know%C2%AE/dp/0190250178?ots=1&slotNum=1&imprToken=cac0faa7-65fb-2f9d-d60&ascsubtag=%5b%5din%5bp%5dcj4u5jzvo0000osy64knayino%5bi%5dhFf9XP%5bu%5d1%5bt%5dw%5bd%5dD%5bz%5dm), heat stress in New York City would exceed that of present-day Bahrain, one of the planet’s hottest spots, and the temperature in Bahrain “would induce hyperthermia in even sleeping humans.” The high-end IPCC estimate, remember, is two degrees warmer still. By the end of the century, the World Bank has estimated, the coolest months in tropical South America, Africa, and the Pacific are likely to be warmer than the warmest months at the end of the 20th century. Air-conditioning can help but will ultimately only add to the carbon problem; plus, the climate-controlled malls of the Arab emirates aside, it is not remotely plausible to wholesale air-condition all the hottest parts of the world, many of them also the poorest. And indeed, the crisis will be most dramatic across the Middle East and Persian Gulf, where in 2015 the heat index registered temperatures as high as 163 degrees Fahrenheit. As soon as several decades from now, the hajj will become physically impossible for the 2 million Muslims who make the pilgrimage each year.

It is not just the hajj, and it is not just Mecca; heat is **already killing us.** In the sugarcane region of El Salvador, as much as one-fifth of the population has chronic **kidney disease**, including over a quarter of the men, the presumed result of dehydration from working the fields they were able to comfortably harvest as recently as two decades ago. With dialysis, which is expensive, those with kidney failure can expect to live five years; without it, life expectancy is in the **weeks**. Of course, heat stress promises to pummel us in places other than our kidneys, too. As I type that sentence, in the California desert in mid-June, it is 121 degrees outside my door. It is not a record high.

**III. The End of Food**

Praying for cornfields in the tundra.

Climates differ and plants vary, but the basic rule for staple cereal crops grown at optimal temperature is that for every degree of warming, yields decline by 10 percent. Some estimates run as high as 15 or even 17 percent. Which means that if the planet is five degrees warmer at the end of the century, we may have as many as 50 percent more people to feed and 50 percent less grain to give them. And proteins are worse: It takes 16 calories of grain to produce just a single calorie of hamburger meat, butchered from a cow that spent its life polluting the climate with methane farts.

Pollyannaish plant physiologists will point out that the cereal-crop math applies only to those regions already at peak growing temperature, and they are right — theoretically, a warmer climate will make it easier to grow corn in Greenland. But as the pathbreaking work by Rosamond Naylor and David Battisti has shown, the tropics are already too hot to efficiently grow grain, and those places where grain is produced today are already at optimal growing temperature — which means **even a small warming** will **push them down the slope** of declining productivity. And you can’t easily move croplands north a few hundred miles, because yields in places like remote Canada and Russia are **limited by the quality of soil** there; it takes **many centuries** for the planet **to produce optimally fertile dirt**.

Drought might be an even bigger problem than heat, with some of the world’s most arable land turning quickly to desert. Precipitation is notoriously hard to model, yet predictions for later this century are basically unanimous: **unprecedented droughts** nearly everywhere food is today produced. By 2080, without dramatic reductions in emissions, southern Europe will be in permanent extreme drought, much worse than the American dust bowl ever was. The same will be true in Iraq and Syria and much of the rest of the **Middle East;** some of the most densely populated parts of Australia, Africa, and South America; and the **breadbasket regions** of China. None of these places, which today supply much of the world’s food, will be reliable sources of any. As for the original dust bowl: The droughts in the American plains and Southwest would not just be worse than in the 1930s, a 2015 NASA study [predicted](https://www.nasa.gov/press/2015/february/nasa-study-finds-carbon-emissions-could-dramatically-increase-risk-of-us), but worse than any droughts in a thousand years — and that includes those that struck between 1100 and 1300, which “dried up all the rivers East of the Sierra Nevada mountains” and may have been responsible for the death of the Anasazi civilization.

Remember, we do not live in a world without hunger as it is. Far from it: Most estimates put the number of undernourished at 800 million globally. In case you haven’t heard, this spring has already brought an unprecedented quadruple famine to Africa and the Middle East; the U.N. has warned that separate starvation events in Somalia, South Sudan, Nigeria, and Yemen could kill **20 million this year alone**.

**IV. Climate Plagues**

What happens when the **bubonic ice melts**?

Rock, in the right spot, is a record of planetary history, eras as long as millions of years flattened by the forces of geological time into strata with amplitudes of just inches, or just an inch, or even less. Ice works that way, too, as a climate ledger, but it is also frozen history, some of which can be reanimated when unfrozen. There are now, trapped in Arctic ice, **diseases** that have **not circulated** in the air for **millions of years** — in some cases, since before humans were around to encounter them. Which means our immune systems **would have no idea** how to fight back when those **prehistoric plagues** emerge from the ice.

The Arctic also stores terrifying bugs from more recent times. In Alaska, already, researchers have discovered remnants of the 1918 flu that infected as many as 500 million and killed as many as **100 million** — about 5 percent of the world’s population and almost six times as many as had died in the world war for which the pandemic served as a kind of gruesome capstone. As the BBC [reported](http://www.bbc.com/earth/story/20170504-there-are-diseases-hidden-in-ice-and-they-are-waking-up)in May, scientists suspect smallpox and the bubonic plague are trapped in Siberian ice, too — an abridged history of devastating human sickness, left out like egg salad in the Arctic sun.

Experts caution that many of these organisms won’t actually survive the thaw and point to the fastidious lab conditions under which they have already reanimated several of them — the 32,000-year-old “extremophile” bacteria revived in 2005, an 8 million-year-old bug brought back to life in 2007, the 3.5 million–year–old one a Russian scientist [self-injected](https://www.youtube.com/watch?v=lv0_Cu0FcPA) just out of curiosity — to suggest that those are necessary conditions for the return of such ancient plagues. But already last year, a boy was killed and 20 others infected by anthrax released when retreating permafrost exposed the frozen carcass of a reindeer killed by the bacteria at least 75 years earlier; 2,000 present-day reindeer were infected, too, carrying and spreading the disease **beyond the tundra.**

What concerns epidemiologists more than ancient diseases are existing scourges relocated, rewired, or even re**-evolved by warming**. The first effect is geographical. Before the early-modern period, when adventuring sailboats accelerated the mixing of peoples and their bugs, human provinciality was a guard against pandemic. Today, even with globalization and the enormous intermingling of human populations, our ecosystems are mostly stable, and this functions as another limit, but global warming will scramble those ecosystems and help disease trespass those limits as surely as Cortés did. You don’t worry much about dengue or malaria if you are living in Maine or France. But as the tropics creep northward and mosquitoes migrate with them, you will. You didn’t much worry about Zika a couple of years ago, either.

As it happens, [Zika may also be a good model](http://nymag.com/scienceofus/2016/02/zika-virus-gmo-mosquitoes.html) of the second worrying effect — disease mutation. One reason you hadn’t heard about Zika until recently is that it had been trapped in Uganda; another is that it did not, until recently, appear to cause birth defects. Scientists still don’t entirely understand what happened, or what they missed. But there are things we do know for sure about how climate affects some diseases: Malaria, for instance, thrives in hotter regions not just because the mosquitoes that carry it do, too, but because for every degree increase in temperature, the parasite **reproduces ten times faster.** Which is one reason that the World Bank estimates that by 2050, **5.2 billion people** will be reckoning with it.

**V. Unbreathable Air**

A rolling death smog that suffocates millions.

Our lungs need oxygen, but that is only a fraction of what we breathe. The fraction of carbon dioxide is growing: It just crossed 400 parts per million, and high-end estimates extrapolating from current trends suggest it will hit 1,000 ppm by 2100. At that concentration, compared to the air we breathe now, human cognitive ability declines by 21 percent.

Other stuff in the hotter air is even scarier, with small increases in pollution capable of shortening life spans by ten years. The warmer the planet gets, the more ozone forms, and by mid-century, Americans will likely suffer a 70 percent increase in unhealthy ozone smog, the National Center for Atmospheric Research has projected. By 2090, as many as 2 billion people globally will be breathing air above the WHO “safe” level; one paper last month showed that, among other effects, a pregnant mother’s **exposure to ozone raises the child’s risk of autism** (as much as tenfold, combined with other environmental factors). Which does make you think again about the autism epidemic in West Hollywood.

Already, more than 10,000 people die each day from the small particles emitted from fossil-fuel burning; each year, 339,000 people die from wildfire smoke, in part because climate change has extended forest-fire season (in the U.S., it’s increased by 78 days since 1970). By 2050, according to the [U.S. Forest Service](https://www.usda.gov/oce/climate_change/effects_2012/FS_Climate1114%20opt.pdf), wildfires will be twice as destructive as they are today; in some places, the area burned could grow fivefold. What worries people even more is the effect that would have on emissions, especially when the fires ravage forests arising out of peat. Peatland fires in Indonesia in 1997, for instance, added to the global CO2 release by up to 40 percent, and more burning only means **more warming only means more burning**. There is also the terrifying possibility that rain forests like the Amazon, which in 2010 suffered its second “hundred-year drought” in the space of five years, could dry out enough to become vulnerable to these kinds of devastating, rolling forest fires — which would not only expel enormous amounts of carbon into the atmosphere but also shrink the size of the forest. That is especially bad because the Amazon alone provides 20 percent of our oxygen.

Then there are the more familiar forms of pollution. In 2013, melting Arctic ice remodeled Asian weather patterns, depriving industrial China of the natural ventilation systems it had come to depend on, which blanketed much of the country’s north in an unbreathable smog. Literally unbreathable. A metric called the Air Quality Index categorizes the risks and tops out at the 301-to-500 range, warning of “serious aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly” and, for all others, “serious risk of respiratory effects”; at that level, “everyone should avoid all outdoor exertion.” The Chinese “airpocalypse” of 2013 peaked at what would have been an Air Quality Index of over 800. That year, smog was responsible for a third of all deaths in the country.

**VI. Perpetual War**

The violence baked into heat.

Climatologists are very careful when talking about Syria. They want you to know that while climate change did produce a drought that contributed to civil war, it is not exactly fair to say that the conflict is the result of warming; next door, for instance, Lebanon suffered the same crop failures. But researchers like Marshall Burke and Solomon Hsiang have managed to quantify some of the non-obvious relationships between temperature and violence: For **every half-degree of warming**, they say, societies will see between a **10 and 20 percent increase** in the likelihood of armed conflict. In climate science, nothing is simple, but the arithmetic is harrowing: A planet five degrees warmer would have at least half again as many wars as we do today. Overall, social conflict could more than **double this century.**

This is one reason that, as nearly every climate scientist I spoke to pointed out, the U.S. military is obsessed with climate change: The drowning of all American Navy bases by sea-level rise is trouble enough, but being the world’s policeman is quite a bit harder when the crime rate doubles. Of course, it’s not just Syria where climate has contributed to conflict. Some speculate that the elevated level of strife across the Middle East over the past generation reflects the pressures of global warming — a hypothesis all the more cruel considering that warming began accelerating when the industrialized world extracted and then burned the region’s oil.

What accounts for the relationship between climate and conflict? Some of it comes down to agriculture and economics; a lot has to do with forced migration, already at a record high, with at least 65 million displaced people wandering the planet right now. But there is also the simple fact of individual irritability. Heat increases municipal crime rates, and swearing on social media, and the likelihood that a major-league pitcher, coming to the mound after his teammate has been hit by a pitch, will hit an opposing batter in retaliation. And the arrival of air-conditioning in the developed world, in the middle of the past century, did little to solve the problem of the summer crime wave.

**VII. Permanent Economic Collapse**

Dismal capitalism in a half-poorer world.

The murmuring mantra of global neoliberalism, which prevailed between the end of the Cold War and the onset of the Great Recession, is that economic growth would save us from anything and everything.  
But in the aftermath of the 2008 crash, a growing number of historians studying what they call “fossil capitalism” have begun to suggest that the entire history of swift economic growth, which began somewhat suddenly in the 18th century, is not the result of innovation or trade or the dynamics of global capitalism but simply our discovery of fossil fuels and all their raw power — a onetime injection of new “value” into a system that had previously been characterized by global subsistence living. Before fossil fuels, nobody lived better than their parents or grandparents or ancestors from 500 years before, except in the immediate aftermath of a great plague like the Black Death, which allowed the lucky survivors to gobble up the resources liberated by mass graves. After we’ve burned all the fossil fuels, these scholars suggest, perhaps we will return to a “steady state” global economy. Of course, that onetime injection has a devastating long-term cost: climate change.

The most exciting research on the economics of warming has also come from Hsiang and his colleagues, who are not historians of fossil capitalism but who offer some very bleak analysis of their own: Every degree Celsius of warming costs, on average, 1.2 percent of GDP (an enormous number, considering we count growth in the low single digits as “strong”). This is the sterling work in the field, and their median projection is for a 23 percent loss in per capita earning globally by the end of this century (resulting from changes in agriculture, crime, storms, energy, mortality, and labor).  
Tracing the shape of the probability curve is even scarier: There is a 12 percent chance that climate change will reduce **global output by more than 50 percent** by 2100, they say, and a 51 percent chance that it lowers per capita **GDP by 20 percent** or more by then, unless emissions decline. By comparison, the Great Recession lowered global GDP by about 6 percent, in a onetime shock; Hsiang and his colleagues estimate a one-in-eight chance of an ongoing and irreversible effect by the end of the century that is eight times worse.

The scale of that economic devastation is hard to comprehend, but you can start by imagining what the world would look like today with an economy half as big, which would produce only half as much value, generating only half as much to offer the workers of the world. It makes the grounding of flights out of heat-stricken Phoenix last month seem like pathetically small economic potatoes. And, among other things, it makes the idea of postponing government action on reducing emissions and relying solely on **growth and technology to solve the problem** an **absurd business calculation**.  
Every round-trip ticket on flights from New York to London, keep in mind, costs the Arctic three more square meters of ice.

**VIII. Poisoned Oceans**

Sulfide burps off the skeleton coast.

That the sea will become a killer is a given. Barring a radical reduction of emissions, we will see at least four feet of sea-level rise and possibly ten by the end of the century. A third of the world’s major cities are on the coast, not to mention its power plants, ports, navy bases, farmlands, fisheries, river deltas, marshlands, and rice-paddy empires, and even those above ten feet will flood much more easily, and much more regularly, if the water gets that high. At least 600 million people live within ten meters of sea level today.

But the drowning of those homelands is just the start. At present, more than a third of the world’s carbon is sucked up by the oceans — thank God, or else we’d have that much more warming already. But the result is what’s called “**ocean acidification,”** which, on its own, may add a half a degree to warming this century. It is also already burning through the planet’s water basins — you may remember these as the place where life arose in the first place. You have probably heard of “coral bleaching” — that is, coral dying — which is very bad news, because reefs support as much as a quarter of all marine life and supply food for half a billion people. Ocean acidification will fry fish populations directly, too, though scientists aren’t yet sure how to predict the effects on the stuff we haul out of the ocean to eat; they do know that in acid waters, oysters and mussels will struggle to grow their shells, and that when the pH of human blood drops as much as the oceans’ pH has over the past generation, it induces seizures, comas, and sudden death.

That isn’t all that ocean acidification can do. Carbon absorption can initiate a **feedback loop** in which underoxygenated waters breed different kinds of microbes that turn the water still more “anoxic,” first in deep ocean “dead zones,” then gradually up toward the surface. There, the small fish die out, unable to breathe, which means oxygen-eating bacteria thrive, and **the feedback loop doubles back**. This process, in which dead zones grow like cancers, choking off marine life and wiping out fisheries, is already quite advanced in parts of the Gulf of Mexico and just off Namibia, where hydrogen sulfide is bubbling out of the sea along a thousand-mile stretch of land known as the “Skeleton Coast.” The name originally referred to the detritus of the whaling industry, but today it’s more apt than ever. Hydrogen sulfide is so toxic that evolution has trained us to recognize the tiniest, safest traces of it, which is why our noses are so exquisitely skilled at registering flatulence. Hydrogen sulfide is also the thing that finally did us in that time 97 percent of all life on Earth died, once all the feedback loops had been triggered and the circulating jet streams of a warmed ocean ground to a halt — it’s the planet’s preferred gas for a **natural \*catastrophe\* ~~holocaust.~~** Gradually, the ocean’s dead zones spread, killing off marine species that had dominated the oceans for hundreds of millions of years, and the gas the inert waters gave off into the atmosphere poisoned everything on land. Plants, too. It was millions of years before the oceans recovered.

**IX. The Great Filter**

Our present eeriness cannot last.

So why can’t we see it? In his recent book-length essay [The Great Derangement](https://www.amazon.com/Great-Derangement-Climate-Unthinkable-Lectures/dp/022632303X?ots=1&slotNum=2&imprToken=cac0faa7-65fb-2f9d-d60&ascsubtag=%5b%5din%5bp%5dcj4u5jzvo0000osy64knayino%5bi%5dc50FCK%5bu%5d1%5bt%5dw%5bd%5dD%5bz%5dm), the Indian novelist Amitav Ghosh wonders why global warming and natural disaster haven’t become major subjects of contemporary fiction — why we don’t seem able to imagine climate catastrophe, and why we haven’t yet had a spate of novels in the genre he basically imagines into half-existence and names “the environmental uncanny.” “Consider, for example, the stories that congeal around questions like, ‘Where were you when the Berlin Wall fell?’ or ‘Where were you on 9/11?’ ” he writes. “Will it ever be possible to ask, in the same vein, ‘Where were you at 400 ppm?’ or ‘Where were you when the Larsen B ice shelf broke up?’ ” His answer: Probably not, because the dilemmas and dramas of climate change are simply incompatible with the kinds of stories we tell ourselves about ourselves, especially in novels, which tend to emphasize the journey of an individual conscience rather than the **poisonous miasma of social fate**.

Surely this blindness will not last — the world we are about to inhabit will not permit it. In a six-degree-warmer world, the Earth’s ecosystem will boil with so many natural disasters that we will just start calling them “weather”: a constant swarm of out-of-control typhoons and tornadoes and floods and droughts, the planet assaulted regularly with climate events that not so long ago destroyed whole civilizations. The strongest hurricanes will come more often, and we’ll have to invent new categories with which to describe them; tornadoes will grow longer and wider and strike much more frequently, and hail rocks will quadruple in size. Humans used to watch the weather to prophesy the future; going forward, we will see in its wrath the vengeance of the past. Early naturalists talked often about “deep time” — the perception they had, contemplating the grandeur of this valley or that rock basin, of the profound slowness of nature. What lies in store for us is more like what the Victorian anthropologists identified as “dreamtime,” or “everywhen”: the semi-mythical experience, described by Aboriginal Australians, of encountering, in the present moment, an out-of-time past, when ancestors, heroes, and demigods crowded an epic stage. You can find it already watching footage of an iceberg collapsing into the sea — a feeling of history happening all at once.

**RWG – AT: Space Col**

**At best, colonization takes centuries – at worst, it causes conflict.**

**Deudney ’20** [Daniel; Associate Professor of Political Science at Johns Hopkins University, PhD in political science from Princeton University, MPA in science, technology, and public policy from George Washington University; March 2020; “Chapter 10: Solar Space, Island Earth, and the Ends of Humanity”; *Dark Skies: Space Expansionism, Planetary Geopolitics, and the Ends of Humanity*; Kindle; TV] \*Edited in brackets for ableist language.

A crucial additional parameter of this scenario is **temporal**: How much time will be required to realize these steps? **Optimistic expansion** timetables presuppose large and **sustained investments** in space, which are **unlikely**. 5 But it seems **plausible** that these steps might be accomplished over **several centuries**. However, this schedule assumes that the Earth will be **willing** and **able** to provide significant initial support for colonization. The question of how rapidly self-sufficient colonies could be established has **direct implications** for their ability to serve as hedges to terrestrial catastrophic and **existential threats**.

Based on the earlier analysis of technological feasibility, the solar expansion success scenario is probably **possible**, with **critical uncertainties** about health and artificial biospheres. But this scenario is also **very improbable** for many strong reasons. Inaction, failure, or **debilitating conflict** are more likely than success. Colonization may not be attempted because it is too **difficult** and **expensive**, or because of growing Earth problems and troubles. Off-Earth living could be **too unhealthy** for humans, and **reproduction** and **child growth** in low-gravity environments may be infeasible, confining viable habitat to spinable artificial bodies. **Potent pathogens** might evolve in novel space environments. **Artificial ecosystems** could be too difficult to create and sustain. People **may not want to** live on Mars or an asteroid, for the same reasons they do not live in the middle of the Sahara or Antarctica. Or colonization might be attempted and quickly **fail**, like Norse Vineland in Newfoundland or Scot Darien in Panama. Or a colony might be only minimally successful and linger as a **remote**, climate-stunted **backwater**, like early modern Iceland. Space colonies might be like the many **failed societies** analyzed by the geographer Jared Diamond in Collapse. 6 The small population of a space settlement might succumb to disease or debilitating internecine conflict. Conflicts over the **limited number of** metal-bearing **asteroids** might start early. 7 The sponsoring Earth agent might abandon its colony due to shifting priorities, insufficient resources, or diverting conflicts. If interstate rivalry propels colonization it will happen more rapidly but will also be more likely to involve violence sooner. If **rivalrous states** establish colonies, **conflict** between them might beggar and hobble [hinder] all. There may be a vast gap between a colony that can be kept operational with continual inputs from Earth and one that is capable of persisting **without** any **Earth support**. If, as Sagan proposed, large-scale settlement is delayed until after major terrestrial problems have been solved, the prospects for success rise, while the rationales weaken and the time frames lengthen. And as colonization becomes imminent, doubts of the sort voiced here may lead to **organized opposition**.

The success scenario, and much of space expansionist thinking, operates with the implicit **assumption** that space settlement will be propelled by numerous **capable agents** committed to advancing the **long-term success** of humanity. This is a **dubious** assumption, given that the Earth’s growing problems have **yet to stimulate** the emergence of numerous powerful agents committed to advancing **even** the species’ **short-term success**. And if powerful actors were motivated by long-term species interest, colonization would be much less necessary.

The success scenario also assumes that different space ventures build on each other when they The success scenario also operates with what can be called the Benign Parent Model of Terra-Colony Relations. In this approach, Earth **lavishes resources** on its space colonial offspring and **benignly supervises** their development until they are able to direct and support themselves. Constitutions for space polities embodying the best of Terran political wisdom are established. This model, however, is almost **entirely at variance** with the **historical experience** of terrestrial colonization and the incentives of relevant self-interested actors. To the extent states or corporations invest in space colonies, they will want to **maintain control** and reap the benefits of their investments. To the extent they anticipate **colonial independence**, they **will not invest**; if they do, they will try to keep colonies **small** and **dependent**.

The success scenario also assumes that different space ventures build on each other when they might **subvert** and **impede** one another. The two central projects, Mars colonization and asteroidal resource extraction, might be quite antagonistic. Wealth generated from space resources will most probably be repatriated to Earth, not plowed into space habitat construction. Asteroidal exploitation is likely to be capital- and robot-intensive, with a minimal human labor force rotating through small off-world bases, as on off-shore oil rigs. If resources from asteroids are the bonanza some anticipate, the beneficiaries of this wealth **will not want colonies** to **contest their access** and possession and can be expected to **actively oppose colonization**. The more space mining benefits terrestrial actors, the greater their incentive to **impede space settlements**. And once the **bombardment potential** of asteroidal orbital alteration technology becomes obvious, the **dangers of** independent **space colonies** might be sufficiently obvious to **thwart** their **realization**.

A long list of powerful barriers stand between colonization visions and accomplishment. Given the **many obstacles** that render successful space colonization at scale very improbable, it is **extremely imprudent** for humanity to view space colonization as a hedge against catastrophe or **extinction**. With **low probabilities of success** and **significant** moral hazards and **opportunity costs**, space colonization should not be considered a viable response to severe Earth problems and troubles.

**Space colonization causes existential wars---**secessionist movements, reactionist colonies, and inter-colonial conflict outweigh every terrestrial war in history.

**Kovic ’21** [Marko; February 2021; independent researcher and PhD at Institute of Mass Communication and Media Research, University of Zurich; Futures, “Risks of space colonization,” vol. 126; kp]

Imagine, for example, the large, **self-sustaining habitat** on **Venus** that consists of 2 billion people that I mentioned in a thought experiment before. That hypothetical habitat is truly **self-sustainable**, in the sense that survival on Venus is not contingent in any way on resources or other kinds of support from Earth. If **prior human history** is an **indication**, it is conceivable that the **Venusians** could at some point seek to **change** their **political status**. They might want to **no longer** be **governed by Earth** or Earth-based governements and instead have sovereignty to **autonomously** and freely shape Venus’ future. They might, in other words, seek to **seceede** and become an independent political entity.

Given prior human history of **secession** and independence movements, such a claim to **independence** in the context of **space colonization** could **easily result** in **violent conflict**, and given the scale of the conflict parties in this scenario, the **bloodshed** could be **much greater** than **all the wars** that happened in **Earth’s history** so far. Of course, we do not know what the dominant political philosophy of the future will be. Perhaps popular sovereignty and the wish for autonomy will be fully respected and met with unconditional, enlightened understanding. But that prospect is, at best, uncertain, and the prospect of catastrophic violent conflicts seems at least possible.

5.2 **Reactionary colonies**

Let us assume for the sake of argument that the risks surrounding secession- ist claims of extraterrestrial colonies will eventually have been overcome and that there are colonies which have attained a **country-like** or world-like status. What should the **political systems** in and the **moral foundations** of those independent colonies look like? **Ideally**, they would be at least as democratic, liberal, and generally morally progressive as the most democratic, liberal, and morally progressive countries today. More specifically, independent fu- ture colonies should have socio-political systems that do not **lower** average **wellbeing** or **create** (disproportionately) **more suffering** compared to their pre-existing peers such as Earth-based countries (Or whatever the dominant polity on Earth in that future might be.). **However**, there is **no guarantee** that independent colonies will meet that **socio-political** and **moral bar**. It is possible that there will be colonies whose socio-political systems are **regressive** in one way or another, marked by a **relative moral decay** compared to the baseline of political systems and moral frameworks. I call such potential undesirable entities **reactionary colonies**.

The emergence of reactionary colonies **might seem implausible** given that humankind has, very roughly speaking, so far morally improved over the course of its history8. But reactionary colonies might actually be a **fairly common** future development. If humankind at some point achieves the tech- nological means for creating colonies with relative ease, creating new colonies might be an **attractive option** for **extremist groups** and **beliefs**. Imagine, for example, a **religious group** that believes in the fundamental **superiority** of men over women. Such a religious group might find it difficult adhering to their flawed moral principles in a pluralistic society. Opting for **colonial exodus** might represent an attractive opportunity for that religious group to build a society from scratch which is based on their notions of female **inferiority** and **subjugation**.

The specific risk posed by reactionary colonies ist twofold. Reactionary colonies would by definition **lower** the **average happiness** and **wellbeing** of humankind and create unnecessary, preventable **suffering**. Reactionary colonies would also represent potential rogue actors that could greatly amplify the aberration risks described in section 4. For example, a **dictatorial regime** that causes great suffering to its population might be tempted to expand its dictatorial **ideology** to other colonies. Or that dictatorial colony could be led by a **psychopathic elite** that enjoys letting **sentient simulations suffer** as much as possible. The potential catastrophic and even **existential** **multiplicator effects** of reactionary colonies are, unfortunately, **numerous**.

5.3 **Inter-colonial conflict**

Let us, again for the sake of the argument, assume that the previous problem of reactionary colonies has somehow been solved or avoided. Humankind has continued its path of technological development, and it has established several large clusters of colonies beyond the Solar system. Assuming that the fundamental problem of faster-than-light communication has not been solved yet, **communication** between the clusters **lags months** or even **years**, and physical contact between the clusters is rare since travel takes even longer than communication.

The **inevitable consequence** of such a **splintering** of human civilization is that the different clusters of colonies would over time develop **distinct cultures**, and with only scarce and delayed contact with other clusters, a form of **intergroup bias** [40], the **moral preference** of one’s own **in-group** over the **out-group**, would likely start to **manifest**. Over time, that **us-versus- them** heuristic could help create **distinct** and **solidified** **social identities** within the colony clusters [41], and the beliefs and preferences about the outgroup colonies could become more **overtly negative**. Given enough time and great enough idiosyncratic development within each colony cluster, the cultural and moral connections between the colony clusters could **further erode**, and in their place, a sense of **dread** and **looming danger** about the others’ goals and preferences could take hold. Over a long enough period of time and great enough separation, the perception that other colonies are a threat could grow; so much so that taking **preventative action** and attacking and suppressing them might seem like the most **rational** course of action [42]. Given the **scale** and the likely **technological sophistication** of **future weapons systems**, a violent conflict between advanced colonies and colony clusters would create **suffering** on an **astronomical scale**.

Of course, the prospect of inter-colonial conflict is somewhat speculative [43]. But given humankind’s **past experiences**, violent conflict clearly seems within the realm of the possible. That does not mean that such an almost immeasurably terrible conflict is unavoidable. Even the **slightest probability** of such conflict, however, means **immense** potential expected **disvalue**.

**Chance of asteroids very small.**

Robert **Walker 16**. Software Developer of Tune Smithy, Wolfson College, Oxford. 12-14-2016. "Why Resilient Humans Would Survive Giant Asteroid Impact." Science 2.0. https://www.science20.com/robert\_inventor/we\_wont\_go\_extinct\_after\_a\_major\_asteroid\_impact\_even\_96\_of\_species\_extinct\_0\_chance\_of\_humans\_extinct-187383

Although there is a risk of “mass extinction” if a large asteroid hit Earth, “mass extinction” there **doesn’t mean “extinction of humans”,** we are such a resilient species that we would certainly survive a giant asteroid impact. We are **not “due” an extinction at all**. Next **giant** impact is most likely to happen many **millions of years into the future**. As we'll see, there is **almost zero chance** of a giant impact in the **next century.** There is however much we can do to protect ourselves from smaller asteroids. As a result of extensive asteroid surveys over the last couple of decades: We can be pretty sure (as in perhaps **99.999999%** sure) that there **isn’t an extinction level asteroid headed our way in the next century**. We **know the orbits** of **all** the Near Earth Asteroids that could do this and **none will hit Earth** over that timescale. That leaves comets, and the chance of that is something like **1 in 100 million per century**, as a very rough guess (since 99% of the impacts are thought to be from asteroids). This risk has been pretty much retired due to the automated asteroid searches by the likes of Pan STARRS.

**Reproduction on a colony is impossible**

**Lerner 18** (Steven Lerner. Staff writer @ Tech Times. 5-31-2018. "Having Sex On Mars Could Be Challenging And It Might Lead To A New Species." Tech Times. https://www.techtimes.com/articles/229073/20180531/having-sex-on-mars-could-be-challenging-and-it-might-lead-to-a-new-species.htm)

"Unfortunately, such an endeavour comes with **titanic challenges** in various disciplines, from space **travel tech**nology to **medical**, **biological**, **social** and **ethical challenges**," the researchers wrote. "We assume that **human reproduction** in a Mars settlement will be necessary for the long-term success of an outer-space mission." The researchers hypothesized that if humans were to successfully conceive and give birth in space, it could potentially be a **new species** because of all of the unique circumstances outside of Earth. Challenges Of Reproducing On Mars Although the researchers are optimistic about reproducing on Mars, there could be numerous challenges that might **make sex nearly impossible.** The biggest challenge is with the **gravity**. Mars has roughly one-third the gravity of Earth, which could endanger the likelihood of **getting pregnant**. It is well-documented that prolonged time in space could alter a **human's biological makeup** and it could change the **shape of a person's brain**. This is how a new species might get created. Lower gravity could lower a person's **blood pressure**, which is **needed** for engaging in sexual intercourse. Scientists also know that low gravity can cause **vision problems** and lead to a **weakened immune system**, which would be dangerous for pregnant women. In addition to the lack of gravity, there are also **other complications**. There is more **solar radiation** on Mars, which would reduce a man's sperm count. More importantly, there is no documented evidence that a woman could have a full term pregnancy without any problems. The researchers wrote that these challenges could increase "the risks of infection-induced abortions and facilitate the dissemination of diseases among pregnant and non-pregnant individuals."

**Neither governments nor the private sector will commit.**

Konrad **Szocik 19**. University of Information Technology and Management in Rzeszow, Department of Philosophy and Cognitive Science. 01/2019. “Should and Could Humans Go to Mars? Yes, but Not Now and Not in the near Future.” Futures, vol. 105, pp. 54–66.

6. Public opinion **Public opinion** is, at least in the **near future**, the **main sponsor** of space research and space exploration. Bertrand, Pirtle, and Tomblin, (2017) show that the public is interested in human mission to Mars. The most **preferred** space mission is a **crew in orbit** and a robot mission on Mars surface. In other words, **public criteria** is **low risk and low cost**. The German space agency follows public opinion and social interest because is focused on duty for society and oriented to social purposes as “climate change, mobility, communication and security” (Zypries, 2017). Politicians are prone to reduce space budgets or to **not invest in long-term human settlement missions** due to **public opinion**. Consequently, progress in space technology is still retarded. State of art in space transport means did not change qualitatively since the Space Race between the US and the Soviet Union. Impact of public opinion may differ in various countries. Max Grimard (2012), p. 6) shows how important is space program for public opinion in the US. Public sympathy for American presence in space is counterbalanced by the unpredictability of politician authorities, the tensions between presidents and the Congress (Grimard, 2012, p. 12), and the important role played by competition with Russia and China (Grimard, 2012, p. 6). Grimard adds that **Russia** is similar case but it is currently entire focused on stability of space programs, including **renovation** of old infrastructure than on new space exploration programs. According to Grimard (2012), p. 13), this fact **excludes** Russia from being the leader of international collaboration in space policy despite its historical advantages. **China**, according to Grimard, **repeats** space policies of the **US** and **Soviet Union**. By contrast, in **Japan and Europe**, prestige does not play role. Japan and Europe are focused on scientific and technological contexts. Space program is not a part of national policy. Due to its **costs**, politicians may decide to **not risk negative approach of public opinion**. But public opinion does not threaten private investors which can consider space as object of their investment. 7. Commercial exploration of space is not a workable alternative Risk of funding the wall might be **avoided** by **commercial exploration** of space (Crawford, 2016). According to Crawford, some space projects such as next generation of large telescopes or crewed mission to Mars are non-profitable. While they are a governmental duty, they could be funded partially by profits from commercial exploration of space (for instance, space mining). Hope for private exploration sounds reasonable but is **counterbalanced** by **commercial focus on profits**. Because mission to Mars has only scientific profits, **only public sponsors** will be invested in this project. James S. J. Schwartz (2014) adds that two of the possible reasons for human space mission, such as improving human welfare and progress in scientific exploration, are well beyond interests of private companies. Newman and Williamson (2018) quite similarly expect that private space exploration will be focused on financial profits more than on environmental sustainability. Private investors are not obliged to act altruistically and to sacrifice their business for uncertain idea. W. Henry Lambright (2017) adds that private companies at least at **first stages** of Mars space program will not be able to fund it. For this reason, Mars space program requires **multi-generational effort** and **political stabilization**. The challenge of **safety** works against private investors in space program. Public space agencies have achieved high standards of safety. They behave in careful and conservative ways. Commercial, private projects do not have the same **advanced tech**nology, the large number of **scientists** and **support staff**, and the **generous budgets**. **Catastrophe** would likely **break** a private space program. The lack of experience of private companies in space exploration is partially responsible for higher risk of **tech**nological **failures** even in relatively easy tasks as crash of Momo-2 rocket launched by Japanese start-up on 30 June 2018 several seconds after launch. This does not mean that private investors are not able to explore space, but they are able to do that **only** when they **receive profits**. In scenario of commercial exploration of space, we should wait for some point in the future when a human space base appears as byproduct of **commercial activity**. A human base on Mars might be a by-product of hotels on LEO or space mining. Some investors who want to build space hotels may try to settle space regions beyond LEO and build hotels on the Moon and/or Mars. From touristic point of view, staying in the Moon or Mars hotel may be more attractive than on LEO. Investors working in asteroid mining may extend their business to the Moon and/or Mars. Both enterprises even if focused on purely commercial purposes, will not be easy (perhaps impossible) to achieve by private companies alone. Elvis (2012), p. 549) argues that asteroid mining will be challenging due to, among others, difficulties in detection of appropriate asteroids. He shows that among about 1200 analyzed meteorites only 13 of them contain high level of platinum profitable for their exploitation. Elvis suggests that NASA should reorient its strategy from focus on exploration to support for commercial utilization of space. Exploration will appear as a consequence of commercial profitable activity (Elvis, 2012, p. 549). Estimated profits of asteroid mining10 are counterbalanced by high costs of exploitation and possible decreasing of price of currently rare resources (Genta, 2014).11

**It’s an S-risk.**

Phil **Torres 18**. Project for Future Human Flourishing. 06/2018. “Space Colonization and Suffering Risks: Reassessing the ‘Maxipok Rule.’” Futures, vol. 100, pp. 74–85.

Finally, we should note that the present paper compliments the conclusions of several other scholars who have approached the topic from different angles. Most notably, Brian Tomasik worries that terraforming Earth-like planets or spreading life via “directed panspermia” (as Claudius Gros, who founded the Genesis Project, advocates) could **significantly increase the total amount of suffering in the universe**—an **especially bad outcome** if one espouses a “suffering-focused” ethics (Tomasik 2016, 2017a, 2017b). There could also be **massive simulations running on exoplanets** that have been converted into computronium in which **billions of sentient simulants suffer immense agony**. Given the **huge number of future beings** who could exist if we do colonize space, it stands to reason that **someone somewhere** would run such simulations (perhaps from within a simulation), create **new biospheres** in which wild **animals are subject to Darwinian misery**, and so on. As Tomasik (2017a) speculates, “if I had to make an estimate now, I would give ~70% probability that if humans choose to colonize space, **this will cause more suffering than it reduces on intrinsic grounds**.” The result could be an **s-risk**. Thus, the present paper offers a complimentary reason for rejecting the normative ideology of space expansionism.

**Also multiplies S-risks – outweighs extinction.**

**Kovic ’21** [Marko; February 2021; independent researcher and PhD at Institute of Mass Communication and Media Research, University of Zurich; Futures, “Risks of space colonization,” vol. 126; kp]

4.3 **Astronomical suffering**

**Space colonization** means that humans and human actions will spread beyond Earth and possibly cover, relatively speaking, vast areas of the **reachable universe**. This will potentially create immense positive value, but it also makes possible a form of **existential risks** that are **astronomical in scope** and **hellish in severity** — that are, in other words, **orders of magnitude** **worse** than anything humankind has caused or encountered so far. This subset of extreme existential risks is referred to as **suffering risks** [35].

**Suffering risks** are risks that are **far worse** than humankind **going extinct** or entering permanent moral stagnation because they mean that the suffering that is created through these risks is **far greater** than **all suffering** that has existed on Earth so far. There are different vectors of potential astronomical suffering. For example, it is conceivable that future human generations will **spread wildlife** throughout the colonized space, either **inadvertently** or **actively**. **Wild animals** on Earth generally lead short, miserable lives full of sometimes the most brutal suffering [36]. In in the history of Earth, wildlife suffering has not really improved at all, so **astronomical wildlife suffering** would likely represent a **constant source** of **disvalue**.

Another vector for suffering risks are **sentient simulations**. Given growing computational power, it is conceivable that we will eventually be able to **simulate sentience**, and as soon as simulated sentience is possible, simulated suffering will be as well. This technological path is not necessarily depen- dent on space colonization, but a **colonizing humankind** might have **greater capabilities** for running such **simulations**, for example by tapping into the power of stars in different Solar systems. Instances of simulated suffering could **create more suffering** than has ever occurred in the **biological universe**, within **fractions of a second**.

The risk of astronomical suffering is more uncertain than other existential risks, but it is at the same time **more severe**. At stake is not just humankind’s total potential positive future moral value, but **disvalue** that is **decoupled** from humankind and is potentially **many orders of magnitude greater** than all the **happiness** and **wellbeing** that could be created by human **colonization of space**.

**Space col exports astronomical wild animal suffering throughout the Universe---outweighs extinction**

**Bruers 18 –** Stijn Bruers, Professor in the Department of Philosophy and Moral Sciences at Ghent University, PhD in Physics and PhD in Moral Philosophy, “My Cause Prioritization”, 2-15, https://stijnbruers.wordpress.com/2018/02/15/my-cause-prioritization/

Welfare biology Because at least some people choose a conditional maximum as their reference preference, we have to give some weight to the person affecting view in population ethics. In that case, we have a priority to avoid the existence of individuals with lives not worth living. Here we face the problem of wild animal suffering. It is possible that some animals in nature have lives **not worth living**, because their lives are **full of negative experiences** due to hunger, diseases, injuries, parasites and predators. Especially the animals with an **r-selection** reproductive strategy have a problem: these animals have a lot of offspring (the population has a high rate of reproduction, hence the name ‘r-selection’), and **only a few of them survive** long enough to reproduce themselves. Most lives of those animals are **very short** and probably **miserable**. We are not likely to see the majority of those animals, because they will die and be eaten quickly. A better reproductive strategy in terms of well-being, is K-selection: having few offspring with long lives and high survival rates. If a life is long, it is more likely to be positive because it has proportionally fewer negative experiences of hunger or deadly diseases. Only humans are very close to a perfect K-selection: the average fertility rate of a woman is 2,5 children, and this rate is decreasing and expected to reach 2 children in the second halve of this century. When it reaches 2 children per woman, and when all children survive till they reproduce, the human population becomes stable. Every human can have a full live. (As lifespan increases, the fertility rate can drop below 2 children per woman.) According to the person affecting view, we have to give priority to avoiding r-selection and promoting K-selection. Perhaps with genetic manipulation (e.g. gene drives), we can turn every population into K-selection (where female animals have on average two offspring) and make sure that all animals have long healthy lives. But for the moment, only humans are about to reach the ideal K-selection reproduction. Healthy humans have other advantages: they have complex preferences and strong personal identities over time, which means they can have potentially high levels of lifetime well-being when their preferences are satisfied. So it is possible that humans can have larger relative preferences than non-human animals. Most humans can also clearly communicate their preferences: it is easier to determine the levels of well-being of humans who can self-consciously think and speak than the levels of well-being of non-human animals who can only communicate their preferences in very indirect ways through behavior. Estimating the well-being or relative preferences of wild animals is very difficult and may require accurate brain scans. We can be very confident that the lives of healthy humans are worth living, but not confident at all that the life of an average wild animal is worth living. The above implies that we can give a priority to saving and helping humans. This preference for healthy humans (increasing the relative number of healthy humans) is not speciesism, because the basic criteria to derive this preference (e.g. the level of personal identity over time, the level of communication and the level of K-selection) did not refer to species membership. The above discussion did not use the word ‘species’ at all. Given our current state of knowledge, a preference for healthy humans is most likely to satisfy the maximum relative preferences principle. Pros and cons of human population growth As explained above, helping humans means increasing K-selection in the world. The more individuals who belong to a K-selection population, the better. However, there are also problems with human population growth. More humans means more competition for scarce resources, more people who can invent dangerous technologies, more greenhouse gas emissions, higher likelihood of spreading of dangerous viruses. These things increase existential risks. But it can also mean more mutually beneficial situations through trade and cooperation, more inventions of good technologies, higher likelihood of resistance against dangerous viruses. However, there is one very big disadvantage of giving priority to humans: most humans consume animal products. Buying animal products gives an incentive to breed animals who have lives not worth living in e.g. factory farms. Fighting poverty and promoting economic development might increase animal suffering: a $1,000 increase in per capita GDP in the poorest countries implies an increased consumption of 1.7 kg of meat per person per year. Saving the life of a human omnivore means a consumption of about 30 kg of meat. It is difficult to estimate the total costs and benefits of further human population growth. Give the consumption of animal products, I tend towards the conclusion that decreasing human population growth is valuable, but only if it is done in a way that has other cobenefits. Avoiding unwanted pregnancies through family planning is the only strategy that has a lot of cobenefits in terms of women’s rights, health of newborn children, environmental impact reduction and poverty reduction. The benefit-cost ratio of family planning is high. This means that family planning may also be consistent with the total view in population ethics, even if fewer happy people might come into existence. Finally by reducing the fertility rate, family planning is a means to reach perfect K-selection. Therefore, I give a low priority to family planning by supporting organizations such as Marie Stopes International. Cause area: veganism and antidiscrimination As helping humans involves a risk of increasing animal suffering, I give a high priority to promoting veganism, animal rights and antispeciesism. According to some thought experiments, we can conclude that most animals in agriculture and aquaculture have lives not worth living, so creating those lives violates both the person affecting view and the total view in population ethics. Promoting veganism is a more neglected area than improving human health and well-being. Furthermore, veganism also has many cobenefits in terms of improved human health: less chronic diseases due to healthier diets, less health impact from climate change due to lower greenhouse gas emissions, less malnutrition due to lower food prices for the poorest people, and less health risks from pollution, zoonotic viruses and antibiotic resistant bacteria. Veganism also facilitates spreading the value of antidiscrimination. Speciesism is an example of discrimination. If people consume animal products, a cognitive dissonance prevents them from valuing animals as equal to humans. When they eat vegan, this cognitive dissonance diminishes and they are more open to the value of antispeciesism. The interspecies model of prejudice predicts that a decrease in speciesism results in a decrease in racism, i.e. a decrease of prejudice against other groups of people. Antispeciesism is also necessary to start scientific research about wild animal suffering and to find safe and effective means to intervene in nature to improve wild animal well-being. And finally, antispeciesism becomes important when it comes to the development of artificial general intelligence and superintelligence. If we create superintelligent AI machines and implement them with our own speciesist goals, even more animals can be exploited by AI machines for many years in the future. The cause area of veganism is also relatively neglected and tractable, which means effective altruists have a lot of high impact opportunities in this area. Effective vegan advocacy, perhaps with deep canvassing, is promising. But clean meat, and more generally tissue engineering, appear to be very promising as well. With these technologies, we can create animal products without using animals. It might also be a crucial technology for wild animal suffering reduction, as it can provide a food alternative for predators. The tissue engineering technology can also be used to extend life and replace a lot of animal experimentation. Therefore, I support the Good Food Institute and to a lesser degree the Methuselah Foundation. Catastrophic risks There are several possible extinction risks (X-risks) where everyone dies: asteroid impacts, supervolcano eruptions, pandemic viruses, runaway global warming, global nuclear war, dangerous nanotechnology. According to the **total view** of population ethics, extinction of sentient and intelligent life is a tragedy, because it means a lot of future preference satisfaction (well-being, happiness) is lost. Hence, extinction prevention (X-risk reduction) gets a top priority. From a **person affecting** view, extinction is **less bad**, because with extinction, non-existent future beings cannot complain and wild animals with lives not worth living will no longer be born, so future complaints will be avoided. Extinction is **only bad** for those of the current generations who value a continued existence in the far future, and especially for the last generation, because most extinction scenarios involve suffering when everyone dies. But there is a **class of catastrophic risks that is even worse than X-risks: S-risks or suffering risks**, where the future contains huge populations of sentient beings with lives full of misery. **This is worse than extinction**, because an S-risk is **terrible** **both** from a total view as well as from a person affecting view. An example of an S-risk is space colonization where we **export** wild animal suffering and livestock farming: the number of animals with lives not worth living will **multiply** when other planets are colonized. Before we start with space colonization, we should first adopt veganism and antispeciesist values such that we will not export and multiply animal suffering.

**Every second of no space colonization outweighs.**

**Torres ’18** [Phil; April 20; Affiliate Scholar at the Institute for Ethics and Emerging Technologies, and founder of the X-Risks Institute; Futures, “Space Colonization and Suffering Risks: Reassessing the ‘Maxipok Rule’,” vol. 100 p. 74-85; kp]

Abstract: This article argues that, contra **Bostrom** (2003), **every second** of **delayed space colonization** could be **immensely desirable**; indeed, the longer the delay, the better, with the **best outcome being no colonization at all**. The argument begins by hypothesizing that expansion into space will generate a wide variety of distinct species, many having their own cultural, political, religious, etc. traditions. Next, the paper offers reasons for expecting **catastrophic conflicts** between different civilizations, both near and far, to be the **default outcome**. Third, it examines some strategies for mitigating conflict, including (i) the establishment of a “cosmic Leviathan” that is capable of imposing law and order within the cosmopolitical arena, and (ii) the implemen- tation of policies of deterrence to prevent one civilization from attacking another. Both of these strategies appear problematic, though, due to (a) fundamental physical limitations on the speed of space travel and the transfer of information, and (b) the advanced weaponry that future civili- zations will almost certainly have at their disposal. The conclusion is that colonizing our solar system, galaxy, and beyond will engender a **Hobbesian predicament** in which all actors are perpetually in **fear** of **being destroyed**—that is, when they aren’t engaged in devastating wars with their neighbors.

**Accidents create a 99.3% chance of conflict.**

**Torres ’18** [Phil; April 20; Affiliate Scholar at the Institute for Ethics and Emerging Technologies, and founder of the X-Risks Institute; Futures, “Space Colonization and Suffering Risks: Reassessing the ‘Maxipok Rule’,” vol. 100 p. 74-85; kp]

Here we should also not overlook the potential for **accidents** to cause **conflicts** when inter-civilizational tensions are sufficiently high. The disturbing historical fact is that **“pure dumb luck”** played a critical role in preventing nuclear war from occurring during the **Cold War**. Indi- viduals like Vasili Arkhipov and Stanislav Petrov more or less single-handedly averted nuclear holocausts, and an interpretation error in 1995 led Boris Yeltsin to become “the first Russian president to ever have the ‘nuclear suitcase’ open in front of him” (Cirincione 2013). Although intelligence is negatively correlated with accident proneness, and presumably our (post)human descendants will be cognitively enhanced to some extent, even a **small probability of error** could make **disaster** almost **certain** (see Author). For example, imagine that a mere 500 people have access to a “**button**” that, if pushed, would initiate a catastrophic first strike against the other civilization. If each of these individuals has a mere **0.01 chance per decade** of accidentally pushing this button, the result is a staggering **99.3 percent probability** that, within **10 years**, the **strike will occur**. So, perhaps Earth and Mars—whose civilizations could potentially coexist for another 10 million centuries, until the sun burns out—**won’t be quite as lucky** as the US and Soviet Union were for the slightly more than four decades between 1947 and 1991.

**RWG – War inevitable**

**War is inevitable—-BUT, the longer we wait, the worse it gets.**

**Baum and Barrett ’18** (Seth D. Baum and Anthony M. Barrett, A Model For The Impacts Of Nuclear War. Global Catastrophic Risk Institute Working Paper 18-2) stowPCB

On the other end of the spectrum, the norm could be weaker. The Hiroshima and Nagasaki bombings provided a vivid and enduring image of the horrors of nuclear war—hence the norm can reasonably be described as a legacy of the bombings. Without this image, there would be less to motivate the norm. A weaker norm could in turn have led to a nuclear war occurring later, especially during a near-miss event like the Cuban missile crisis. **A later nuclear war would likely be much more severe, assuming some significant buildup of nuclear arsenals and especially if “overkill” targeting was used**. A new nuclear war could bring a similarly wide range of shifts in nuclear weapons norms. It **could strengthen the norm**, **hastening nuclear disarmament.** Already, there is a political initiative drawing attention to the humanitarian consequences of nuclear weapons use in order to promote a new treaty to ban nuclear weapons as a step towards complete nuclear disarmament (Borrie 2014). It is easy to imagine this initiative using any new nuclear attacks to advance their goals. Alternatively, it could weaken the norm, potentially leading to more and/or larger nuclear wars. This is a common concern, as seen for example in debates over low-yield bunker buster nuclear weapons (Nelson 2003). Given that the impacts of a large nuclear war could be extremely severe, a shift in nuclear weapons norms could easily be the single most consequential effect of a smaller nuclear war. Norms about nuclear power can also be highly consequential. Fear of ionizing radiation from nuclear power inflates public concern about nuclear power relative to the actual medical risk (e.g., Slovic 2012). Some of this fear appears to derive from perceptions of nuclear weapons, especially Hiroshima and Nagasaki (e.g., Cwikel 1997). A new nuclear attack could strengthen general fears of nuclear radiation, further reducing support for nuclear power. Reduced support for nuclear power can in turn have major consequences to energy systems and the environment. Energy analysts are divided on the details, with some warning that increased use of fossil fuels.

**RWG – AI Module Updates**

**We’re developing AI now and have passed the point of no return—extinction**

Sean **Martin**, 11-3-20**17**, "Humanity’s days are NUMBERED and AI will cause mass extinction, warns Stephen Hawking," Express.co.uk, https://www.express.co.uk/news/science/875084/Stephen-Hawking-AI-destroy-humanity-end-of-the-world-artificial-intelligence

Professor Hawking has once again reiterated his claims ~~man~~humankind will inevitably fail, and says that our time on Earth is now numbered after we passed the point of “no return”. The theoretical physicist says that **developments in AI have been so great that the machines will one day be more dominant than human beings**. He told Wired Magazine: "I fear that AI may replace humans altogether. If people design computer viruses, someone will design AI that improves and replicates itself. “This will be a new form of life that outperforms humans.”

**It's likely- arms racing makes mis development far more likely**

Brian **Tomasik 13** {Tech advisor for the Foundational Research Institute. 12-5-2013. “International Cooperation vs. AI Arms Race.” https://foundational-research.org/international-cooperation-vs-ai-arms-race/#AI\_arms\_races}//JM

AI arms races **Government AI development could go wrong in several ways**. Plausibly governments would botch the process by not realizing the risks at hand. It's also possible that governments would use the AI and robots for totalitarian purposes. It seems that both of these bad scenarios would be **exacerbated by international conflict.** Greater hostility means countries are more inclined to use AI as a weapon. Indeed, whoever builds the first AI can take over the world, which makes building AI the ultimate arms race. **A USA-China race** is one reasonable possibility. **Arms races encourage risk-taking --** being willing to skimp on safety measures to improve your odds of winning ("Racing to the Precipice"). In addition, the weaponization of AI could lead to worse expected outcomes in general. CEV seems to have less hope of success in a Cold War scenario. ("What? You want to include the evil Chinese in your CEV??") With a pure CEV, presumably it would eventually count Chinese values even if it started with just Americans, because people would become more enlightened during the process. However, when we imagine more crude democratic decision outcomes, this becomes less likely. In Superintelligence: Paths, Dangers, Strategies (Ch. 14), Nick Bostrom proposes that another reason AI arms races would crimp AI safety is that **competing teams wouldn't be able to share insights about AI control**. What Bostrom doesn't mention is that competing teams also wouldn't share insights about AI capability. So even if less inter-team information sharing reduces safety, it also reduces speed, and the net effect isn't clear to me. Of course, there are situations where arms-race dynamics can be desirable. In the original prisoner's dilemma, the police benefit if the prisoners defect. Defection on a tragedy of the commons by companies is the heart of perfect competition's efficiency. It also underlies competition among countries to improve quality of life for citizens. Arms races generally speed up innovation, which can be good if the innovation being produced is both salutary and not risky. This is not the case for general AI. Nor is it the case for other "races to the bottom".

**Risks of Astronomical suffering outweigh all other impacts, you should overcorrect against the optimism bias and the Disjunction fallacy**

**Althaus 16** (Reducing Risks of Astronomical Suffering: A Neglected Priority by [David Althaus](https://foundational-research.org/author/david-althaus/) and [Lukas Gloor](https://foundational-research.org/author/lukas-gloor/) II.I Psychological factors First published: Sep. 2016. Last edited: August 2019. <https://foundational-research.org/reducing-risks-of-astronomical-suffering-a-neglected-priority/>)

It is human nature to (subconsciously) flinch away from contemplating horrific realities and possibilities; the world almost certainly contains more misery than most [want to admit](http://slatestarcodex.com/2015/12/24/how-bad-are-things/) or [can](http://reducing-suffering.org/on-the-seriousness-of-suffering/) [imagine](http://www.simonknutsson.com/the-seriousness-of-suffering-supplement). **Our tendency to underestimate the expected amount of future** (as compared to present-day) **suffering might be even more pronounced**. While it would be unfair to apply this characterization to all people who display great optimism towards the future, these considerations certainly play a large role in the epistemic processes of *some* future “optimists.” **One** contributing **factor is optimism bias** (e.g. Sharot, Riccardi, Raio, & Phelps, 2007), which refers to the tendency to overestimate the likelihood of positive future events while underestimating the probability and severity of negative events – even in the absence of evidence to support such expectations. Another, related factor is [*wishful thinking*](https://foundational-research.org/against-wishful-thinking/), where people are prone to judging scenarios which are in line with their desires as being more probable than what is epistemically justified, while assigning lower credence to scenarios they dislike. Striving to avert future dystopias inevitably requires one to contemplate vast amounts of suffering on a regular basis, which is often demotivating and may result in [depression](https://www.facebook.com/Xuenay/posts/10155487265968662?comment_id=10155487433518662&comment_tracking=%7B%22tn%22%3A%22R1%22%7D). By contrast, while the prospect of an apocalypse may also be depressing, working towards a utopian future is more inspiring, and could therefore (subconsciously) bias people towards paying less attention to s-risks. Similarly, working towards the reduction of extinction risks or the creation of a posthuman utopia is also favored by many people’s instinctual, self-oriented desires, notably one’s own survival and that of family members or other loved ones. As it is easier to motivate oneself (and others) towards a project that appeals to altruistic as well as more self-oriented desires, efforts to reduce risks of astronomical suffering – risks that lie in the distant future and often involve the suffering of unusual or small minds less likely to evoke empathy – will be comparatively neglected. This does not mean that the above motivations are misguided or unimportant; rather, it means that if one also, upon reflection, cares a great deal about reducing suffering, then it might take deliberate effort to give this concern due justice. Lastly, psychological inhibitions against contemplating s-risks and unawareness of such considerations are interrelated and tend to reinforce each other. II.II Unawareness of possible sources of astronomical suffering In discussions about the risks from smarter-than-human artificial intelligence, it is often assumed that the sole reason to consider AI safety an important focus area is because it decides between utopia or human extinction. The possibility that misaligned or suboptimally aligned AI might instantiate suffering in astronomical quantities is, however, rarely brought up. Misaligned AI as a powerful but morally indifferent optimization process might transform galactic resources into highly optimized structures, some of which might very well include suffering. The structures **a superintelligent AI** or an AI-based economy decoupled from human interests **would build** in the pursuit of its goals may for instance include **a fleet of “worker bots,”** factories, supercomputers to [simulate ancestral Earths for scientific purposes](https://foundational-research.org/risks-of-astronomical-future-suffering/#Sentient_simulations), and space colonization machinery, to name a few. In the absence of explicit concern for suffering reflected in the goals of such an optimization process, **AI systems would be willing to instantiate suffering minds** (or “[subroutines](https://foundational-research.org/risks-of-astronomical-future-suffering/#Suffering_subroutines)”) **for even the slightest benefit to their objectives.** (Note that, as was the case with natural selection’s use of wild animals, some of these optimization processes might also lead to the instantiation of happy minds.) This is especially worrying because the stakes involved could literally turn out to be astronomical: Space colonization is an attractive subgoal for almost any powerful optimization process, as it leads to control over the largest amount of resources. Even if only a small portion of these resources are used for purposes that involve suffering, **the resulting disvalue would tragically be enormous.**[8](https://foundational-research.org/reducing-risks-of-astronomical-suffering-a-neglected-priority/#link_ajs-fn-id_8-3131) Finally, next to bad states of affairs being brought about for instrumental reasons, because of indifference to suffering, there is also the risk that bad states of affairs could be brought about for strategic reasons: In competition or conflict between different factions,if one side is compassionate and the other not, **threatening to bring about bad states of affairs could be used as an extortion tactic.** For an overview on ways the future could contain vast amounts of suffering – including as a result of suboptimally aligned AI or human-controlled futures where dangerous ideologies win – see [Superintelligence as a Cause or Cure for Risks of Astronomical Suffering](https://foundational-research.org/superintelligence-cause-cure-risks-astronomical-suffering/) and [Risks of Astronomical Future Suffering](https://foundational-research.org/risks-of-astronomical-future-suffering/). **II.III Astronomical suffering as a likely outcome** One might argue that the scenarios just mentioned tend to be speculative, maybe extremely speculative, and should thus be discounted or even ignored altogether. However, the claim that creating extremely powerful agents with alien values and nocompassion might lead to vast amounts of suffering – through some way or another – is a *disjunctive* prediction. Only *one* possible action by which the AI could increase its total utility, yet involving vast quantities of suffering, would be required for the AI to pursue this path *without reservation.* Worries of this sort are weakly supported by the universe’s historical track record, where the “morally indifferent optimization process” of Darwinian evolution instantiated vast amounts of misery in the form of [wild-animal suffering](https://foundational-research.org/the-importance-of-wild-animal-suffering/). Even if the probability of any one specific scenario involving astronomical amounts of suffering (like the ones above, or other scenarios not yet mentioned or thought of) is small, the probability that at least one scenario will occur may be fairly high. In this context, **we should beware the disjunction fallacy** (Bar-Hillel & Neter, 1993), according to which most people not only underestimate the probability of disjunctions of events, but they actually judge the disjunction as *less* likely than a single event comprising it.[9](https://foundational-research.org/reducing-risks-of-astronomical-suffering-a-neglected-priority/#link_ajs-fn-id_9-3131)

**Rapid advances in AI are coming quickly**

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You’ve probably been told that the singularity is coming. It is that long-awaited point in time — likely, a point in our very near future — when advances in artificial intelligence lead to the creation of a machine (a technological form of life?) smarter than humans. If Ray Kurzweil is to be believed, [the singularity will happen in 2045](https://futurism.com/kurzweil-claims-that-the-singularity-will-happen-by-2045/). If we throw our hats in with Louis Rosenberg, then the day will be arriving a little sooner, likely sometime in 2030. MIT’s Patrick Winston would have you believe that it will likely be a little closer to Kurzweil’s prediction, [though he puts the date at 2040, specifically](https://futurism.com/separating-science-fact-science-hype-how-far-off-singularity/). But what difference does it make? We are talking about a difference of just 15 years. The real question is, is the singularity *actually* on its way? At the [World Government Summit in Dubai](https://www.worldgovernmentsummit.org/), I spoke with Jürgen Schmidhuber, who is the Co-Founder and Chief Scientist at [AI company NNAISENSE](https://nnaisense.com/), Director of the Swiss AI lab IDSIA, and heralded by some as the “father of artificial intelligence” to find out. He is confident that the singularity will happen, and rather soon. Schmidhuber says it “is just 30 years away, if the trend doesn’t break, and there will be rather cheap computational devices that have as many connections as your brain but are much faster,” he said. And that’s just the beginning. Imagine a cheap little device that isn’t just smarter than humans — it can compute as much data as all human brains taken together. Well, this may become a reality just 50 years from now. “And there will be many, many of those. There is no doubt in my mind that AIs are going to become super smart,” Schmidhuber says. Today, the world faces a number of hugely complex challenges, from global warming to the refugee crisis. These are all problems that, over time, will affect everyone on the planet, deeply and irreversibly. But the real seismic change, one that will influence the way we respond to each one of those crises, will happen elsewhere. “It is much more than just another industrial revolution. It is something that transcends humankind and life itself.” “All of this complexity pales against this truly important development of our century, which is much more than just another industrial revolution,” Schmidhuber says. Of course, the development that he is referring to is the development of these artificial superintelligences, a thing that Schmidhuber says “is something that transcends humankind and life itself.” When biological life emerged from chemical evolution, 3.5 billion years ago, a random combination of simple, lifeless elements kickstarted the explosion of species populating the planet today. Something of comparable magnitude may be about to happen. “Now the universe is making a similar step forward from lower complexity to higher complexity,” Schmidhuber beams. “And it’s going to be awesome.” Like with biological life, there will be an element of randomness to that crucial leap between a powerful machine and artificial life. And while we may not be able to predict exactly when, **all evidence points to the fact that the singularity will happen**.

**AI engineers a dystopia worse than extinction.**

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**Losing our potential** means getting **locked into** a **bad set of futures**. We can categorize existential catastrophes by looking at which aspects of our future get locked in. This could be a world without humans (**extinction**) or a world without civilization (unrecoverable collapse). But it could also take the form of an **unrecoverable dystopia**—a world with civilization intact, but locked into a terrible form, with little or no value.116

[Footnote 116]

In the worst cases, perhaps even **negative value**—an outcome **worse than extinction**.

[Footnote 116 ends]

This has not happened yet, but the past provides little comfort. For these kinds of catastrophes only became possible with the advent of civilization, so our track record is much shorter. And there is reason to think that the risks may increase over time as the world becomes more interconnected and experiments with new technologies and ideologies.

I won’t attempt to address these dystopian scenarios with the same level of scientific detail as the risks we’ve explored so far, for the scenarios are diverse and our present understanding of them very limited. Instead, my aim is just to take some early steps toward noticing and understanding these very different kinds of failure.

We can divide the unrecoverable dystopias we might face into three types, on the basis of whether they are desired by the people who live in them. There are possibilities where the people don’t want that world, yet the structure of society makes it almost impossible for them to coordinate to change it. There are possibilities where the people do want that world, yet they are misguided and the world falls far short of what they could have achieved. And in between there are possibilities where only a small group wants that world but enforces it against the wishes of the rest. Each of these types has different hurdles it would need to overcome in order to become truly locked in.

Note that to count as existential catastrophes, these outcomes don’t need to be impossible to break out of, nor to last millions of years. Instead, the defining feature is that entering that regime was a crucial negative turning point in the history of human potential, locking off almost all our potential for a worthy future. One way to look at this is that when they end (as they eventually must), we are much more likely than we were before to fall down to extinction or collapse than to rise up to fulfill our potential. For example, a dystopian society that lasted all the way until humanity was destroyed by external forces would be an existential catastrophe. However, if a dystopian outcome does not have this property, if it leaves open all our chances for success once it ends—it is a dark age in our story, but not a true existential catastrophe.

The most familiar type is the **enforced dystopia**. The rise of **expansionist totalitarianism** in the mid-twentieth century caused intellectuals such as George Orwell to raise the possibility of a totalitarian state achieving global dominance and absolute control, locking the world into a miserable condition.117 The regimes of **Hitler** and **Stalin** serve as a **proof of principle**, each scaling up to become **imperial superpowers** while maintaining **extreme control** over their citizens.118 However, it is unclear whether Hitler or Stalin had the expansionist aims to control the entire world, or the technical and social means to create truly lasting regimes.119

This may change. **Technological progress** has offered **many new tools** that could be used to detect and undermine dissent, and there is every reason to believe that this will continue over the next century. **Advances in AI** seem **especially relevant**, allowing automated, detailed **monitoring of everything** that happens in public places— both physical and online. Such advances may make it possible to have **regimes** that are **far more stable** than those of old.

That said, technology is also providing new tools for rebellion against authority, such as the internet and encrypted messages. Perhaps the forces will remain in balance, or shift in favor of freedom, but there is a credible chance that they will shift toward greater control over the populace, making enforced dystopias a realistic possibility.

A second kind of unrecoverable dystopia is a stable civilization that is desired by few (if any) people. It is easy to see how such an outcome could be dystopian, but not immediately obvious how we could arrive at it, or lock it in, if most (or all) people do not want it.120

The answer lies in the various population-level forces that can shape global outcomes. Well-known examples include market forces creating a race to the bottom, Malthusian population dynamics pushing down the average quality of life, or evolution optimizing us toward the spreading of our genes, regardless of the effects on what we value. These are all dynamics that push humanity toward a new equilibrium, where these forces are finally in balance. But there is no guarantee this equilibrium will be good.

For example, consider the tension between what is best for each and what is best for all. This is studied in the field of game theory through “games” like the prisoner’s dilemma and the tragedy of the commons, where each individual’s incentives push them toward producing a collectively terrible outcome. The Nash equilibrium (the outcome we reach if we follow individual incentives) may be much worse for everyone than some other outcome we could have achieved if we had overcome these local incentives.

The most famous example is environmental degradation, such as pollution. Because most of the costs of pollution aren’t borne by the person who causes it, we can end up in a situation where it is in the self-interest of each person to keep engaging in such activities, despite this making us all worse off. It took significant moral progress and significant political action to help us break out of this. We may end up in new traps that are even harder to coordinate our way out of. This could be at the level of individuals, or at the level of groups. We could have nations, ideological blocs, or even planets or descendent species of Homo sapiens locked in harmful competition—doing what is best for their group, but bad for groups on the whole.

I don’t know how likely it is that we suffer a sufficiently bad (and sufficiently intractable) tragedy of the commons like this. Or that we are degraded by evolutionary pressures, or driven to lives of very low quality by Malthusian population dynamics, or any other such situation. I’d like to hope that we could always see such things coming and coordinate to a solution. But it’s hard to be sure that we could.

The third possibility is the “**desired dystopia**.”121 Here it is easier to see how universal desire for an outcome might cause us to lock it in, though less clear how such an outcome could be dystopian. The problem is that there are many compelling ideas that can radically shape our future —especially ideologies and moral theories, as these make direct normative claims about the world we should strive to create. If combined with the **technological or social means** for instilling the same views in the next generation (indoctrination, surveillance), this has the potential to be **disastrous**.

The historical record is rife with examples of seriously defective ideologies and moral views that gripped large parts of the world. Moreover, even reasonable normative views often recommend that they be locked in—for otherwise a tempting rival view may take over, with (allegedly) disastrous results.122 Even though the most plausible moral views have a lot of agreement about which small changes to the world are good and which are bad, they tend to come strongly apart in their recommendations about what an optimal world would look like. This problem thus echoes that of **AI alignment**, where a **strong push** toward a **mostly correct ideal** could instead **spell disaster**.

Some plausible examples include: worlds that completely renounce further technological progress (which ensures our destruction at the hands of natural risks),123 worlds that forever fail to recognize some key form of harm or injustice (and thus perpetuate it blindly), worlds that lock in a single fundamentalist religion, and worlds where we deliberately replace ourselves with something that we didn’t realize was much less valuable (such as machines incapable of feeling).124

All of these unrecoverable dystopias can be understood in terms of lock-in. **Key aspects** of the future of the civilization are being **locked in** such that they are almost **impossible to change**. If we are locked into a sufficiently bad set of futures, we have an **unrecoverable dystopia**; an **existential catastrophe**.

**Outweighs everything.**

(Max **Daniel 17**. Executive Director, Foundational Research Institute. 2017. “S-risks: Why they are the worst existential risks, and how to prevent them (EAG Boston 2017).” FRI. <https://foundational-research.org/s-risks-talk-eag-boston-2017/> )

“S-risk – One where an adverse outcome would bring about severe suffering on a cosmic scale, **vastly exceeding all suffering that has existed on Earth so far**.” So, s-risks are roughly as severe as factory farming, but with an even larger scope. To better understand this definition, let’s zoom in on the part of the map that shows existential risk. Risks of extinction have received the most attention so far. But, conceptually, x-risks contain another class of risks. These are **risks of outcomes even worse than extinction in two respects**. **First**, with respect to their **scope**, **they not only threaten the future generations of humans** or our successors, **but all sentient life in the whole universe.** **Second**, with respect to their **severity, they not only remove everything that would be valuable but also come with a lot of disvalue** – that is, features we’d like to avoid no matter what. Recall the story I told in the beginning, but think of Greta’s solitary confinement being multiplied by many orders of magnitude – for instance, because it affects a very large population of sentient uploads.