**AT: Spark**

**2AC---AT: Spark**

**Tech development solves all their scenarios and space col. All of these are also add-ons.**

**Pethokoukis 21** [James Pethokoukis, 11-26-2021, America took one small step toward saving humanity this week&nbsp;, No Publication, , <https://fasterplease.substack.com/p/-america-took-one-small-step-toward>, DOA: 11-27-2021 //ArchanSen]

Not only does planetary defense make the strong case for further investment in space, but also for further scientific discovery, technological invention, and commercial innovation — all of which leads to more economic growth and wealth creation. Stagnation, or even “de-growth,” is a **recipe for human extinction**, as well as needless suffering from poverty, illness, ecological collapse, and the decline of human freedom. Of course, killer comets aren’t the only threat out there. In 2020’s excellent The Precipice: Existential Risk and the Future of Humanity, philosopher Toby Ord explores various natural and manmade threats to modern civilization and humanity’s existence. Among them: asteroids and comets, supervolcanic eruptions, stellar explosions such as supernovas and gamma-ray bursts near our solar system, nuclear war, climate change, pandemics natural and engineered, hostile AI, a totalitarian surveillance state, and extraterrestrial contact. Overall, Ords figures there’s a 1-in-6 chance of an existential catastrophe over the next 100 years. So what to do? Ban AI and CRISPR? Reduce our electromagnetic signature so we don’t attract ETs? **Attempt to live like pre-industrial societies?** Maybe, but exploding stars and space rocks don’t care about any of that stuff. Such a path also means renouncing humanity’s potential. In his book The Beginning of Infinity: Explanations That Transform the World, UK physicist David Deutsch writes about the possibility for an “appallingly narrow escape” from the sorts of scary scenarios Ord outlines: We have such a chance because we are able to solve problems. **Problems are inevitable.** We shall always be faced with the problem of how to plan for an unknowable future. We shall never be able to afford to sit back and hope for the best. Even if our civilization moves out into space in order to hedge its bets, as Rees and Hawking both rightly advise, a gamma-ray burst in our galactic vicinity would still wipe us all out. Such an event is thousands of times rarer than an asteroid collision, but when it does finally happen **we shall have no defence** against it **without a great deal more scientific knowledge** and an enormous increase in our wealth.

**Nuke war causes extinction.**

**SW 22** [Socialist Worker, 3-7-2022, "Unleashing nuclear weapons would destroy all life on earth", https://socialistworker.co.uk/features/unleashing-nuclear-weapons-would-destroy-all-life-on-earth/, DOA: 3-11-2022 //ArchanSen]

The Ukraine war has resurrected the utterly chilling prospect of potential nuclear war—and with it the end of humanity. Scorched flesh, vaporised bodies, and exploding lungs would be the immediate results. The long-term ones would be even more catastrophic. Yet most commentators and politicians calmly discuss this as just the geopolitics of escalation rather than a threat that should lead to revolt to stop it. Nuclear war between the United States and Russia or between the United States and China, would mean death for hundreds of millions immediately. But then it would mean a climate disaster known as **nuclear winter.** As smoke from the blasted cities rises into the atmosphere, the **entire planet will soon be choked** under dense clouds of soot. This would mean a cataclysmic drop in global temperatures that would make **agriculture impossible** and **wipe out the entire human race.** Alan Robock, a climate researcher at Rutgers university, has been studying nuclear weapons for 30 years. His team modelled a scenario of “limited” war where two sides launched 100 bombs each. “There would be between 16 and 37 million tons of carbon,” Robock says. It would mean 50 to 125 million people dead in the first week. A reduction of as much as **35 ­percent in sunlight reaching Earth’s surface.** That means **worldwide famine for a decade**. The road to nuclear war is prepared by the idea of “battlefield” nuclear weapons and thermobaric ones. In 2017 the US military used the biggest bomb since the nuclear destruction of Hiroshima and Nagasaki at the end of the Second World War. The US unleashed the 22,000-pound Massive Ordnance Air Blast Bomb in Afghanistan. It didn’t lead to worldwide condemnation. The world is awash with nuclear weapons. All figures for nuclear weapons are estimates but, according to the Federation of American Scientists, Russia has 5,977 nuclear warheads—the devices that trigger a nuclear explosion. But this includes about 1,500 that are so out of date they are set to be dismantled. That leaves 4,500 or so. In ­contrast, the US has 5,428, France 290 and Britain 225—with more to come. This gives a Nato total of 5,943. Just because all sides of this conflict have nuclear weapons doesn’t mean they would shy away from using them. This line of thinking is dangerous. Mutually assured destruction isn’t off the cards, it’s the kind of barbarism that capitalism allows. At points the great powers enter talks and negotiations which may seem to steer away from nuclear war. But behind this face lies the brute possibility of actually using their arsenals. The Ukraine war reminds us that this is one of the methods of **extinction**—together with recurring pandemics and environmental collapse —that capitalism threatens.

**2AC---AT: Spark---War Not Inevitable**

**Wars not inevitable**

**Krepon 17** [Michael Krepon is co-founder of the Stimson Center and co-editor of “Anti-Satellite Weapons, Deterrence and Sino-American Space Relations.” "Op-ed | Is space warfare’s final frontier?" https://spacenews.com/op-ed-is-space-warfares-final-frontier/]

Asserting that **warfare in space is inevitable** makes about as much sense as asserting that **nuclear warfare is inevitable**: If this is the case, then constraints of any kind, including norms of responsible behavior, are worse than useless. The record of the last **seven decades** suggests that nuclear warfare is not inevitable, and that diplomacy has been **essential** to avoid this outcome. The record of the last six decades suggests that warfare in space is **not inevitable, either**. What’s **painfully missing now** is the **diplomatic piece** to help **avoid worst cases**.

**2AC---AT: Spark---No Survivors**

**Even if people survive, they inevitably die from the aftermath.**

Brian **Kahn, 18** (Brian Kahn, journalist covering climate change, senior reporter at Earther, BA in Anthropology from Hampshire College, MA in Climate and Society from Columbia University, 1-9-2019, accessed on 7-25-2022, Earther, Gizmodo, “This Is What Nuclear War Would Mean for Life on Earth”, <https://gizmodo.com/this-is-what-nuclear-war-would-mean-for-life-on-earth-1821910459>, HBisevac)

Hopefully indeed. Research shows that even a **relatively small** nuclear war involving 50 nuclear weapons would toss **11 billions lbs**. of soot into the **stratosphere**. That would set off a major chain reaction leading to **widespread human suffering**. The soot would **reflect sunlight back into space**, **cooling** the planet. Commonly referred to as **nuclear winter**, this global cooling would cause **widespread crop failure** and attendant **famine for years** before the soot finally falls out.

Up the number of nuclear weapons to around 100 Hiroshima-sized bombs, and **society would cease to exist**. The survivors of such a catastrophic event would face a **horrific**-**sounding** **nuclear famine**. That’s according to a 2013 report, which states that “the primary mechanisms for **human fatalities** would likely not be from blast effects, not from thermal radiation burns, and not from ionizing radiation, but, rather, from **mass starvation**.”

The report shows that 2.3 billion people would face starvation, and **ecosystems** around the world would **wither** and **die**. In other words, **that’d be it**. ***No more dick jokes***. No more worrying about climate change. **No more nothing**.

That’s why what journalist Jonathan Schell wrote about nuclear holocaust in The New Yorker in 1982 still rings as true today as ever:

“To employ a mathematical analogy, we can say that although the risk of extinction may be fractional, the **stake is**, humanly speaking, **infinite**, and a **fraction** of infinity is **still infinity**. In other words, once we learn that a holocaust might lead to extinction we have **no right to gamble**, because if we **lose**, the **game will be over**, and neither we nor anyone else will ever get a **another chance**.”

**2AC---AT: Spark---No Mindset Shift**

**No mindset shift – human psychology makes crisis inevitable**

**Heinberg, 15**—Senior Fellow-in-Residence of the Post Carbon Institute (Richard, “The Anthropocene: It’s Not All About Us”, <http://www.postcarbon.org/the-anthropocene-its-not-all-about-us/>, dml)

In addition to our innate propensity to maximize population and consumption, we humans also **have difficulty making sacrifices** in the present in order to reduce future costs. We’re **genetically hardwired** to respond to immediate threats with fight-or-flight responses, while distant hazards **matter much less** to us. It’s not that we don’t think about the future at all; rather, we **unconsciously apply a discount rate** based on the amount of time likely to elapse before a menace has to be faced.

True, there is some variation in future-anticipating behavior among individual humans. A **small percentage** of the population may change behavior now to reduce risks to forthcoming generations, while **the great majority is less likely to do so**. If that small percentage could oversee our collective future planning, we might have much less to worry about. But **that’s tough to arrange** in democracies, where people, politicians, corporations, and even nonprofit organizations get ahead by promising immediate rewards, usually in the form of more economic growth. If none of these can organize a proactive response to long-range threats like climate change, the actions of **a few individuals** and communities **may not be so effective** at mitigating the hazard.

This pessimistic expectation is **borne out by experience**. The general outlines of the 21st century ecological crisis have been **apparent since the 1970s**. Yet **not much has actually been accomplished** through efforts to avert that crisis. It is possible to point to hundreds, thousands, perhaps even millions of imaginative, courageous programs to reduce, recycle, and reuse—yet the **overall trajectory** of industrial civilization remains **relatively unchanged**.

**2AC---AT: Spark---Bunkers**

**Bunkers fail.**

Charlie **Gao, 19** (Charlie Gao, studied political and computer science at Grinnell College and is a frequent commentator on defense and national-security issues, “Can Russia's Bunkers Really Save Moscow from Nuclear War?” National Interest, November 19, 2019, https://nationalinterest.org/blog/buzz/can-russias-bunkers-really-save-moscow-nuclear-war-97302)//RP

The “sphere” style of bunker was developed as a way to improve the survivability of shallow bunkers since shallow bunkers are cheaper to build than deeper ones. To attain greater survivability, an outer bunker is made in the form of a sphere. This sphere is placed inside a shallow circular shaft. Shock absorbers are placed around the sphere connecting into an internal bunker. Those absorbers cushion the occupants from the shock waves of a nuclear explosion. Other bunkers that use similar technology in which the central bunker is suspended on shock absorbers in a central structure might also be present, with various variations on the shape of the central bunker. “Cylinder” and “Nut bolt” (hexagonal) types are also rumored to exist. The infamous “metro-2” bunker style is laid out similarly to the older “metro” style but is deeper underground for greater blast resistance and secrecy. It was said to be built in two phases, with the first being in the 1970s and 1980s, called D-6 ,and the second being between 1990–2000 by the TIS (OAO Трансинжстрой) firm, which also builds civilian metro stations. However, most sources reporting on Metro-2 are **speculative**, with the primary ones being reports of hobbyists who may have stumbled upon some Metro-2 entrances or exits or a 1990s DIA report on the system. **Despite the vast number of bunkers**, recent advances in fuzing technology for nuclear weapons are **threatening** to make the **minimum civil defense** standard obsolete. As fuzing technology improves, such as that used on the American Super Fuze, it’s more likely that pressure levels experienced by the civil defense bunkers will far **exceed** their **design rating.**

**Long term survival is impossible.**

Natasha **Zaretsky, 18** (Natasha Zaretsky is a Professor of History at Southern Illinois University in Carbondale. She got her MA and PhD in American Studies from Brown University and co-edits the fourth edition of Major Projects in US History Since 1945. 2018, Radiation Nation: Three Mile Island and the Political Transformation of the 1970s, Columbia University Press, New York)

These predictions suggested that nuclear war would shatter national boundaries. Even with its transnational dimensions, the freeze movement in the United States relied on a nation-statist framework when it forecasted the effects of a nuclear war on American towns and cities. But NW theory cast nuclear war as a planetary emergency. While NW scenarios were often based in the northern hemisphere, scientists pointed out that the global south would experience effects that, while less severe, would be devastating. Sagan predicted that a cloud of fine particles would travel across the equator, bringing the cold and dark with it.108 Anne Ehrlich painted a grotesque picture of postwar survival in the southern hemisphere, where small bands of people "might persist for several generations in a strange, inhospitable environment ... their adaptive capacities sapped by inbreeding and a burden of genetic defects from the postwar exposure to ionizing radiation and increased ultraviolet B—a classic recipe for extinction."

**2AC – AT: AI**

**No runaway AI and no impact.**

**Pierce 22** [Rj Pierce, 2-17-2022, "Why You Shouldn't Be Scared Of AI Taking Over The World ", Tech Times, https://www.techtimes.com/articles/271938/20220217/why-ai-wont-take-over-the-world.htm, DOA: 6-24-2022 //ArchanSen]

AI has been the subject of countless popular TV shows and movies over the years-just not in a relatively positive way. In these shows, it always seems like artificial intelligence will decide to completely wipe out humanity and civilization from existence. It's a bleak "prediction," but does it actually have any basis in reality?

According to several scientists, **the feared dangers of AI aren't much of an existential threat to humanity as a whole**. And that depends on one thing: whether it is even possible for us to create artificial intelligence way smarter than we are, writes ScienceAlert.

Current-Gen AI Is Still Pretty 'Weak'

The AI that exists right now is pretty powerful in its own right. It is what's being used for things like self-driving cars, facial recognition software, and even Google recommendations. But the thing with current-gen AI is that it's considered "narrow" or "weak."

While this kind of artificial intelligence is already quite good, **they're often only capable of doing one thing exceptionally**, according to LabRoots. If you try to make them do something else while doing something they're good at, these AIs will fail because **they lack the necessary data to perform it**.

Current-generation artificial intelligence still falls short of tasks that will always require abilities that only humans possess, writes Forbes. For instance, experienced surgeons are still the best choice for performing surgeries, with their fine motor skills and skill at perceiving individual situations.

You also can't use an AI to replace HR professionals, because the job will require a deep, intrinsic understanding of human reactions that a machine just doesn't have, no matter how "advanced" it might be. It is these kinds of situations where combining machine and human intelligence still reigns supreme. The human element provides the machine with the necessary context, while the latter is put to work crunching numbers and giving recommendations.

Machines Are Just Called 'Intelligent' For Their Ability To Learn

In an article by The Conversation, they put this specific argument forward. A machine can always "learn" if it is fed data about the task it's meant to achieve. Sure, it can process information much faster than a human can (and perhaps even come up with solutions no person can ever think of), but it doesn't make the machine smarter than a human at all.

Here's one situation where machine learning is still way behind human learning. Take a toddler, for instance. That child can learn how to do a specific task within seconds just by watching somebody do it. A machine can only learn something if it is fed an **extremely massive amount of data**, which it uses when performing trial-and-error according to Synthesys.

**No AI extinction -- it’s impossible and centuries away at best.**

Oren **Etzioni, 16** - CEO of the Allen Institute for Artificial Intelligence and Professor of Computer Science at the University of Washington; "Most experts say AI isn’t as much of a threat as you might think," MIT Technology Review, 9-20-2016, https://www.technologyreview.com/s/602410/no-the-experts-dont-think-superintelligent-ai-is-a-threat-to-humanity/

To get a more accurate assessment of the opinion of leading researchers in the field, I turned to the Fellows of the American Association for Artificial Intelligence, a group of researchers who are recognized as having made significant, sustained contributions to the field.

In early March 2016, AAAI sent out an anonymous survey on my behalf, posing the following question to 193 fellows:

“In his book, Nick Bostrom has defined Superintelligence as ‘an intellect that is much smarter than the best human brains in practically every field, including scientific creativity, general wisdom and social skills.’ When do you think we will achieve Superintelligence?”

Over the next week or so, 80 fellows responded (a 41 percent response rate), and their responses are summarized below:

In essence, according to 92.5 percent of the respondents, superintelligence is **beyond the foreseeable horizon**. This interpretation is also **supported** by written comments shared by the fellows.

Even though the survey was anonymous, 44 fellows chose to identify themselves, including Geoff Hinton (deep-learning luminary), Ed Feigenbaum (Stanford, Turing Award winner), Rodney Brooks (leading roboticist), and Peter Norvig (Google).

The respondents also shared several comments, including the following:

“Way, way, way more than 25 years. **Centuries most likely**. But not never.”

“We’re competing with **millions of years’ evolution of the human brain**. We can write single-purpose programs that can compete with humans, and sometimes excel, but the world is not neatly compartmentalized into single-problem questions.”

“Nick **Bostrom is** a professional scare monger. His Institute’s role is to find existential threats to humanity. He sees them everywhere. I am tempted to refer to him as **the** ‘**Donald Trump’** **of AI.**”

Surveys do, of course, have limited scientific value. They are notoriously sensitive to question phrasing, selection of respondents, etc. However, it is the one source of data that Bostrom himself turned to.

Another methodology would be to extrapolate from the current state of AI to the future. However, this is difficult because we do not have a quantitative measurement of the current state of human-level intelligence. We have achieved superintelligence in board games like chess and Go (see “Google’s AI Masters Go a Decade Earlier than Expected”), and yet our programs failed to score above 60 percent on eighth grade science tests, as the Allen Institute’s research has shown (see “The Best AI Program Still Flunks an Eighth Grade Science Test”), or above 48 percent in disambiguating simple sentences (see “Tougher Turing Test Exposes Chatbots’ Stupidity”).

There are many valid concerns about AI, from its impact on jobs to its uses in autonomous weapons systems and even to the potential risk of superintelligence. However, predictions that superintelligence is on the foreseeable horizon **are not supported** by the available data. Moreover, doom-and-gloom predictions often **fail to consider the potential benefits** of AI in preventing medical errors, reducing car accidents, and more.

Finally, it’s possible that AI systems could collaborate with people to create a **symbiotic superintelligence**. That would be very different from the pernicious and autonomous kind envisioned by Professor Bostrom.

**It’s empirically overemphasized.**

**Allenby 16** – Brad Allenby, an American environmental scientist, environmental attorney and Professor of Civil and Environmental Engineering, and of Law, at Arizona State University. [Emerging technologies and the future of humanity, Bulletin of the Atomic Scientists, 71(6), https://journals.sagepub.com/doi/full/10.1177/0096340215611087]//BPS

Emerging technologies as an Earth system

The first question to ask about emerging technologies is deceptively simple: Is today really that different? Is there something about today’s emerging technologies—which for purposes of this analysis include nanotechnology, biotechnology, information and communication technology (ICT), robotics, applied cognitive science, humtech (design and engineering of the human as a foundational emerging technology), and their various combinations and permutations—that is qualitatively different from those that characterized other eras of technological change? If there isn’t, much of today’s dramatic language can be understood as simply a reflection of the emphasis that all humans give to the particular era and landscape and culture within which they exist. Each generation tends to **overemphasize** the degree of change that it experiences, partly because of the **immediacy** of the stresses to which it is exposed, and partly because it is easy to underestimate how difficult and unpredictable life was in the past, since when one looks back at history it seems to flow logically and necessarily. Indeed, **apocalyptic fears** have been **common** when many major technology systems first emerged because of this **immediacy**, even as subsequent generations grew to view the technology as **banal, even boring**. In the early days of railroads, for example, there was a widespread belief that traveling at the heretofore **unimaginable speed of 25 miles per hour** would **kill** the passengers, in part because such technology was against **the obvious will of God**. As an Ohio school board put it,

If God had designed that His intelligent creatures should travel at the frightful speed of 15 miles an hour by steam, He would have foretold it through His holy prophets. It is **a device of Satan** to lead immortal souls down to Hell. (Nye, 1994: 57)3

In this case, however, a strong argument can be made that emerging technologies today are different not just in degree, but in kind, from those of the past. To begin with, the scope, scale, and speed of technological change are unprecedented. Where previous waves of technological change have involved a few core technologies, such as railroads or electrification, today technological evolution is occurring across the entire technological frontier. Partially as a result of such technologies rippling across a population of seven billion people, we now live on a terraformed planet, the first world we know of anywhere that has been shaped by the deliberate activities of a single species. That is not a discontinuous process, but it is qualitatively new.

Moreover, as the discussion of the engineered warrior of 2050 suggests, the human itself has become a design space. It is certainly true that people have always changed themselves in many ways, from consuming intoxicants of all kinds, to medicine, to education, but there is little question that the direct interventions that are now possible, combined with accelerating advances in fields such as neuroscience, genetics and molecular biology, and prosthetics, make virtually all aspects of the human, including cognitive and psychological domains, potentially subject to design. That the designer is not just engineering external systems, but him- or herself, adds a degree of reflexivity, nonlinearity, and complexity that makes simple predictions about particular technologies tangential and irrelevant at best.

It is worth emphasizing in passing that the argument that humans are at risk from emerging technologies is in an important sense **circular**. Humans are increasingly both designer and designed; they are, in other words, increasingly an emerging technology in their own right. People are many things, but they are now, and certainly will be in the future, a design project. Thus, in a meaningful way the argument that people are at risk from emerging technologies becomes the argument that emerging technologies are at risk from emerging technologies, which makes little sense, and isn’t very helpful analytically, or in guiding policy or practice.

**AT: Simulation---2AC**

**Not in a simulation**

Duncan H. **Forgan 19**. Associate Lecturer at the Centre for Exoplanet Science at the University of St Andrews, Scotland, founding member of the UK Search for Extra-terrestrial Intelligence (SETI) research network and leads UK research efforts into the search. 04/30/2019. “24 The Simulation Hypothesis.” Solving Fermi’s Paradox, Cambridge University Press.

24.3 Arguments against the Simulation Hypothesis

The principal arguments against a simulation hypothesis are moral and ethical. If we were capable of running a simulation with **fully sentient beings** contained **within**, then the **termination** of such a simulation, resulting in **death** of the contained sapients, must be considered as an act of **mass murder or genocide**. One could imagine a proscription against running sufficiently advanced simulations for this very reason. Creating an advanced simulation is perhaps the very definition of playing God. and creators have a moral duty to their creation. Even if their creation never produces sentience, we understand as humans that animal cruelty is also morally wrong.

In other words, as soon as an advanced simulation is instantiated, it should never be ceased, and provisions must be made for this simulation to be **run indefinitely**. Future civilisations **with this tenet** in their moral code **must therefore** be willing to expend an effectively **infinite** amount of **resources**, which is **clearly unfavourable** from a thermodynamic standpoint. It could **therefore** be argued that **ancestor-simulations will never be run**, invoking this mix of economic and moral objections as cause.

**Turn---nuke war causes simulation termination.**

**Turchin et al. 19**. Alexey Turchin, Foundation Science for Life Extension; Michael Batin, Foundation Science for Life Extension; David Denkenberger, Alliance to Feed the Earth in Disasters @ University of Alaska Fairbanks; Roman Yampolskiy @ University of Louisville. 05/12/2019. “Simulation Typology and Termination Risks.” ArXiv:1905.05792 [Cs]. arXiv.org, http://arxiv.org/abs/1905.05792.

2.3. A global catastrophe in the simulation

A simulation which is **modeling a global catastrophe** is not the same that a terminating simulation from formal point of view, but doesn’t have much difference for the simulation inhabitants. There are **several overlapping reasons** why we **could be located in such type of simulation:**

**1)** Fermi simulations created by alien AIs to solve the Fermi paradox are designed in the way that they **should model the world in the vicinity of** a **global catastrophe**.

**2)** **Singularity simulations**, or models of the first AI appearing, are modeling the **period of history** when different **global risks peak**. The period before creating of AGI is also a period of quick development of **other** potentially **dangerous tech**nologies, like synthetic biology (Millett & Snyder-Beattie, 2017; Turchin, Green, & Denkenberger, 2017), colliders (Kent, 2004), **advance nuc**lear weapon**s** etc. The events before singularity could **quickly accelerate**, driven by **arms races** and different instabilities. Singularity simulations may also end up with unstable or evil AI which will cause an observable catastrophe, like a paperclipper.

**3)** Simulations as **computer games** **center**ed around **attempt**s to **save the world**.

4) Second leg of the Bostrom’s argument: if we are not in the simulation, it is best explained by the fact that there is some universal reason for the civilizations’ extinction.

Obviously, alien AGI will be also interested in outcomes of the attempts of AGI creation of different planets, so there is no practical difference between Fermi simulations by alien AGI and ancestral Singularity simulations by our own superintelligent AI.

2.4. Doomsday Argument for simulations predicts termination soon

The DA and SA do not cancel each other, as was assumed by Aranyosi (Aranyosi, 2004), but are actually supporting. Combined, they claim: “A conscious observer is most likely in a simulation, and it will probably end soon”. The reason for this is that the DA logic should be applied only to the duration of the simulation, but not to the number of observers in all real and simulated worlds, as observer birth rank is known and ordered only inside any given simulation. While the birth order in the simulation could be faked by creators, it make the DA inside the simulation even stronger: if the simulation was created – with all false memories – just yesterday, it will most likely will end tomorrow.

Thus, Doomsday argument for simulations runs as following: using the Copernican mediocrity principle (Gott, 1999), an observer can suggest that the observer is located somewhere in the middle of the duration of his-her simulation, as his-her moment now is randomly chosen from the whole duration of the simulation. This means that if the median total duration of the simulation duration is T, when it will likely end in T/2 from now.

Perhaps one’s simulation was created just yesterday with all his-her memories? It means even shorter duration of the simulation thus making DA in simulation even stronger. But to have all the memories in order, these memories should be simulated for some period of time, so the idea of the simulation with false memories appears to be self-defeating as it assumes the existence of another simulation which prepared these false memories. However, these false memories could be prepared once for many short runs, the same way as false memories were prepared for characters of the TV-series Westworld, where each short run of a character was only one day, after which she was reloaded with the same old memories.

Anyway, T cannot be very short, or much more complex structure of the nested simulation is needed to describe appearance of the false memories. For Fermi simulations, it is probably reasonable to simulate human history between the beginning of the 20th century and the Singularity, which is approximately 150 years, as during this period most critical choices were made.

Moreover, simulation argument itself predicts shorter simulations. As we discuss above, simpler simulations should numerically dominate. This also means that shorter duration of internal time simulations also should numerically dominate: that is, the simulations which simulate only one human’s life are more numerous than simulations which simulate whole the

human history for 5000 years, and billion years old simulations are extremely rare.

Lewis also compared SA and DA (Lewis, 2013), and finds that SA works, but DA doesn’t. However, he did not analyze the simple Gott’s DA, and instead used the Sleeping Beauty model for his analysis, and did not apply the DA to an observer inside the simulation.

2.5. Immortality in simulations

Existence of an extremely large number of simulations created by many different civilizations in a potentially infinite universe implies that there are other copies of each person in different simulations. There is a very large but finite number of possible people, limited by different combinations of atoms, and if the number of the simulations is larger than the number of possible people, people will repeat in the simulations.

Moreover, if humanity is located in an ancestral simulation, it will likely be run many times with small variations (according to the assumptions of SA), and thus many of its elements will be repeated exactly or with small variations, including human beings.

Thus, if one’s simulation were turned off, other simulations with other copies would continue to exist and this could be a form of immortality. For example, if there are 10 exact copies of oneself in different simulations, and 9 of the simulations are terminated, one copy will survive, which may or may not be interpreted as some form of immortality depending on how one treats personal identity and measure, see (Turchin, 2018a).

If one were an avatar of some gamer, the end of the simulation would look like the awakening for that avatar in the body of gamer, and merging of memories of the gamer and the avatar’s experiences in the simulation. This is analogous to the way that one’s memories about a dream merge with real life after awakening.

Conclusion

Humanity’s location at the **beginning of the 21st century** could be **best explained** by the fact that this period is **in a scientific Fermi simulation** by an **alien civilization or future humanity-based AGI simulating variants of its own origin**, which could be called a “singularity simulation”. This means that humanity could be **tested** for **different** scenarios of **global catastrophic risks**, and no matter what the result of the test is, the simulation of us would be turned off relatively soon, in tens to hundreds of years from now.

**Turn---bringing up the simulation causes it to get turned off.**

**Turchin et al. 19**. Alexey Turchin, Foundation Science for Life Extension; Michael Batin, Foundation Science for Life Extension; David Denkenberger, Alliance to Feed the Earth in Disasters @ University of Alaska Fairbanks; Roman Yampolskiy @ University of Louisville. 05/12/2019. “Simulation Typology and Termination Risks.” ArXiv:1905.05792 [Cs]. arXiv.org, http://arxiv.org/abs/1905.05792.

5) **Simulation awareness**. The beings **inside** the simulation start to **realize** that they are in a simulation, so it is **not a simulation anymore** and **cannot be used as such**. Pure philosophizing about being in a simulation would likely not be enough to cause termination, as such theorizing it is likely inevitable. However, observing some undeniable glitches would **destroy the purpose** of the simulation as an **illusion of reality**, unless the simulation is rewound and corrected.

6) Game over. The simulation finally solves the unknown-to-humanity task, and there is **no need** to **run the simulation any more**. Most tasks do not require a simulation to run until the heat death of the universe, so simulations would typically have shorter duration than real life. Even movies, games and dreams typically have short duration compared with the duration of human life. However, some simulations may run very long in internal life, like the Civilization game.

7) Accidental termination. Some events in the “real world” terminate the simulation. A person could wake from a dream if her alarm rings. A computer could experience a power outage.

8) Termination accumulation the nested simulation. Higher-level simulation (closer to the actual reality) in nested simulations turns off. Interestingly, nested simulations are not dominant in our world currently, i.e., one is not often dreaming about seeing a movie in which one is writing a book about a computer gamer. Most human-created simulations are one level, and it is exactly what one should expect from the idea of domination of computationally inexpensive simulations. Multilevel simulation is inherently complex. It means that the possible simulation of humanity would be likely terminated before it would be capable of generating many multilevel simulations, that is shortly after the appearance of superintelligent AI, as was mentioned by Bostrom and Greene (Bostrom, 2003; Greene, 2018).

9) Natural end. A simulation will probably be terminated after all beings in it have died or all natural processes have stopped.

10) Unknown threshold. The simulation of humanity could pass an unknown threshold after which it must be terminated. As humanity is now alive such threshold, if it exists, is ahead of us. The threshold could not only be AGI creation, but some moral threshold, such as a large population, intense suffering, or sentient computers. Alternatively, the threshold could be technological, such as self-replicating nanotechnology or genetically engineered babies or philosophical, like the capability of thinking about being in a simulation clearly. Given the accelerated rate of progress, such thresholds will probably happen almost simultaneously in historical time, probably somewhere in the 21st century. Other thresholds could be more remote, like star-travel or destroying life on Mars (as it could be taken as an evidence of our hostile nature) or colonizing the galaxy.

Robin Hanson recommended acting in a way that will make one’s simulation more interesting to the possible hosts thus lowering chances of the simulation termination: “If you might be living in a simulation then all else equal you should care less about others, live more for today, make your world look more likely to become rich, expect to and try more to participate in pivotal events, be more entertaining and praiseworthy, and keep the famous people around you happier and more interested in you” (Hanson, 2001).

On the other hand, even **discussing simulations** maybe an **informational hazard** as it could **increase chances that the simulation will be terminated**. However, as the topic **has been discussed** for ~20 years without the simulation’s termination, this is evidence for the host’s tolerance to the simulation awareness. This evidence maybe **rather weak** given **observational selection effects**: even if most self-aware simulations were terminated, we could find ourselves only **where the termination threshold is higher than zero-tolerance**. However, it may not be possible to simulate the 21st century without simulating some scientists who think that they may be in a simulation. Hanson wrote that “simulations... tend to be ended when enough people in them become confident enough that they live in a simulation” (Hanson, 2001). It appears that Bostrom did not worry about his SA possibly causing simulation shutdown, and thus being the ultimate hazardous information, though he wrote a lot about information hazards in other domains (Bostrom, 2011).

**2AC -- AT: Particle Accelerators**

**No impact to particle accelerators.**

**Physicist 11** — Physicist (magazine), 6-25-2011, "Q: If you stood in the beam of a particle accelerator, what would happen?," Ask a Mathematician / Ask a Physicist, http://www.askamathematician.com/2011/06/q-if-you-stood-in-the-beam-of-the-lhc-what-would-happen/

If you took all of the matter that’s being flung around inside an active accelerator, and collected it into a pellet, it would be so small and light you’d never notice it. The danger is the energy. If you stood in front of the beam you would end up with a very sharp, **very thin line of ultra-irradiated dead tissue** going through your body. It might possibly drill a hole through you. You may also be the first person in history to get pion (“pie on”) radiation poisoning (which does the same thing as regular radiation poisoning, but with pions!). When it’s up and running, there’s enough energy in the LHC beam to flash boil a fair chunk of person (around 10-100 pounds, depending on the setting of the accelerator). However, even standing in the beam, most of that energy will **pass right through you**. The higher the kinetic energy of a particle, the smaller the fraction of its energy tends to be deposited. Instead, high energy particles tend to glance off of other particles. They deposit more overall than a low energy counterpart, but most of their energy is carried away in a (slightly) new direction. So instead of all the energy going into your body, the beam would **glance off of atoms in your body**, causing the beam to widen, and most of the energy would be deposited in whatever’s behind you (the accelerator only holds a very thin beam, so any widening will cause the beam to hit the walls).

**AT: Vacuum Decay---General---2AC**

**No chance of a vacuum transition and there’s no impact**

--best evidence shows we’re already in a true vacuum, so can’t move lower

--humans can’t reach energy required (10 GeV minimum)

--it’s empirically denied by high energy events elsewhere: supernovas, black holes, etc.

--if it happened, it’d spread at the speed of light – but because the Universe is expanding at the same rate, it’d never affect 97% of it

**Siegel 14 –** Dr. Ethan Siegel, Professor at Lewis & Clark College, PhD in Theoretical Physics from the University of Florida, Senior Contributor at Forbes Magazine, “How to Destroy the Entire Universe”, Medium, 9-25, https://medium.com/starts-with-a-bang/how-to-destroy-the-entire-universe-5bd32cf6f985

That’s the situation that Hawking is describing, and even though the probability of that occurring is **very, very small**, it is possible, and — if this is, in fact, how our Universe looks — it could literally happen at any given time.

But is this the situation that does, in fact, describe our Universe? What would happen to our Universe if this tunneling to a lower-energy state happened? Would it, in fact, be destroyed? Or would the changes that occur leave the Universe intact, if only a little different than before?

First off, it’s a **very contentious** claim to say that the Higgs field has settled into a metastable state. While our best calculations say that the Higgs may become unstable at energies in excess of 10^11 GeV (where a GeV is the amount of energy required to accelerate an electron from rest to a potential of one billion Volts), those are based on mass measurements of bosons such as the Higgs, W-boson as well as the top quark, that still have **significant uncertainties** on them. Within the measurement uncertainty, the Higgs **may yet turn out to be truly stable**, meaning that we **already** may be in the lowest part of the valley. In addition, there are **strong reasons** to believe that the theory of asymptotic safety describes **gravity**, and therefore predicts a value for the Higgs mass that’s **perfectly stable**, and consistent with what we observe. If this is the case, then the Higgs **isn’t metastable**, and the whole issue is **moot**.

Second off, what would happen if this scenario were true, and some place in the Universe made the transition to a more stable state? It would be most likely to happen not here on Earth, **nor even in our high-energy particle colliders**, but near a **supernova**, **hypernova**, **active galactic nucleus** or supermassive **black hole**. It’s the highest energy locations in the Universe that are **far more likely** to undergo this quantum transition, where energies of approximately 10^10 GeV and above are **routine**ly achieved. For comparison, the highest energies achieved at the LHC are only around 10^4 GeV, which means the odds of the transition happening by us are **far lower**.

If the transition happened, the laws of physics would instantly change, with properties like the masses of particles, the strength of interactions and the sizes of atoms changing instantaneously where the Higgs field achieved this lower value. In addition, the lower value of the Higgs field would begin to take over the Universe, with the transition propagating outward at the speed of light. This is both good and bad for us. It’s bad because we’d never be able to see it coming; all the observable signals of the Universe propagate no faster than the speed of light in vacuum, and so if the transition is propagating at that speed, we’d have no signal of it before it was on top of us. But it’s also good, because the Universe is accelerating in its expansion, meaning that — for 97% of the observable Universe — a signal propagating at the speed of light will **never reach** us. So **even if the transition happens** somewhere in our Universe, it’s **unlikely to affect us**.

**The vacuum is fully stable**

--high energy events like cosmic ray collisions and the big bang should create energies high enough to cause a transition, but haven’t

--it’s more likely that we don’t fully understand the vacuum than it’s metastable

--there are clear gaps in human knowledge like quantum gravity and dark matter that will change our understanding of physics

--even if they’re right, no collapse for billions of years

**Dattaro 14 –** Laura Dattaro, Associate Producer at the World Science Festival, Science Journalist and Writer for 10 years, For Outlets Including the Columbia Journalism Review, Symmetry Magazine, Slate, and The New York Times, “What Stephen Hawking Really Said About Destroying the Universe”, Popular Mechanics, 9-10, https://www.popularmechanics.com/science/a11217/what-stephen-hawking-really-said-about-destroying-the-universe-17192502/

In July 2012, when scientists at CERN's Large Hadron Collider culminated decades of work with their discovery of the Higgs boson, most physicists celebrated. Stephen Hawking did not. The famed theorist expressed his disappointment that nothing more unusual was found, calling the discovery "a pity in a way." But did he ever say the Higgs could destroy the universe?

That's what many reports in the media said earlier this week, quoting a preface Hawking wrote to a book called Starmus. According to The Australian, the preface reads in part: "The Higgs potential has the worrisome feature that it might become metastable at energies above 100 [billion] gigaelectronvolts (GeV). This could mean that the universe could undergo catastrophic vacuum decay, with a bubble of the true vacuum expanding at the speed of light. This could happen at any time and we wouldn't see it coming."

What Hawking is talking about here is not the Higgs boson but what's called the Higgs potential, which are "totally different concepts," says Katie Mack, a theoretical astrophysicist at Melbourne University. The Higgs field permeates the entire universe, and the Higgs boson is an excitation of that field, just like an electron is an excitation of an electric field. In this analogy, the Higgs potential is like the voltage, determining the value of the field.

Once physicists began to close in on the mass of the Higgs boson, they were able to work out the Higgs potential. That value seemed to reveal that the universe exists in what's known as a meta-stable vacuum state, or false vacuum, a state that's stable for now but could slip into the "true" vacuum at any time. This is the catastrophic vacuum decay in Hawking's warning, though he is not the first to posit the idea.

Is he right?

"There are a couple of really good reasons to think **that's not the end of the story**," Mack says. There are two ways for a meta-stable state to fall off into the true vacuum—one classical way, and one quantum way. The first would occur via a huge energy boost, the 100 billion GeVs Hawking mentions. But, Mack says, the universe **already** experienced such high energies during the period of inflation just after the big bang. Particles in cosmic rays from space also **regularly** collide with these kinds of high energies, and **yet the vacuum hasn't collapsed** (otherwise, we wouldn't be here).

"Imagine that somebody hands you a piece of paper and says, 'This piece of paper has the potential to spontaneously combust,' and so you might be worried," Mack says. "But then they tell you 20 years ago it was in a furnace." If it didn't combust in the furnace, it's not likely to combust sitting in your hand.

Of course, there's always the quantum world to consider, and that's where things always get weirder. In the quantum world, where the smallest of particles interact, it's possible for a particle on one side of a barrier to suddenly appear on the other side of the barrier without actually going through it, a phenomenon known as quantum tunneling. If our universe was in fact in a meta-stable state, it could quantum tunnel through the barrier to the vacuum on the other side with no warning, destroying everything in an instant. And while that is theoretically possible, predictions show that if it were to happen, **it's not likely for billions of billions of years**. By then, the sun and Earth and you and I and Stephen Hawking will be a distant memory, so it's probably not worth losing sleep over it.

What's more likely, Mack says, is that there is some **new physics** not yet understood that **makes our vacuum stable**. Physicists know there are parts of the model missing; mysteries like quantum gravity and dark matter that still defy explanation. When two physicists published a paper documenting the Higgs potential conundrum in March, their conclusion was that an explanation lies beyond the Standard Model, **not that the universe may collapse at any time**.

**2AC -- AT: Nanotech**

**Nano impossible**

**Locklin, PhD, 10** Physicist specializing in Quantitative Finance, PhD UC Davis, “Nano-nonsense: 25 years of charlatanry” <http://scottlocklin.wordpress.com/2010/08/24/nano-nonsense-25-years-of-charlatanry/>

I used to work next to the center for nanotechnology. The first indication I had that there was something wrong with the discipline of “nanotechnology” is I noticed that the people who worked there were the same people who used to do chemistry and material science. It appeared to be a more fashionable label for these subjects. Really “material science” was a sort of fancy label for the chemistry of things we use to build other things. OK, new name for “chemist.” Hopefully it ups the funding. Good for you guys.¶ Later on, I actually read Drexler’s Ph.D. thesis which invented the subject. I can sum it up thusly:¶ Behold, the Schroedinger equation! ¶ With this mighty equation we may go forth and invent an entirely new form of chemistry, with which we may create new and superior forms of life which are mechanical in their form, rather than squishy inefficient biological looking things. We shall use the mighty powers of the computer to do these things! It shall bring forth many great marvels!¶ That’s it. That’s what the whole book is. Oh yes, there are a few collections of intimidating tables and graphs purporting to indicate that such a thing might be possible, and Drexler does sketch out some impressive looking mechanical designs of what he supposes a nanobot might look like, but, without more than a passing justification. He seems to lack the imagination, and of course, the **physics** to figure out what a real nanosized doodad might look like. Much of his thesis seems to be hand wavey arguments that his “looking rather a lot like a meter scale object” designs would work on a nano or small microscale. I know for a fact that they will not. You can wave your hands around all you want; when you stick an atomic force microscope down on nanosized thingees, you know what forces they produce. They don’t act like macro-objects, at all. Drexler would also occasionally notice that his perfect little robots would probably, you know, **oxidize**, like most reactive things do, and consign them to Ultra High Vacuum chambers in a fit of embarrassment. Then sometimes he would forget about the chemical properties of oxygen, and enthusiastically stick them everywhere. **None** of the chemistry you’d need to figure out to **even begin** to do this was done in his book. **Little** real **thought** was given to thermodynamics or **where the energy was coming from** for all these cool Maxwell-Demon like “perpetual motion” reactions. It was never noticed that computational chemistry (aka figuring out molecular properties from the Schroedinger equation) is basically **useless**. Experimental results were **rarely** mentioned, or explained away with the glorious equation of Schroedinger, with which, all things seemed possible. Self assembly was deemed routine, **despite** the fact that nobody knows how to engineer such thing using macroscopic objects.¶ There is modern and even ancient nano sized tech; lithographic electronic chip features are down to this size now, and of course, materials like asbestos were always nano sized. As far as nano objects for manipulating things on nanoscales; such things **don’t exist**. Imagining self replicating nanobots or nano machines is **ridiculous**. We don’t even have micromachines. Mechanical objects on microscales **do not exist**. On milliscales, everything that I have seen is lithographically etched, or made on a watchmakers lathe. Is it cool? Yep; it’s kind of cool. I have already worked for a “millitech” company which was going to use tiny accelerometers to do sensing stuff in your cell phone. Will it change the universe? Nope. Millitech miniaturization has been available for probably **300 years now** (assuming the Greeks didn’t have it); lithography just allows us to mass produce such things out of different materials.¶ This is an honest summary of Drexler’s Ph.D. thesis/book, and with that, a modest act of imagination, accompanied by a tremendous act of chutzpah, and a considerable talent for self promotion, he created what must be the most successful example of “vaporware” of the late 20th and early 21st century. The “molecular foundry” or “center for nanotechnology” or whatever nonsense name they’re calling the new chemistry building at LBL is but the tip of the iceberg. There are government organizations designed to keep up America’s leadership in this imaginary field. There are zillionaire worryworts who are afraid this mighty product of Drexler’s imagination will some day turn us all into grey goo. There are news aggregators for this nonexistent technology. There are even charlatans with foundations promoting, get this, “responsible nanotech.” All this, for a technology which can’t even remotely be thought of as existing in even pre-pre-prototype form. It is as if someone read Isaac Asimov’s books on Robots of the future (written in the 1950s) and thought to found government labs and foundations and centers to responsibly deal with the implications of artificial intelligence from “positronic brains.” ¶ You’d think such an endeavor would have gone on for, I don’t know, a few years, before everyone realized Drexler was a science fiction author who doesn’t do plot or characterization. Nope; this insanity has gone on for 25 years now. Generations of academics have spent their entire careers on this subject, yet not a **single goal** or fundamental technology which would make this fantasy a **remote** possibility has yet been developed. Must we work on it for another 25 years before we realize that we can’t even do the “take the Schroedinger equation, figure out how simple molecules stick together” prerequisites which are a fundamental requirement for so called molecular engineering? How many more decades or centuries of research before we can even create a macroscopic object which is capable of the feat of “self replication,” let alone a self replicator which works at length scales which we have only a rudimentary understanding of? How many more cases of nincompoops selling “nanotech sunscreen” or “nanotech water filters” using the “nanotechnology” of activated carbon; must I endure? How many more CIA reports on the dangers of immanent **nanoterror**ism must my tax dollar pay for, when such technologies are, **at best**, **centuries** away? How many more vast coffers of government largesse shall we shower on these clowns before we realize they’re selling snake oil?¶ Drexler’s answer to all this is, since nobody can disprove the necessary things to develop nanotech, they will be developed. Well, that depends what you mean by the words “can” and “disprove.” It also depends on what your time scale is. I’m willing to bet, at some nebulous point in the future, long after Drexler and I are dead, someone may eventually develop a technology sort of vaguely like what he imagines. At least the parts that don’t totally violate the laws of thermodynamics and materials physics (probably, most of the details do). As an argument, “you can’t disprove my crazy idea” doesn’t hold much water with me. Doubtless there are many denizens of the booby hatch who claim to be Jesus, and I can’t really disprove any of them, but I don’t really see why I should be required to. ¶ I have nothing against there being a few people who want to achieve some of the scientific milestones needed to accomplish “nanotech.” I have a great deal against charlatans who claim that we should actually invest significant resources into this crazy idea. If you’re an investor, and somebody’s prospectus talks about “nano” anything, assuming they’re not selling you a semiconductor fab, you can bet that they are selling you snake oil. **There is no nanotech**. Stop talking about it. Start laughing at it. As Nobel prize winning chemist Richard Smalley put it to Drexler: “No, you don’t get it. **You are still in a pretend world** where atoms go where you want because your computer program directs them to go there.”

**2AC -- AT: Dark Energy**

**Dark energy observations will not destroy the Universe**

**McIrvin 7 –** Dr. Matt McIrvin, PhD in Particle Physics from Harvard University, “Dark Energy Observations Will Not Destroy The Universe”, Live Journal, 11-27, https://mmcirvin.livejournal.com/402005.html

There's this preprint by Krauss and Dent getting a lot of discussion that suggests, in a remark at the very end that was of course destined to get a writeup in New Scientist, that our astronomical measurements of dark energy may destroy the universe for arcane quantum reasons. I think **it's totally wrong**.

The paper starts with an oddity that I learned about back in college, that a system that decays exponentially will (if left completely undisturbed) eventually pass to a realm in which it decays more slowly, via power law. This is generally practically unobservable, but they suggest it may have cosmological relevance if we live in an unstable false vacuum: it interacts in an interesting way with the cosmic inflation induced by dark energy, and this effect could be the only thing keeping us around. But watch out: since observing the system "resets the clock" (the famous quantum Zeno effect), we may have just returned to the exponential realm and thus sealed our doom by measuring the dark energy through supernova observations! Eat of the fruit of the tree of knowledge and you shall die.

Max Tegmark points out the obvious objection, that **this isn't really magic**--you don't really need a conscious observer with a telescope to cause something like the quantum Zeno effect; all you need is some coupling of other parts of the environment to the relevant operator. **Natural processes would have done this for us long ago**, if it were so important.

Tegmark is absolutely right, but he doesn't go far enough. Decay of the false vacuum in such a scenario would, as Krauss states, destroy everything in the universe. It therefore follows that there's a great big coupling here--**continued survival of anything** at all **constitutes a null-result "measurement"** that the dark energy in our vicinity hasn't decayed yet. It seems to me that **this invalidates the paper's whole argument**; the undisturbed state evolution that leads to the power-law realm **can't happen** in a universe populated with stuff. Unless I'm missing something really fundamental.

**The claim has been formally retracted by the authors because it’s not reliable**

**Baez 7 –** Dr. John Baez, Professor of Mathematics at the University of California, Riverside, PhD from MIT, “Astronomers Destroy Universe”, The n-Category Café, 12-1, https://golem.ph.utexas.edu/category/2007/12/astronomers\_blamed\_for\_death\_o.html

On November 12th, Lawrence Krauss and James Dent wrote a paper that caused quite a kerfuffle in the media:

Lawrence Krauss and James Dent, The late time behavior of false vacuum decay: possible implications for cosmology and metastable inflating states (version 1).

Most of the paper is quite technical, but on November 22, the New Scientist took a couple of sentences and blew them out of proportion in a story with a far-out title: Has observing the universe hastened its end?

On November 24, Krauss and Dent **changed** those sentences to something a bit more reasonable.

The bulk of the paper remains unchanged… but nobody ever talked about that part. It’s a cute example of how **sensationalism amplifies the least reliable aspects** of science, while ignoring the solid stuff.

**2AC -- AT: Blackholes**

**No risk of black holes**

**Easterbrook 3** --- Gregg Easterbrook (Senior Fellow – New Republic), “We’re All Gonna Die!”, Wired Magazine, July, http://www.wired.com/wired/archive/11.07/doomsday.html?pg=1&topic=&topic\_set=)

6. Voracious black holes! A supermassive black hole roughly the weight of 3 million suns almost certainly occupies the center of the Milky Way. And smaller (actually, lighter) ones are probably wandering around in space.

If such a rogue black hole happened to find its way into the solar system, its gravitational influence would disrupt the orbits of all the planets and their moons. Earth might slingshot out of the temperate range it now occupies and into frigid reaches more familiar to Mars, or it might be pushed closer to the sun to be singed, charred, or vaporized. Worse, if a sufficiently large black hole were to pass through the globe, it might be lights-out in more ways than one. The planet would be sucked into a vortex of such intense gravity that nothing would escape. The atoms that once made up Earth would be crushed out of existence as it's currently understood. An encounter between Earth and a black hole is **astronomically**, as it were, **improbable**. However, collisions with supermassive objects of any kind would not be survivable.

**No black holes** -- The black holes would disappear instantly, or we should be dead by now.

**Cavaglia 10** [Marco Cavaglia, assistant professor of physics at the University of Mississippi.] “Particle accelerators as black hole factories?” Einstein Online Vol. 04, 2010 (<http://www.einstein-online.info/spotlights/accelerators_bh.1.html>) – MZhu

According to general relativity, a black hole should form whenever some mass is squeezed into a very small region of space. The precise meaning of "very small" is defined by a length scale called the Schwarzschild radius. This radius depends on the mass, but also on the properties of whatever hidden extra dimensions there might be. For certain kinds of extra dimensions, the Schwarzschild radius of a given mass will be significantly larger than otherwise. Consequently, in order to form a black hole, you wouldn't need to compress matter nearly as much as in a space without extra dimensions. Under those favourable conditions, collisions of protons with other protons at the LHC should result in the formation of miniature black holes.

More concretely: Protons consist of subcomponents called quarks. When two quarks in collision do not just fly past each other, but collide nearly head-on, then, at the energies achievable with the LHC, a sufficiently high concentration of mass would result, and a mini-black hole would form. In the following animation, the relevant portion of our three-dimensional world is represented by a plane, embedded in a higher-dimensional (in the image: three-dimensional) space. Ordinary elementary particles are confined to the world-plane - they cannot ever move out into the extra dimensions. When the two particles moving in that plane have almost reached each other, a black hole forms, its horizon represented by the black sphere:

**Black holes with a mass that is extremely small are extremely unstable**. The intensity of Hawking radiation, a hypothetical quantum process by which black holes emit elementary particles, depends on the black hole's mass - the smaller the mass of a black hole, the greater the amount of energy emitted in this way. By this process, the **mini-black holes formed in particle accelerators would evaporate nearly as soon as they are created** - typically, such black holes would only exist for a few tenth of a trillionth of a trillionth (10-25, in exponential notation) seconds. Their decay would result in a sudden blast of a few energetic particles. Possibly, some exotic remnant object might survive as well (however, what such an object could be, and whether or not there really are exotic remnants, is not at all clear to present physics):

With respect to the numbers, types and energies of the resulting particles a decaying black hole would look different from other particle collisions. Some of its characteristics are directly related to the existence of the extra dimensions: For instance, in the animation above, you can see that some energy associated with gravity (shown as brown, wiggly arrows) is carried off into the extra dimensions - from the point of view of a physicist in our three-dimensional universe, this energy would simply vanish!

When physicists study collisions in particle accelerators, they use sensitive detectors to keep track of the different types of resulting particles and their energies, which enables painstaking reconstructions of each collision. The following image, based on a simulation, shows what physicists might see in their detector when a mini-black hole decays:

The image shows a sideways cut-away view of the particle detector CMS currently under construction at the LHC accelerator. The colliding particles move at right angles to the image, either directly towards the observer or directly away. The lines represent traces of particles produced by the black hole decay. The green line is the trace of an electron, while the red lines are traces of particles called muons, which are similar to electrons but more massive. The blue and cyan lines denote particles consisting of quarks, and are thus distant kin to protons and neutrons - so-called Kaons in blue, pions in cyan.

The detector contains a powerful magnet which produces a strong magnetic field. This field deflects all moving particles which carry electric charge - in the illustration, their traces are curved. The degree of curvature, combined with other data, is used to infer each particle's momentum and mass.

By studying collision products, physicists at LHC would be able to identify and study the decay of mini-black holes. In this way, they might be able to prove the existence of extra dimensions, and even gain some insight into their properties.

How often would black holes be produced? The answer depends on what model of the extra dimensions one uses for the calculation. According to some models, black holes should be produced at the LHC at a rate of one per second!

If particle collisions at high-energy may indeed create black holes, we should also expect creation of other gravitational objects which are predicted by string theory, such as higher-dimensional spatially extended solutions of the gravitational equations called branes - cousins of the three-dimensional extended subdomain that is our world.

Artificial mini-black holes - should we worry?

Do we need to worry? Might these mini black holes start growing and, eventually, devour the whole earth? **We should not worry about this**. Even if you do not trust the calculations predicting a quick demise for such minuscule black holes, there is solid data to go by.

If black holes really form in high-energy particle collisions, they are **also continuously created in the earth's atmosphere** by the collision of Ultra High-Energy Cosmic Rays (UHECRs) with nuclei of oxygen, carbon, nitrogen and other elements present in the atmosphere.

UHECRs are particles of unknown origin and identity (protons? light atomic nuclei?) reaching the earth from outer space. In such collisions with atmospheric nuclei, a shower of new particles is produced (consisting mostly of electrons, their slightly more massive cousins called muons, and photons). These particles can be detected by specialized observatories on earth or in space, as sketched in the following illustration:

The collision energies for UHECRs can be enormous - some observations show energies of hundreds of TeV (hundreds of trillions of electron volts), **which is much larger than the collision energies in particle collider experiments**. And while the events with very high energy are exceedingly rare, this type of collision has been going on for literally billions of years, so an inordinate number of mini black holes would have formed. Since the earth has not (yet!) disappeared into one of these black holes, the much less massive man-made mini black holes should be quite safe.

The rarity of ultra-high energy collisions is also one of the reasons that physicists have not been able to confirm or disprove the formation of mini-black holes in this way. Still, this could change over the next few years, as the Pierre Auger Cosmic Ray Observatory in Argentina, which has just started taking data, becomes fully operational.

So will we actually find these tiny black holes? Hard to tell - at the moment, we have no direct evidence that the models predicting the existence of extra dimensions are on the right track, and if they are, that among all the many possible shapes and sizes for the extra dimensions, those realized in our universe allow the production of miniature black holes at a detectable rate. Our search is akin to playing the lottery - we will need to get very, very lucky to find what we seek, but if we did, the payoff would be enormous: We would have the first direct evidence that space has extra dimensions!

**No mindset shift**

**No mindset shift – human psychology makes crisis inevitable**

**Heinberg, 15**—Senior Fellow-in-Residence of the Post Carbon Institute (Richard, “The Anthropocene: It’s Not All About Us”, <http://www.postcarbon.org/the-anthropocene-its-not-all-about-us/>, dml)

In addition to our innate propensity to maximize population and consumption, we humans also **have difficulty making sacrifices** in the present in order to reduce future costs. We’re **genetically hardwired** to respond to immediate threats with fight-or-flight responses, while distant hazards **matter much less** to us. It’s not that we don’t think about the future at all; rather, we **unconsciously apply a discount rate** based on the amount of time likely to elapse before a menace has to be faced.

True, there is some variation in future-anticipating behavior among individual humans. A **small percentage** of the population may change behavior now to reduce risks to forthcoming generations, while **the great majority is less likely to do so**. If that small percentage could oversee our collective future planning, we might have much less to worry about. But **that’s tough to arrange** in democracies, where people, politicians, corporations, and even nonprofit organizations get ahead by promising immediate rewards, usually in the form of more economic growth. If none of these can organize a proactive response to long-range threats like climate change, the actions of **a few individuals** and communities **may not be so effective** at mitigating the hazard.

This pessimistic expectation is **borne out by experience**. The general outlines of the 21st century ecological crisis have been **apparent since the 1970s**. Yet **not much has actually been accomplished** through efforts to avert that crisis. It is possible to point to hundreds, thousands, perhaps even millions of imaginative, courageous programs to reduce, recycle, and reuse—yet the **overall trajectory** of industrial civilization remains **relatively unchanged**.

**1AR – No Mindset Shift**

**Small risk of no-mindset shift means that it O/Ws because we should not risk extinction. Heinberg says that we are psychologically borne of experience and hardwired to respond to immediate threats and have fight or flight responses which means a great majority would want increased technology to prevent a future war because they are traumatized from this one.**

**Empirics prove---first two uses didn’t cause disarmament**

David **Law 15**, CDA Institute Security & Defence Blogger, Senior Fellow at the Centre for Security Governance in Kitchener, “NUKES: NEVER AGAIN?”, CDA Institute, Aug 6 2015, https://cdainstitute.ca/nukes-never-again/

The sixth and ninth of August 2015 mark the seventieth anniversaries of the nuclear bombings of the Japanese cities of Hiroshima and Nagasaki. The total death toll exacted by these first ever, and as yet only, use of nuclear weapons may never really be known. Estimates range from 70,000 to double that number depending on the counting criteria used. Nuclear weapons surely deserve the descriptor “weapons of mass destruction,” but it is also true that the incendiary bombs dropped on Tokyo during two days in March 1945, generating one of the greatest fire storms the world has ever seen, had a kill rate similar to that of the atomic bombs. In our times, a dirty bomb might have as horrifying an effect as a tactical nuclear weapon. The nuclear bombs were dropped over three generations ago but their **significance continues to resonate in Japan and around the world.** Washington used its nuclear power against Japan to save the American lives that would have had to be sacrificed in an effort to pacify a Japan that in early August 1945 still did not consider itself defeated, and whose military tradition was continuing to push its men in uniform to fight to the death. Within a week of the nuclear bombing of Nagasaki, the Japanese Emperor announced that his country was ready to sue for peace. Washington’s resort to the nuclear option has been a catalyst for the anti-Americanism that has been a constant feature of the post-war period. The underlying story has been that the American lives saved were worth more that the Japanese ones destroyed. An understandable judgment, this fails to take in to account just how many Japanese lives were spared when Tokyo elected to capitulate almost immediately after the second attack and how many more Japanese would have been killed if their country’s soldiers had continued to fight to the death in an effort to repel an Allied invasion. It is worth noting that on the day before the nuclear attack on Nagasaki, the Soviet Union declared war on Japan. This action suggested that the pattern of communist expansionism that had been put in evidence on the western front as Hitler’s armies collapsed and Stalin’s advanced stood to be repeated in Asia. Against this background, Washington’s decision to go nuclear was also likely designed to fire a warning shot across Moscow’s bow. With that as background, let’s look at how the world has evolved on the nuclear front since 1945. Here, several elements stand out. Crucially, **a non-proliferation regime has been in place since 1970 that has discouraged states from going the nuclear route**. This has been undergirded by a commitment by the five nuclear powers that sponsored the accord to work for a steady decrease in their nuclear arsenals. Thus, the number of nuclear warheads has decreased from a high of roughly 68,000 in 1985 to some 4,000 now, with an additional 6,000 or so having been decommissioned but not destroyed. **At the same time, there has been a modest but still disconcerting increase in the number of nuclear weapon states**. In addition to the first generation nuclear powers – the US, the USSR, the PRC, the UK and France – India and Pakistan are nuclear empowered as are Israel and North Korea. All four powers are outside the non-proliferation regime. Israel does not admit to its nuclear status; North Korea wears it as a badge. Just how many nuclear weapons the second-tier nuclear states have is unclear, but their nuclear arsenals are probably sufficient to blow up a large part of the world. Nonetheless, the **nukes have remained holstered since those fateful days in August seventy years ago. Why?** One reason is that the military advantages of using nuclear weapons have been **outweighed by the significant political costs associated with their deployment**, as the US case has demonstrated.

**AT: Spark---AT: David 18**

**David flows neg** --- concludes the risk of nuclear conflict being existential justifies avoidance

Steven R. **David 18**. Professor of Political Science at Johns Hopkins University. 2018. “The Nuclear Worlds of 2030.” Fletcher Forum of World Affairs, vol. 42, pp. 107–118.

CATASTROPHE AND THE END OF NUCLEAR WEAPONS

In the year 2025, the world very nearly came to an end. Smarting after several years of economic downturn and angry at American efforts to encircle it with NATO bases, Russia responded to a "plea" for help from co-ethnics in the Baltic states. Thousands of Russian troops, disguised as contract "volunteers" dashed across international borders allegedly to protect Russian speakers from governmental assaults. The Baltic countries invoked Article 5 of the NATO Treaty while American forces, deployed there precisely to deter this kind of aggression, clashed with Russian troops. Hundreds of Americans were killed. Washington warned Moscow to halt its invasion to no avail. The United States then prepared for a major airlift of its forces to the beleaguered countries, with Moscow threatening America with "unrestrained force" if it followed through. Washington ignored the threat and Moscow, seeking to "de-escalate by escalating," destroyed the American base of Diego Garcia in the Indian Ocean with a nuclear-armed cruise missile. The United States responded with limited nuclear strikes against Russian bases in Siberia. Thus far, the collateral damage had been kept to a minimum, but this bit of encouragement did not last. Fearing a massive American pre-emptive strike aimed at disarming its nuclear arsenal, Russia struck first against the range of US nuclear forces both in the United States and at sea. America responded with its surviving weapons, destroying much (but not all) of the remaining Russian nuclear arms. And then, both sides took a breather, but it was too late. Although cities had been largely spared, millions had died on each side. Making matters worse, predictions of nuclear winter came to pass - producing massive changes in the weather and killing millions more, especially in developing states.

The world finally had enough. A dawning realization emerged that

leaders of countries simply could not be trusted with weapons that could destroy humankind.3 Protests swept the globe calling for total disarmament. Mass demonstrations engulfed the United States and Russia demanding the replacement of their existing governments with ones committed to ending nuclear weapons. Voices calling for more moderate disarmament that would preserve a modest nuclear deterrent were angrily (and sometimes violently) quashed. The possession of nuclear weapons became morally repugnant and unacceptable. No longer were the intricacies of nuclear doctrine or force levels subject to debate. The only question remaining was how one could get rid of these loathsome weapons as quickly as possible.

Under the auspices of the United Nations, a joint committee composed of the Security Council members, other countries known to possess nuclear arms, and several non-nuclear powers was established. Drawing on the structure and precedent of the Chemical Weapons Convention, this UN body drew up the Treaty that called for the complete disarmament of nuclear arms by 2030. The development, possession, and use of nuclear weapons was prohibited.

An airtight inspection regime, enhancing the procedures already in existence through the Non-Proliferation Treaty, was established to first account for all nuclear arms and fissile material and then monitor the destruction of the nuclear weaponry. All countries were subject to the Treaty, whether they maintained nuclear facilities or not. Violations would produce a range of punishment from global economic sanctions to massive conventional attack.' 6

By 2030, all the nations of the world had agreed to the Treaty. No violations occurred. Armed conflicts persisted, but they proved to be of modest scale, erupting only within countries but not between them. Insofar as the fear of nuclear weapons helped keep the peace during the Cold War and post-Cold War eras, the horror of nuclear use now made war all but unthinkable. A feeling of relief swept the globe as the specter of nuclear holocaust vanished, tempered only by the painful regret that it took the death of millions to realize a goal that for so many had been self-evident since 1945.

**---THEIR EVIDENCE ENDS---**

CONCLUSION

The nuclear world of 2030 might look a lot like the nuclear world of 2018 where deterrence reigns supreme; or it might be a world of warring states where the use of nuclear weapons becomes frighteningly commonplace; or it might be a traumatized world that has rid itself of nuclear weapons. Or it might be none of these. Choosing the most likely outcome is probably a **fool's errand**. It is tempting to believe that the future will be more of the same, but in an era that saw the collapse of the Soviet Union and the election of Donald Trump to the U.S. presidency, it is **difficult to have confidence in predictions** based on **the trends of the past**. Nor is it easy determining which outcome we would **like** to see emerge. Perhaps most would choose a nuclear-free world, but **few would want to pay the price of a horrific nuclear war to get there**. Not many would select a world where nuclear war becomes normalized, but the increasing development of low-yield, highly accurate weapons along with doctrines guiding their use in limited conflicts suggests that we need to prepare for just this eventuality arising. Maybe the best we can hope for is the world we are most familiar with; a world where nuclear weapons help to keep the peace as they have done for the past seventy years. It is not a terrible outcome if deterrence can indeed be maintained. If not, the nuclear worlds of 2030 will look much more like the other two possibilities, or perhaps, if worst comes to worst, **no world at all**.

**AT: Spark---AT: Deudney 07**

**Votes AFF.**

Daniel H. **Deudney 07**. Professor of political science, international relations and political theory at Johns Hopkins University. 2007, last date cited. "An Interview with Daniel Deudney." World Government Research Network. http://wgresearch.org/an-interview-with-daniel-h-deudney/

It has often been observed that the two most important questions of the nuclear era are both essentially unanswerable: how likely is deterrence failure (or nuclear use)?  And what happens after nuclear weapons are used?  My view on the current situation is that the nuclear problem is growing, taking dangerous new forms, and that there is a growing likelihood that nuclear weapons use will occur.  In the **past** I was optimistic that nuclear use would be a catalytic event for a substantial **world order reform**, or even revolution, a view **widely held by many**.  But I am now less confident that ‘the deluge will lead to the covenant.’  Rather, nuclear use now might trigger an extended period of **further arms racing and further nuclear use**.  This is, of course, a **double tragedy in the making**. With all the pressing problems the world faces, most notably climate change, it is **simply obscene that we are sliding in the wrong direction on the nuclear question.**

**AT: Spark---AT: Fuhrmann 16**

**Fuhrmann concludes our impact outweighs.**

Matthew **Fuhrmann 16**. Associate professor of political science at Texas A&M University. 11/2016. “After Armageddon: Pondering the Potential Political Consequences of Third Use.” Should We Let the Bomb Spread?, edited by Henry D. Sokolski, United States Army War College Press, http://www.dtic.mil/dtic/tr/fulltext/u2/1021744.pdf.

The discussion in this section so far assumes that the third use of nuclear weapons would negatively affect the nonproliferation regime. It is also possible, and somewhat paradoxical, that nuclear use would result in a **stronger regime**. The international community often reacts to disasters by instituting sweeping reforms. Most of the major improvements to the nonproliferation regime since 1970 resulted from crises of confidence in existing measures. India’s nuclear test in 1974 led to the creation of the Nuclear Suppliers Group (NSG), a cartel designed to regulate trade in nuclear technology and materials. Iraq’s violations of the NPT prior to the 1991 Persian Gulf War caused the international community to give the International Atomic Energy Agency (IAEA), the main enforcer of the NPT, more teeth through the 1997 Additional Protocol. In addition, the international community sought to strengthen global export controls by passing United Nations Security Council Resolution 1540 after the public exposure of the A. Q. Khan network, 199 a Pakistani-based operation that supplied nuclear weapon-related technology to Iran, Libya, and North Korea. As these examples illustrate, sweeping reforms are sometimes possible in a time of crisis. The third use of nuclear weapons would no doubt be horrific. It might, therefore, create a **broad international consensus** to **strengthen nonproliferation norms** in an attempt to **lower the odds** that the bomb would be used a fourth time. This **does not imply that the third use of nuclear weapons would be** a **good** thing. The **negative consequences** would **outweigh any marginal improvement in the nonproliferation regime resulting from nuclear use.**