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#### CI: Interpretation: “Appropriation of outer space” by private entities refers to the exercise of exclusive control or use of space.

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

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

Limits – topic lit

I meet – reighilgihting doesn’t prove anything – it’s solvency ev that says that public ownership is good – all 1ac ev and explanation in cx of 1ac prove that private sector will own and operate these space stations which occupy regions in LEO.

Rvi – skew

## Case

### advantage

### Space Col

#### Deudney’s critique of space colonization is *TERRIBLE* – our author is *WAY* more qualified about space than yours. Extinction is inevitable, but *only* space colonization solves.

Globus ’20 [Al, co-founded the NASA Ames Space Settlement Contest for 6-12th grade students. 6-12th grade students. He also co-founded the NASA Ames Nanotechnology Group, which, at first, worked on materials for space elevators and diamondoid machine phase matter to build $50,000 personal spacecraft. He has designed three orbital space settlements (Lewis One, Kalpana One, and Kalpana Two) and published over 45 papers in technical conferences and journals, won a Feynman Prize in Nanotechnology, a NASA Software of the Year award, and a NASA Public Service Medal. He has discussed space colonization and nanotechnology on the History Channel, Danish radio, a French magazine, on a European Commission video, and elsewhere. He is co-author of the book The High Frontier: An Easier Way, “Not so dark skies”, 07-13-2020, https://www.thespacereview.com/article/3985/1]//pranav

In the book Dark Skies, Daniel Deudney examines space settlement[1] in detail and comes to the conclusion that it is so likely to exterminate humanity or have other serious consequences that it should not be undertaken at all, or at least not for several centuries, giving time to improve homo sapiens’ habits. Deudney comes to his surprising conclusion by applying geopolitics, a part of political science that studies “the practice of states controlling and competing for territory,”[2] among other things, to space settlement, which Deudney describes as “habitat expansionism.” Deudney uses a version of geopolitical theory to generate 12 propositions and then applies them to predict the future, coming to the conclusion that space settlement is an existential threat to humanity and should be viewed in the same category as nuclear war. Dark Skies is a difficult read but it is also a detailed and extensive critique of space settlement that deserves a thoughtful response. General critique This article examines Deudney’s six major threats to Earth and humanity and compares each with and without space settlements, something oddly left out of the book. This paper finds major problems with most of the six, especially the suitability of asteroids as weapons, which is poor. This article also examines five likely, relatively near-term, threats to Earth and finds that without space settlements any of these threats could exterminate humanity. With space settlements most of the threats would be reduced from existential to catastrophic. In all cases space settlements could help Earth recover. It should be noted that Dark Skies is for the most part a well thought out, carefully reasoned, knowledgeable critique of space settlement. In particular, it correctly points out that space settlement advocates have not spent much time and energy examining the potential downsides of space settlement, a fault that should be remedied. However, the core conclusion, that space settlement is a serious threat to humanity that must be strangled in the crib, is simply wrong. At the simplest level, the list of survivable threats to a space settling civilization is much longer than that for a society that stays exclusively on Earth, particularly an Earth with thousands of nuclear warheads. There are some serious general problems that play a role in generating Deudney’s conclusions. These include: For the six threats identified, Dark Skies does not compare a future with space settlement versus a future without space settlement. When this comparison is done it becomes clear that the “no space settlement case” is far more dangerous to humanity’s long term survival than is the space settlement case. Deliberately-engineered asteroid attacks play an important role in four of the threats, but as weapons asteroids are far inferior to nuclear bombs, making weaponized asteroids somewhat superfluous.[3] The difficulty of weaponizing asteroids is substantially understated. Nothing is quantified, ever. So much so that this author thought geopolitics might not quantify, but an examination of Introduction to Geopolitics by Colin Flint does reveal tables of numbers for various purposes. Geopolitical analysis has always been on a more or less constant sphere (Earth). However, the spatial relationships among free space settlements and between those and planetary settlements are not on a sphere, or even close. For example, the physical relationship between free space settlements constantly varies due to orbital mechanics. Note that France and Germany always share a common border, but the distance between Mars and Earth varies from 54.6 to 401 million kilometers. There is little or no data or experience regarding the geopolitical effects of these unique spatial relationships on a space settlement society and Dark Skies makes no attempt to show how geopolitical theory must be modified (or not) to take this fundamental change into account. Early in Dark Skies, Deudney states that militarization has dominated space development to date and therefore space development is responsible for the existential threat of nuclear war. He sees nuclear-tipped ICBMs as space weapons because they pass through space on the way to their targets. However, in Space Weapons Earth Wars and elsewhere, only weapons based exclusively in space are considered “space” weapons. More to the point, the US space program has been conducted without ICBMs after the first launchers, and civilian space development has made little contribution to ICBM programs. Painting space settlement with the ICBM brush is a little like attributing tank warfare to the automotive industry. In any case, abandoning space settlement is unlikely to reduce the ICBM threat to Earth and certainly means that nuclear war on Earth is an existential threat to humanity as opposed to “just” a severe blow to our home planet. Finally, space development is dominated not by national space programs, either civilian or military, but rather by commerce. Communication satellites, especially video direct to consumers on the ground, and Earth observation systems generate far more revenue than is spent by national governments on space activities. For example, according to thespacereport.org, the total space economy was $383.5 billion in 2017. NASA’s 2017 budget was around $19.6 billion. Table 1 is a partial list of potential existential threats to humanity when there are no space settlements. In all cases an advanced space settlement society could provide refuge and, in most cases, could repopulate Earth with at least those species in use or archived in space settlements. Items on this list were chosen because they Could manifest soon, in many cases within a few years or decades. Threaten an Earth-bound society with extermination. Are relatively uncontroversial, as most knowledgeable observers would agree the threat is real.

#### Civil War is wrong – settlement solves it AND nuclear war – Overview Effect proves.

Globus ’20 [Al, co-founded the NASA Ames Space Settlement Contest for 6-12th grade students. 6-12th grade students. He also co-founded the NASA Ames Nanotechnology Group, which, at first, worked on materials for space elevators and diamondoid machine phase matter to build $50,000 personal spacecraft. He has designed three orbital space settlements (Lewis One, Kalpana One, and Kalpana Two) and published over 45 papers in technical conferences and journals, won a Feynman Prize in Nanotechnology, a NASA Software of the Year award, and a NASA Public Service Medal. He has discussed space colonization and nanotechnology on the History Channel, Danish radio, a French magazine, on a European Commission video, and elsewhere. He is co-author of the book The High Frontier: An Easier Way, “Not so dark skies”, 07-13-2020, https://www.thespacereview.com/article/3985/1]//pranav

War (Geopolitical Malefic)

Argument: Space settlement creates an endless frontier extending for millions of light-years into the cosmos. Frontiers tend to be violent places, creating wars not only at the frontier but between the polities that support the expansion. The vast size of the cosmos means that settlers are widely separated for much of the time, perhaps even evolving new species. When they come close enough to interact there may be little fellow feeling and little reluctance for the stronger to exterminate the weaker.

Counter-argument: With space settlement development there are a number of factors inhibiting violence and warfare. For one, the vast energy and materials resources available will tend to make resource wars obsolete. The fragility of space settlements, particularly free-space settlements in orbit, mandates that settlers avoid pointless provocations and chest-beating exercises. The enormous size of the space inhabited, up to and including the entire galaxy, makes it extremely unlikely that war will consume more than a small fraction of the population and resources available. It is difficult, if not impossible, to predict whether space settlement will lead to an increase or decrease in the odds that any given individual or group is involved in warfare or not. Preventing space settlement may be more or less dangerous than allowing it to proceed; it’s impossible to say.

Comparison with no space settlement: It is reassuring that since World War II warfare has decreased substantially and rarely involves the great powers directly killing each other’s citizens. That is left to proxies. However, not all wars are intentional. Consider World War I and the Cuban Missile Crisis. These suggest that there is a possibility—some would say probability—of an accidental humanity-ending nuclear war.

Space settlement could reduce this probability a bit by exposing large numbers of people to the Overview Effect created by the view of Earth from space, where some astronauts have come to value Earth and the unity of Earth’s people much more than before. More substantively, a sufficiently developed space settlement society surviving a war can repopulate Earth and restock other species if prevention fails. Thus the chance of a humanity-ending nuclear war is much lower with a sufficiently advanced space settlement society.

#### Deliberate asteroid attack is impossible and nukes are more likely, but settlement solves their impact.

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Deliberate asteroid attack (Natural Threat Amplification)

Argument: a sufficiently large asteroid impacting Earth can exterminate homo sapiens; indeed many species have been destroyed this way. It is possible to build a surveillance system to track dangerous asteroids and develop means to deflect them. However, this very system could be used to deliberately target Earth and this may be a more extensive threat than untampered asteroids.

Counter-arguments and counter-counter arguments:

Without intervention, multiple major Earth strikes by large asteroids are certain, although the timing is unknown. Space settlement or no, we must find and monitor existing asteroids and develop deflection technology sufficient to make asteroids miss Earth.

Targeting Earth is much more difficult than making an asteroid miss Earth. Hitting Earth requires a much greater ability to manipulate and predict trajectories accurately. Missing Earth given an on-target asteroid only requires the asteroid to be delayed or advanced by a few minutes. Hitting Earth requires accurate prediction of thrust added to the asteroid, which is dependent on composition, and understanding the non-Newtonian effects (e.g., light pressure) for the time between thrust and collision.

However, given time and a vigorous asteroid mining industry that deliberately deflects asteroids routinely, targeting asteroids will someday be practical.

It is likely that the mining will be done by a factory that goes to the asteroid, and only refined products sent to Earth or elsewhere. Thus, the ability to accurately retarget asteroids will likely not get a boost from mining.

Any reasonable program to protect Earth from asteroids will track and predict the future motion of all the large asteroids, and many of the smaller ones, coming near Earth’s orbit. Thus, tampering with the natural trajectory of a dangerous asteroid will likely be detected long before it is an imminent threat, providing time for deflection.

A trusted but rogue element (i.e., a spy) inside the tracking organization may be able to cover up the new trajectory and true location of the asteroid until it is too late.

A potential solution is multiple redundant tracking operations such that penetration of all of them by rogue elements is extremely unlikely.

Asteroids are inferior weapons.

Aiming at the desired target at any particular time is often impossible. Asteroids travel in predictable orbits and are only a threat to settlements near that trajectory. There may not be an opportunity to hit a particular target with a large asteroid for hundreds of years or more.

Time constraints make a coordinated attack by multiple asteroids all but impossible to design much less execute.

Aiming to hit something as small as Earth is difficult, much harder than trying to miss Earth. Small perturbations can cause an asteroid to miss Earth entirely, whereas small perturbations do not matter much when trying to miss Earth.

Changing the trajectory of large asteroids is difficult. The velocities and masses are huge. Trajectory change must often be done years or even decades in advance to hit the target.

When attacking orbital settlements the target can, at least in principle, maneuver, making the difficult task of hitting the target much harder.

Nuclear weapons are smaller, easier to precisely maneuver, and much easier to hide than asteroids. Consider that, unlike asteroids, nuclear weapon locations won’t be in a solar-system-wide database. Nuclear weapons are far easier to use for surgical attacks that are not intended to exterminate humanity. They are also suitable for whole-planet destruction by designing the attack to create a nuclear winter. Given the superiority of nuclear weapons, it is unlikely that a deliberate asteroid attack will be attempted much less be successful.

Comparison with no space settlement: Space settlement or not, we would be fools indeed not to find, track, and deflect asteroids headed towards Earth. However, without settlement it will be more difficult to accomplish this. Without space settlement, our in-space industrial capabilities will be less advanced, and removing the threat entirely by dismantling the appropriately asteroids and selling the materials will not be an option. The asteroid threat will continue more or less forever and vigilance will be easier to maintain if settlements dot the solar system. Finally, once a large number of space settlements are independent of Earth, a successful asteroid attack on Earth would not exterminate humanity.

#### Treaty collapse is unpredictable threat construction.

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Weakening of treaty obligations (Restraint Reversal)

Argument: Nuclear-tipped ICBMs are a well documented existential threat at least to civilization and possibly humanity. Also, there are other technological developments, such as nanotechnology, biotechnology, and artificial superintelligence, that have the potential to create very serious problems. A series of treaties inhibits the further development of nuclear weapons and, at least in principle, it might be desirable to have similar constraints on other fields. Military pressure on Earth by cislunar space settlements has the potential to loosen treaty obligations and create a greater threat than would otherwise be the case. Space settlement changes the environment and may make restraining ICBMs and other dangerous technology more difficult and therefore less likely to succeed.

Counter-argument: It is possible that there may be military tensions between Earth and cislunar space. It may be that these tensions prevent successful treaty development. Other factors might instead play a dominant role in treaty development. It’s also possible that treaty development is counter-productive if one or both sides cheat. It is extremely difficult to know centuries in advance how well treaty development will fare. To give up the survivability of a space-settlement-based society on the highly uncertain and possibly unimportant improvements in the environment for treaty negotiations predicted by geopolitics does not appear to be wise.

Comparison with no space settlement: Nuclear-tipped ICBMs are here and it is many decades before the first space settlement will be built. The main comparison is that in the space settlement case the use of large numbers of nuclear weapons will not wipe humanity out. Also, hundreds, thousands, or even millions of kilometers of vacuum will separate settlements from Earth and each other, making a barrier to proliferation that even advanced artificial superintelligence may have difficulty penetrating.

#### New totalitarian government is empirically wrong and settlement solves the internal link.

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Totalitarian world government (Hierarchy Enablement)

Argument: According to Deudney, “The further large-scale expansion of human activity into solar space is likely to facilitate the emergence of a highly hierarchical world government on… Earth that could then be prone to become totalitarian” due to military pressure on Earth.

Counter-argument: The hypothesized facilitation of highly hierarchical world government is due to the hypothesized threat of attack specifically:

Bombardment by asteroids. But as we have seen, asteroids make inferior weapons.

Attack from low Earth orbit. In this scenario one entity controls Earth and another controls the orbital space near Earth, which can then be used to launch attacks. However, if a single entity controls both, this threat becomes moot.

With regard to turning totalitarian, it should be noted that none of the classic totalitarian states (Soviet Union, Germany, Italy, North Korea, and China) were subject to significantly more threat than other countries which did not turn totalitarian (e.g., the United Kingdom, France, Switzerland, etc.), suggesting that external pressure is not necessarily the driver towards totalitarianism. Indeed, South and North Korea shows that very similar countries in similar circumstance can be driven to either totalitarianism or democracy.

Comparison with no space settlement: If there is no settlement then there cannot be a threat originating from settlements so a comparison makes no sense.

#### Alien generation & unknown threats super unlikely, but colonization allows safe development and means no extinction.

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Ubermensch (Alien Generation)

Argument: As humanity spreads throughout the solar system, some branches of homo sapiens may eventually evolve into new species, with or without genetic engineering, nanotechnology implants, artificial superintelligence, and/or other cybernetics. One or more of these “Ubermensch” societies may wish to colonize Earth, Mars, or other worlds with little care for the people living there. Earth may be considered particularly valuable as it is uniquely well suited to life. That may make it a target for powerful groups of free space settlements. Assuming the Ubermensch really are superior, at least in warfare, this could lead to homo sapiens’ extinction.

Counter-argument:

Speciation takes a long time. Trying to predict so far into the future is a dicey business.

Except for speciation, cybernetic and nanotech modification could happen even if humanity were to stay only on Earth, although keeping it hidden would be harder than in a society consisting of hundreds or thousands of orbital habitats.

The problems that may come from genetic engineering or cyborg development are likely to arise on Earth well before large-scale space settlement.

A sudden attack on Earth by Ubermensch living on Earth would be harder to counter than an aggressive force working its way in from, say, the Kuiper Belt, which could take years and be seen well before they posed a direct threat to Earth.

Comparison with no space settlement: With space settlement, genetic engineering, cyborg, and nanotech research can be extremely well controlled. Research facilities can be isolated from all other life by thousands of kilometers of vacuum and the entire facility obliterated if things get really out of hand. While possible without settlement, creating a dangerous new species would be much easier for a space settling civilization as the work could be tucked away in one or a few settlements.

Unknown and unknowable threats (Monster Multiplication)

Argument: By moving out into the cosmos there will be many more teams developing and deploying new technology and new social systems. Some of these may create existential threats that we do not know about. Indeed, it is possible that some generated existential threats are unknowable.

Counter-argument: This is true. Of course, one could have made this same claim when people started pounding out flint arrowheads. So far, civilian space development has been a huge boon to humanity in Earth observation, communications, geolocation, treaty monitoring, and more, and there is every reason to believe this will continue.

Comparison with no space settlement: Presumably with no space settlement there would be fewer teams and thus fewer unknowable threats created, but this does not mean we would be safe from unknowable threats. All it would take is one existential unknowable threat to wipe out Earth. It would take a much bigger, more capable one to wipe out all space settlements.

## DA

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#### Framework – debate should be about the hypothetical consequences of the plan – most fair because the plan is the only predictable stasis point – infinite reps and epistemologies explodes prep burdens. Not weighing the aff moots 6 minutes of the 1AC and prevents comparison of practical impacts that refines scholarship to produce the best political strategy.

#### Fairness outweighs – Only impact the ballot can solve, necessary to evaluate all arguments, and debate is a game with switch sides and speech times

#### Extinction outweighs – future generations deserve the choice to live; life is a pre-req to theorizing and executing praxis like the alt; extinction is slow and painful for billions through starvation, dehydration and cancer; and If you’re unsure which value frame is right, stick around another day to find out.

# 1AC

### Plan

#### Plan: Private entities should not appropriate outer space via commercial space stations that replace the International Space Station.

#### Public control of commercial space stations solves all neg offense – OST proves

Smith ’79 [Delbert D., Legal Advisor for the Space Science and Engineering Center of the University of Wisconsin, “Space Stations International Law and Policy”, October 30, 1979, https://www.google.com/books/edition/Space\_Stations\_International\_Law\_And\_Pol/4U2fDwAAQBAJ?hl=en&gbpv=0&kptab=overview]//pranav

Three potential limitations on these conclusions should be noted. First, the interpretation set forth above would not permit commercial or international organizations from claiming exclusive rights to a particular area of outer space in the absence of actual use. Thus, if such an organization had maintained a space station in a specific orbital slot for a substantial period of time and the station-keeping system subsequently failed, the organization would not be entitled to prevent any other entity from occupying that slot pending the orbiting to a replacement station by the original occupant. Second, if an entity were established that, although commercial in form, was essentially under the control of the government of the country in which it was organized, permanent use would constitute national, as distinguished from nonnational, appropriation. This is especially true in light of the Article VI provision that makes states responsible for acts of their nationals and for international organizations of which they are members. Third, dispute has arisen regarding the minimum standard of universality that would determine whether an international organization of relatively universal membership satisfies the minimum standard. However, some question remains regarding the exemption of an organization composed of a limited number of governments.

### Advantage

#### ISS sunset gets extended to 2028 absent commercial replacement – be suspect of “replacement good” offense

Heilwell 12/03 [Rebecca, reporter for Open Sourced, covering emerging technologies, artificial intelligence, and logistics, “NASA gave Jeff Bezos money to build his office park in space”, Updated 12-03-2021 (I couldn’t find the original publishing date – this is the only one that showed up on the website – if you can please lmk), Vox Recode, https://www.vox.com/recode/2021/10/27/22747509/blue-origin-orbital-reef-office-park-bezos]//pranav

After more than two decades in orbit, NASA is preparing to retire the International Space Station. The habitable satellite only has permission to operate until 2024, and while it’s likely that the space station’s funding could be extended until 2028, NASA plans to decommission the ISS and find a replacement by the end of the decade. Cue Jeff Bezos. The billionaire’s spaceflight company, Blue Origin, has proposed a new commercial space station called Orbital Reef, which would provide a “mixed use business park” in space. This concept now has the support of NASA. The agency announced on Thursday that it would award Blue Origin and its partner companies $130 million to develop the space station, which NASA hopes will launch before 2030. With the help of several other companies, including Sierra Space and Boeing, Blue Origin plans to build a satellite that’s slightly smaller than the ISS and houses up to 10 people. The design includes desk space, computers, laboratories, a garden, and 3D printers. The goal, the company says, is to lease out office space to interested parties, including government agencies, researchers, tourism companies, and even movie production crews. Blue Origin’s plan is predicated on the idea that the end is coming for the ISS, which NASA is still figuring out how exactly to remove from orbit. While space stations have been helpful for space exploration, Blue Origin senior vice president Brent Sherwood argued in an October op-ed that private companies now have the capabilities to take over much of the burgeoning economy in low-Earth orbit, or LEO. Blue Origin is even building a space tug, a transport vehicle that moves cargo between different orbits, that could reportedly be used to salvage parts from the ISS and incorporate them into Orbital Reef’s systems. NASA doesn’t mind the corporate takeover of low-Earth orbit. The agency’s first space station, SkyLab, was only in orbit for a few months before NASA let the vehicle descend and decompose into the atmosphere. The space agency has been weighing defunding the ISS, which is full of aging hardware, for several years, and NASA’s investment in Orbital Reef is part of more than $400 million in funding that the agency has set aside to develop new, privately built and operated space stations through its Commercial LEO Destinations program. Eventually, NASA hopes that it can send its astronauts to these stations instead of paying to maintain the ISS. Overall, the plan could save the government more than $1 billion every year. “This is technology that is over 20 years old at this point. When you expose that infrastructure to radiation, solar weather ... things are going to break down,” Wendy Whitman Cobb, a professor at the US Air Force’s School of Air and Space Studies, told Recode. “Having these commercial space stations will be a way of America keeping their foot in low-Earth orbit while focusing more of their resources on moon and Mars exploration.” In the meantime, NASA is currently focusing on the Artemis program, an ambitious plan to establish a long-term human presence on the moon. The agency intends to send people to the moon for the first time in decades as soon as 2025, and hopes the project will eventually serve as a stepping stone to future exploration of Mars. Private companies, including Blue Origin, have desperately fought for a role in this prestigious mission, and especially a lucrative contract to develop pivotal moon landing technology. SpaceX won that contract earlier this year, prompting Bezos’s company to sue NASA and lobby the Senate to reverse the decision. Those efforts have yet to bear fruit, so Bezos now seems to be turning his attention back to the low-Earth orbit economy, where there are more customers and less competition from Elon Musk. “Most, if not all, of the problems or the challenges that need to be worked to have a commercial LEO destination have already been solved by the International Space Station program,” Sherwood, of Blue Origin, said in a Thursday press conference. “That’s the explanation for why we can develop a commercial space station for so much less than it cost NASA the first time.” But there’s reason to believe that the Orbital Reef project may not succeed in the near future — or at all. Blue Origin still hasn’t launched humans into orbit, a feat SpaceX achieved last month during the Inspiration4 mission. Blue Origin also lists its New Glenn reusable launch system and Boeing’s Starliner crew vehicle as pivotal parts of the Orbital Reef plan, but both vehicles have yet to conduct a problem-free spaceflight.

#### Orbital Reef, StarLab, and Northrup Grumman are developing replacements – first round grants from NASA

Foust 12/03 [Jeff, Ph.D. in planetary sciences from the Massachusetts Institute of Technology and a bachelor’s degree with honors in geophysics and planetary science from the California Institute of Technology, “NASA awards funding to three commercial space station concepts”, 12-03-2021, https://spacenews.com/nasa-awards-funding-to-three-commercial-space-station-concepts/]//pranav

The largest award, at $160 million, went to a team led by Nanoracks and includes Voyager Space and Lockheed Martin. Those companies announced a space station concept called Starlab Oct. 21 that could be ready as soon as 2027.

A second award, valued at $130 million, went to a team led by Blue Origin for the Orbital Reef space station announced Oct. 25. That project includes Boeing, Redwire and Sierra Space, among others, with a goal of entering initial operations in the latter half of the 2020s.

The third award, worth $125.6 million, went to a previously undisclosed concept from Northrop Grumman. That proposed station would leverage the company’s work on the Cygnus cargo spacecraft, Mission Extension Vehicle satellite servicing program and the Habitation and Logistics Outpost module it is building for NASA’s lunar Gateway.

Rick Mastracchio, director of business development for human exploration at Northrop Grumman, said in a call with reporters that a single launch could place in orbit a facility able to support four people, with the ability to expand. “This allows for low risk and rapid deployment,” he said. The station, which he said doesn’t yet have a name, is being developed with Dynetics, with others to be announced in the near future.

NASA selected the three concepts from 11 proposals the agency received in August. “Almost all of the proposals represented viable concepts for commercial LEO destinations,” said Phil McAlister, director of commercial spaceflight at NASA Headquarters, in the call.

All the bidders and others will be eligible to compete for the second phase of the program in the middle of the decade, where NASA will issue contracts to certify commercial space stations for use by NASA astronauts and purchase initial services from those stations.

#### Public projects like the ISS are key to global cooperation and create a template for future multilateral space co-op.

Cobb ’20 [Wendy Whitman, received a BA in political science (summa cum laude and university honors) and an MA in political science from the University of Central Florida. I received a Ph.D. in political science from the University of Florida where my research focused on the intersection of political institutions and public policy. I have authored several books including Unbroken Government: Success and Failure in Policymaking (Palgrave Macmillan, 2013), The Politics of Cancer: Malignant Indifference (Praeger, 2017), and The CQ Press Career Guide for Political Science Students (CQ Press, 2017). My research has also appeared in journals including Congress and the Presidency, Space Policy, and the Journal of Political Science Education. I am currently professor of strategy and security studies at the US Air Force's School of Advanced Air and Space Studies, a selective graduate program for Air Force officers. Prior to my current position, I was associate professor of political science at Cameron University in Lawton, Oklahoma, “The International Space Station at 20 offers hope and a template for future cooperation”, 11-04-2020, The Conversation, https://theconversation.com/the-international-space-station-at-20-offers-hope-and-a-template-for-future-cooperation-149363]//pranav

On Nov. 2, 2020, the International Space Station celebrated its 20th anniversary of continuous human occupation. With astronauts and cosmonauts from around the world working together, the ISS has demonstrated humankind’s ability to not only live and work in space but cooperate with one another. This remarkable achievement is significant as countries and companies around the world look to expand space exploration beyond Earth orbit. The path to this anniversary was not easy; like most things done in space, the cost and the difficulty were high. Supported by the Reagan administration as part of the Cold War competition with the Soviet Union, the ISS began its life in the 1980s. Following the Challenger disaster in 1986, planning fell by the wayside as costs increased. Facing delays and cost overruns, the space station – then known as Freedom – was nearly canceled by the House of Representatives in the early 1990s. While already bringing international partners aboard to lower costs, the Clinton administration invited Russia to participate, leveraging the station as a tool of foreign policy between former adversaries. What began as competition has turned into fruitful cooperation not just between Russia and the United States but Canada, Japan, Italy, the European Space Agency and over 100 other countries. As a space policy expert, I argue that the achievements of the ISS to date are indeed significant, but they also point the way ahead for cooperation and commercialization in space. By the numbers, the International Space Station is indeed impressive. At 357 feet in length, it is just one yard shy of an American football field. More than 241 individuals from 19 countries have visited, and at least 3,000 research projects have taken place on the ISS. The ISS is the third brightest object in the night sky and can often be spotted worldwide. Even Lego has immortalized the station with its own building set. The ISS has proven that humans can live and work in space. These experiences are key as countries look to longer term exploration. The ISS has led to advances in understanding how the human body reacts to sustained microgravity and increased exposure to radiation. Other experiments have allowed researchers to study materials and chemicals in a microgravity environment. Astronauts have also learned how to grow food on the station, leading to insights on how plants grow on Earth. These accomplishments have not come without criticism. It cost more than US$100 billion to construct; some have questioned the amount and value of the science that has been conducted. More recently, limits on the the number of crew residing on the station have reduced the amount of time available for scientific experiments. However, perhaps one of the most significant legacies of the ISS is the long-term cooperation that has enabled it. While the U.S. and Russia are the countries most closely identified with the program, Canada, Japan and the European Space Agency also take part. While not always easy, sustained cooperation in a place where operations are difficult and costly is impressive. For the U.S. and Russia in particular, this achievement is unique. While there was some cooperation between the two during the Cold War, the ISS is the first major space program in which the two have worked together. Even as relations between Russia and the U.S. have deteriorated over the past several years, the partnership on the ISS has continued. While scientific and space cooperation does not solve all terrestrial issues, it can strengthen other diplomatic relationships. Though turning 20 may not seem like a milestone, for a complicated piece of machinery operating in the dangerous environment of space, the ISS is approaching old age. In recent years, it has suffered several problems, most recently an air leak in the Russian module, Zvezda. However, recent assessments support continued operation of the ISS for at least another 10 years. In that time, the ISS will likely see an increase in commercial activity. Recently, cosmetics company Estee Lauder launched one of its products to the station to be featured in a commercial filmed there. SpaceX is looking to make the ISS a tourist destination following NASA’s 2019 decision making it easier for space tourists to visit. Another space company, Axiom, recently received a contract to build a commercial module to be added to the ISS in 2024. The module would give additional living and working space to astronauts aboard the station as well as serve as the starting point for a future commercial space station. Thinking beyond Earth orbit, international cooperation in the ISS provides a solid example for future cooperation in space. As NASA seeks to return to the Moon, international cooperation will be a way of reducing costs, normalizing behavior in space and increasing national prestige. NASA has made efforts in these areas through the Artemis Accords, an agreement outlining norms and behaviors for lunar exploration. Additionally, NASA is partnering with the European Space Agency and others on its plans for the Gateway, a mini-space station in lunar orbit. The ISS experience has been fundamental to all of these developments as it continues to launch the next generation of space endeavors.

#### Space colonization solves otherwise inevitable extinction.

Zarkadakis 19 [George; December 26; Ph.D. in Artificial Intelligence; George Zardakis, “Abandoning the metropolis: space colonisation as the new imperative,” <https://georgezarkadakis.com/2019/12/26/abandoning-the-metropolis-space-colonisation-as-the-new-imperative/>]

Space colonization is not only the subject of fiction but of serious science too. The late physicist Stephen Hawking argued that unless colonies were established in space the human race would become extinct. There are several natural phenomena beyond our control that could spell our obliteration. Over a long enough period of time our planet is vulnerable to catastrophic meteorite strikes, or getting exposed to the deadly radiation of a nearby supernova explosion. As our Sun burns its fuel it will start to expand and, in a few million years, will scorch Earth. We can also self-destruct by waging nuclear war, or by tilting our planet’s climate towards a runaway greenhouse effect. Space colonization is therefore the ultimate insurance policy of long-term human survival[4].

#### No private space stations good offense – they’re unproven, decades away, and underestimate ISS resiliency

Davenport ’20 [Christian, covers NASA and the space industry for The Washington Post's Financial desk. He joined The Post in 2000 and has served as an editor on the Metro desk and as a reporter covering military affairs. He is the author of "The Space Barons: Elon Musk, Jeff Bezos and the Quest to Colonize the Cosmos", “The International Space Station can’t stay up there forever. Will privately run, commercial replacements be ready in time?”, 12-23-2020, The Washington Post, https://www.washingtonpost.com/technology/2020/12/23/space-station-replace-biden/?outputType=amp]//pranav

But while those options show promise, they are still unproven and years from hitting the market.

As a result, NASA has been increasingly concerned it could have a gap in low Earth orbit that would be even more consequential than the ignominious period after the space shuttle fleet was retired that left the space agency with no way to launch its astronauts to space from U.S. soil. Instead, NASA was forced to rely on the Russians for rides to space, at a price that grew to as much as $90 million a seat, before Elon Musk’s SpaceX restored human spaceflight for NASA earlier this year.

Even if the station is extended, NASA needs to be working now on its replacement, officials said. It took years to get the ISS up and running. The concept was born in 1984, when President Ronald Reagan announced the United States would put a station, eventually dubbed Freedom, in orbit. But after different administrations and design changes, the first segments weren’t launched until 1998. Since then, NASA has invested more than $100 billion in the facility, which receives more than $3 billion annually from NASA.

Privately run stations would also need time to build their business cases, signing foreign governments as tenants, working with companies and universities that want to do research in space, and wealthy tourists who would pay millions of dollars to visit.

While NASA and the private sector work toward developing commercial habitats, China is building its own space station that it hopes to launch within a couple of years and is recruiting countries around the world as partners. The United States would not be one of them, however, since NASA is effectively barred by law from partnering with China in space.

“I think it would be a tragedy if, after all of this time and all of this effort, we were to abandon low Earth orbit and cede that territory,” NASA administrator Jim Bridenstine told a Senate panel earlier this year.

The ISS still does have some good years left, officials said. “We’re good from an engineering standpoint,” Joel Montalbano, NASA’s space station program manager, said in an interview. “We’re cleared through 2028.”

Boeing, which is paid $225 million per year as the prime contractor supporting space station operations, said it could stay in orbit for even longer.

“The ISS is incredibly healthy, with life capability well beyond 2030,” said John Mulholland, Boeing’s ISS program manager. He said the U.S. and Russia recently completed a life extension study “and all the hardware has been cleared to a minimum of 2030. That’s a real testament to the design and the maintenance that’s been done on it.”

Recently, the station got new lithium-ion batteries that “are less than half the size of the original batteries and produce twice the power,” Mulholland said. The power upgrade also doubled the speed at which the station’s crew can send data from science experiments back to Earth.

Over the years, the station’s water recovery system has improved to the point where today, 95 percent of the water used for drinking and cooking is recycled, Montalbano said. The communications systems have also been upgraded, as have life support systems like carbon dioxide removal.

#### Reinvigorated space multilateralism solves space conflict – brings revisionist powers to the table and increases transparency which solves future militarization

Mason ’21 [Paul, author of several books, and a visiting professor at the University of Wolverhampton, “How to halt the space arms race”, 11-17-2021, New Statesman, https://www.newstatesman.com/comment/2021/11/how-to-halt-the-space-arms-race]//pranav

Could space be demilitarised? Not a chance, say the experts, who point out that – in contrast to the space exploration of the popular imagination, where it is still seen as a benign, trans-national endeavour – the entire history of space technology, from the Nazi V2 rocket to the recent Russian anti-satellite strike, has been driven by the military. Yet military activity in space could be made more orderly and transparent. The two most authoritative annual reports on military space capabilities are both reliant on open-source information and acknowledge that there are huge gaps in what even the experts know. We know how many satellites are up there: we do not know much about what weapons they might carry. This stands in contrast to the way the rival superpowers have managed both nuclear and conventional deterrence since the onset of the Cold War, with a series of treaties signed by Russia and the West to minimise or regulate aggression – for example, limiting the possession of nuclear weapons or the deployment of armoured vehicles. But there is almost no such framework for regulating the space arms race, or for achieving basic transparency about who’s doing what, still less for avoiding conflict. US and Russian space commanders convened in Vienna last July, agreeing to “enhance communications between the two countries about space-related operational issues in order to reduce the risks of misunderstanding, help prevent or manage space-related incidents, and prevent inadvertent escalation”. This did not stop Russia’s surprise launch of an anti-satellite missile on 15 November, nor did it avert the war of words that followed it. In truth the US-Russia space dialogue, a hangover from the Cold War, is a long way from the multilateral and comprehensive framework needed to bring China, India, Israel and Iran around the table. Lacking any formal international treaty beyond the anti-nuclear one, space has, in effect, become a demonstration zone for geopolitical realism. Those who have real power on Earth have untrammelled power in space. They will zap their own satellites at will, buzz the satellites of others, launch “projectiles” from existing satellites – as Russia allegedly did last year – and unleash spoofing attacks to disorient civilian shipping, all without acknowledgement or explanation. The emerging field of space war looks, in other words, exactly like terrestrial conflict would if there were no treaties and deployment patterns, or journalists and NGOs to observe them. This year the UK launched its own space command, with military chiefs acknowledging space as a domain of conflict co-equal with air, land, sea and cyber. Britain is late to the space war game and, after years of offshoring and outsourcing, lacks the expertise and resources to compete with the big four space powers: it doesn’t figure in either of the monitoring reports on space militarisation documenting significant offensive capabilities. As a medium-sized power, self-excluded from large parts of the EU’s space programmes, it is in Britain’s interest to promote order, multilateralism and transparency in space, and to resist its further militarisation. And, to an extent, haltingly, it has done so, promoting the first real debate at the UN over a new space treaty.

#### Weaponization of space and dual-use tech results in unsustainable arms races and causes a laundry list of impacts – alternative measures to check weaponization are NOT mutually exclusive with the aff

Ortega et al. ’21 [ALMUDENA AZCÁRATE ORTEGA - associate researcher, John Borrie - senior research fellow, James Revill - program lead of the Weapons of Mass Destruction and Other Strategic Weapons Programme of the United Nations Institute for Disarmament Research, “Star Wars: the not-so-phantom menace”, 05-12-2021, [https://english.elpais.com/opinion/2021-05-12/star-wars-the-not-so-phantom-menace.html]//pranav](https://english.elpais.com/opinion/2021-05-12/star-wars-the-not-so-phantom-menace.html%5d//pranav) \*modified for ableist language\*

The picture isn’t all rosy, however. Due to the critical importance of space, several countries have, in recent years, formed “space forces” and are developing national doctrines for fighting in space. A handful of nations have even tested offensive capabilities of various kinds. These countries have some legitimate security concerns. The problem is this pattern of responses to the actions and activities of space competitors is fuelling an arms race. If the international community doesn’t act to turn down the dial on space’s quickening weaponization, humankind risks suffering the devastating consequences of a space-based conflict, such as mass disruption of services like GPS and denial of internet access. Debris from the destruction of space objects could also prevent space users from using orbits, possibly for years. States have long sought to ensure that outer space is used only for peaceful purposes. Even at the height of the Cold War, they reached international agreements such as the 1967 Outer Space Treaty that, among other things, indicates that states shall not “place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space.” These treaties have contributed to safety and security in space and on Earth, but as technology advances so does the risk of conflict in space. Counterspace capabilities have the capacity to interfere, incapacitate or destroy adversaries’ space assets, and some of them are commonly used nowadays, such as cyberattacks and electronic interference with satellites. Others, such as interceptor missiles launched from Earth to attack space objects, could be used during a conflict on Earth, and would have a [devastating]~~crippling~~ effect on militaries and civilians alike. Even if specific space technologies were not invented with a counterspace purpose in mind, their characteristics nevertheless could make them a threat in the eyes of others. An example of this is the so-called space harpoon, a barbed projectile fired from a satellite to collect space junk, which could be exploited for hostile purposes. In the face of such strategic unpredictability, trust deficit grows and tensions escalate more easily. For decades governments have argued about “preventing an arms race in outer space” in multilateral forums like the Geneva-based Conference on Disarmament. Now the space arms race is here – and given what is at stake – governments need to focus afresh on practical steps to provide each other meaningful reassurance about their capabilities and intentions in space. There are already several proposals. China and Russia have proposed a treaty to prevent weapons from being placed in space and threats against space objects. Other, predominantly Western governments, have proposed “reducing space threats through norms, rules and principles of responsible behaviors.” These approaches are not mutually exclusive. Arms control history suggests legal and normative measures can be combined and sequenced in ways that are mutually reinforcing. Even then, it’s unlikely these measures will be sufficient to ensure the safe and secure use of space in the future. Measures to increase transparency and confidence in space-related activities to minimize misunderstandings are also required. This could be augmented by the publication of national policies on counterspace capabilities and by encouraging dialogue between space users – including commercial stakeholders – about the impacts of and risks introduced by new strategic technologies. Greater mutual understanding of these issues among space users could help to avoid escalatory situations. Space is critical for sustaining and enhancing life on Earth. It actively contributes to sustainable development in a myriad of ways. To ensure space’s continued contribution to humankind’s wellbeing, spacefaring nations must work to arrest their weaponization of outer space and develop safeguards to prevent current tensions blowing out into full-blown conflict, thus keeping Star Wars firmly in the realm of science fiction.

#### Goes nuclear – great powers are developing nukes for new territorial conflicts in space

Tisdall ’20 [Simon, foreign affairs commentator. He has been a foreign leader writer, foreign editor and US editor for the Guardian, “A nuclear arms race in space? It seems we've learned nothing from Hiroshima”, 08-02-2020, The Guardian, https://www.theguardian.com/commentisfree/2020/aug/02/a-nuclear-arms-race-in-space-it-seems-weve-learned-nothing-from-hiroshima]//pranav

The battle for outer space is only getting going – yet deserves immediate attention. Russia’s alleged development of anti-satellite weapons is almost certainly matched by the US and China, and undermines past undertakings about the peaceful use of space. Christopher Ford, US assistant secretary of state for international security and non-proliferation, warned last week that Russia and China had already turned space into a “war-fighting domain”. “What [the Russians] are doing is signalling to the world that they’re able to destroy satellites in orbit with other satellites,” Ford said. “This is the sort of thing that could get out of hand and go very badly rather quickly.” The UK called the alleged test “a threat to space systems on which the world depends” – meaning use of such weapons could, in theory, produce an instant global security and communications blackout. Yet in relaunching US space command last year, Donald Trump also pointed to space as the next great-power battlefield. Nato secretary-general Jens Stoltenberg says the alliance will not deploy weapons in space but is obliged to defend its interests, which include 2,000 orbiting satellites. For Nato, too, space is now an “operational domain”. New and “improved” nuclear weapons are proliferating in parallel with the race for space. According to the Stockholm International Peace Research Institute (Sipri), nine states – the US, Russia, China, Israel, the UK, France, India, Pakistan and North Korea – together possess about 13,400 weapons. While the overall total is falling, “retired” warheads and bombs are being replaced by more powerful, versatile devices, such as smaller, “use-able” US battlefield nukes. “All these states are either developing or deploying new weapon systems or have announced their intention to do so,” Sipri’s annual report said. The US and Russia each possessed about 1,550 deployed, long-range weapons, while China had about 300. Both the US and Russia were spending more and placing greater reliance on nuclear weapons in future military planning, it said, while China was rushing to catch up. “China is in the middle of a significant modernisation of its nuclear arsenal. It is developing a so-called nuclear triad for the first time, made up of new land- and sea-based missiles and nuclear-capable aircraft. India and Pakistan are slowly increasing the size and diversity of their nuclear forces,” Sipri reported. Meanwhile, North Korea continued to prioritise its military nuclear programme, while conducting “multiple” ballistic missile tests. “Instead of planning for nuclear disarmament, the nuclear-armed states appear to plan to retain large arsenals for the indefinite future, are adding new nuclear weapons, and are increasing the role such weapons play in their national strategies,” a Federation of American Scientists survey said. It estimated about 1,800 warheads were kept on high alert, ready for use at short notice. Russia claims to lead the world in developing hi-tech weaponry. Speaking in July, Putin boasted that Russia’s navy was being equipped with nuclear-powered hypersonic cruise missiles, which supposedly have unlimited range, and submarine-launched underwater nuclear drones. Despite celebrated speeches supporting a nuclear-free world, Barack Obama authorised a $1.2tn plan to upgrade America’s nuclear triad while pursuing strategic arms reductions via the 2010 New Start treaty with Russia. Trump has doubled down, at the same time abandoning arms control pacts. His 2018 nuclear posture review proposed an extra $500bn in spending, including $17bn for low-yield, battlefield weapons. Trump looks set to scupper New Start, which expires in February, on the spurious ground that it does not reduce China’s much smaller arsenal (which it was never intended to do). He has previously reneged on the 2015 Iran nuclear treaty, the 1987 Intermediate-range Nuclear Forces treaty, and is said to favour resumed nuclear testing in Nevada in defiance of the 1996 Comprehensive Nuclear-Test-Ban treaty. Like Britain and other signatories, the US continues to fail to fulfil its obligation under the 1970 Nuclear Non-Proliferation treaty “to pursue nuclear disarmament aimed at the ultimate elimination of nuclear arsenals”. Despite its acute financial situation, Britain remains committed to replacing its Trident missile system at an estimated cost of £205bn over 30 years. While nuclear weapons have not been used since 1945, great-power military flashpoints are increasing the risk that they might be. These potential triggers include the South China Sea, Taiwan, the India-Pakistan and India-China borders, the US-Israel-Iran conflict, North Korea and Ukraine. Heightened international tensions and collapsing arms-control regimes only partly explain the accelerating pace of nuclear rearmament. Resurgent nationalism, authoritarian rightwing populism, revived or new territorial rivalries (as in space), the bypassing of the UN and multilateral institutions, and a shifting economic and geopolitical power balance are all aggravating factors.

**Causes extinction** through winter, firestorms, EMP blasts, ozone damage, and meltdowns

-Immediate death -Climate destruction spurring an ice age (Nuclear winter) via nuclear firestorms and smoke -Ozone collapses -2 Billion insta-die in famine -kills biodiversity -Meltdowns and grid collapse via EMPs -Remaining fallout

**Starr 14** {Steven, Senior Scientist for Physicians for Social Responsibility, Director of the Clinical Laboratory Science Program (Missouri), commentator in the Bulletin of the Atomic Scientists and the Strategic Arms Reduction, Associate member of the Nuclear Age Peace Foundation, “The Lethality of Nuclear Weapons: Nuclear War has No Winner,” Global Research: Centre for Research on Globalization, 6/5, http://www.globalresearch.ca/the-lethality-of-nuclear-weapons-nuclear-war-has-no-winner/5385611}

Nuclear war **has no winner**. Beginning in 2006, several of the world’s **leading climatologists** (at Rutgers, UCLA, John Hopkins University, and the University of Colorado-Boulder) published a series of studies that evaluated the long-term environmental consequences of a nuclear war, including baseline scenarios fought with **merely 1%** of the explosive power in the US and/or Russian launch-ready nuclear arsenals. They concluded that the consequences of even a “small” nuclear war would include **catastrophic disruptions** of global climate[i] and **massive destruction** of Earth’s protective ozone layer[ii]. These **and more recent studies** predict that global agriculture would be so negatively affected by such a war, a global famine would result, which would cause up to **2 billion people to starve to death**. [iii]¶ These **peer-reviewed** studies – which were analyzed by the **best scientists in the world** and found to be without error – also predict that a war fought with less than half of US or Russian strategic nuclear weapons would **destroy the human race**.[iv] In other words, a US-Russian nuclear war would create such extreme long-term damage to the global environment that it would leave the Earth **uninhabitable** for humans and most animal forms of life.¶ A recent article in the Bulletin of the Atomic Scientists, “Self-assured destruction: The climate impacts of nuclear war”,[v] begins by stating:¶ “A nuclear war between Russia and the United States, **even after the arsenal reductions** planned under New START, could produce a nuclear winter. Hence, an attack by either side could be **suicidal**, resulting in self-assured **destruction**.”¶ In 2009, I wrote an article[vi] for the International Commission on Nuclear Non-proliferation and Disarmament that summarizes the findings of these studies. It explains that nuclear firestorms would produce millions of tons of smoke, which would rise above cloud level and form a global stratospheric smoke layer that would **rapidly encircle the Earth**. The smoke layer would remain for at least a **decade**, and it would act to destroy the protective ozone layer (vastly increasing the UV-B reaching Earth[vii]) as well as block warming sunlight, thus creating Ice Age weather conditions that would last **10 years** or longer.¶ Following a US-Russian nuclear war, temperatures in the central US and Eurasia would fall below freezing every day for one to three years; the intense cold would **completely eliminate growing seasons for a decade** or longer. No crops could be grown, leading to a famine that would **kill most humans and large animal populations**.¶ Electromagnetic pulse from high-altitude nuclear detonations would destroy the integrated circuits in all modern electronic devices[viii], including those in commercial nuclear power plants. Every nuclear reactor would almost **instantly** meltdown; every nuclear spent fuel pool (which contain many times more radioactivity than found in the reactors) would boil-off, releasing vast amounts of **long-lived** radioactivity. The fallout would make most of the US and Europe **uninhabitable**. Of course, the survivors of the nuclear war would be **starving to death anyway.** Once nuclear weapons were introduced into a US-Russian conflict, there would be little chance that a **nuclear holocaust** could be avoided. Theories of “limited nuclear war” and “nuclear de-escalation” are **unrealistic**.[ix] In 2002 the Bush administration modified US strategic doctrine from a retaliatory role to permit preemptive nuclear attack; in 2010, the Obama administration made only incremental and miniscule changes to this doctrine, leaving it essentially unchanged. Furthermore, Counterforce doctrine – used by both the US and Russian military – emphasizes the need for preemptive strikes once nuclear war begins. Both sides would be under immense pressure to launch a preemptive nuclear first-strike once military hostilities had commenced, especially if nuclear weapons had already been used on the battlefield.

#### Counterspace capabilities collapse American military superiority in space

Cronk ’21 [Terri Moon, Writer & Editor for the Department of Defense News, “Space-Based Capabilities Critical to U.S. National Security, DOD Officials Say”, 05-24-2021, https://www.defense.gov/News/News-Stories/Article/Article/2629675/space-based-capabilities-critical-to-us-national-security-dod-officials-say/]//pranav

John D. Hill told the HASC subcommittee on strategic forces that Secretary of Defense Lloyd J. Austin III has also testified that the growth of Chinese and Russian counter space capabilities presents the most immediate and serious threats to U.S. allied and partner space activities. Additionally, ''Russia and China view space as critical to modern warfare and consider the use of counterspace capabilities as both a means of reducing U.S. military effectiveness and winning future wars,'' Hill said. As these developments portend, the United States must be prepared for conflict to extend to, or even originate, in space, he said. But to be clear, such a conflict would not be a space war distinct from terrestrial war, but would represent ''an extension of traditional armed conflict into the space domain of human endeavor,'' Hill clarified. The 2020 defense-based strategy addresses such challenges of deterrence and the challenges of crisis de-escalation and warfare, extending to space along four lines of effort, Hill said. The DOD is building comprehensive military advantages in space; integrating space into national joint and combined operations; shaping the strategic environment to enhance domain stability and reduce the potential for miscalculation; and enhancing space cooperation with its international partners, commercial entities and agency partners. Supporting national security strategic guidelines, Hill noted his office also leads DOD's participation in the U.S. government space diplomatic initiative, which centers on establishing voluntary non-binding standards of responsible behavior and on exposing the disingenuous space arms control initiatives of Russia and China.

#### Only U.S. space heg solves war – it’s sustainable and Chinese counter-hegemonic pushes on Earth mean it’s try or die for American hegemony

Elvevold ’19 [Eirik Billingsø, master’s in international Relations from Universidade Nova, ““War in Space: Why Not?” A Neorealist Analysis of International Space Politics (1957-2018)”, May 2019, https://run.unl.pt/bitstream/10362/82269/1/Thesis\_InternationalRelations\_EirikBElvevold\_47082.pdf]//pranav

* ON = Offensive Neorealism - anarchy forces states to maximize space power instead of security and aim for space hegemony

The risk of space war seems to have decreased substantially in the beginning of the Second Space Age because no other state could threaten the US in space – the ideal position for any state seeking security according to Mearsheimer.973 The US had, by force of all its satellites, the most to lose from a space war, but also the most space weapons to strike back. The US had already developed conventional and nuclear ASATs together with a slowly maturing ABM systems, both domestically and regionally. All of these space capabilities came on top of conventional military capabilities, which was in turn was enhanced further by US capabilities. Meanwhile, the USSR lost physical control over its primary spaceport, Baikonur, and important ground facilities as the union broke up in the transition between the First and Second Space Age.974 By joining both the ISS975 and the MTCR976, and commercialising and selling its space launchers977978979980, Russia appear to have admitted to US space hegemony – at least temporarily. Chinese space capabilities were growing, but placed under strict export controls by the US.981 In sum, a space attack from any state could undoubtedly have been met with even harsher US attacks in retribution. The US was a threat to other states in space in the second Space Age.982 Several unilateralist moves in space proved that the distribution of space power was in fact unipolar. The US pulled out of the ABMT, a corner-stone treaty of space stability, on the back of an explicitly unilateralist space doctrine.983 After the 9/11 terrorist attacks, the US conducted what has been called “informationalised warfare” in Afghanistan and Iraq.984 All along, new space weapons ideas – like the “Rods for Gods” concept – were being explored.985 Space institutions under the UN provided some goods to China and Russia, but ultimately served the US better, as made clear by the latter states´ attempts at replacing central international space treaties.986 As the US invested in advanced defensive space power systems, the two other states faced a dilemma. Enter into an arms race with the US in space and potentially lose? Or give away sovereignty by being dominated by superior US space weapons circling above? Regardless, US dominance in space during the Second Space age was a source of insecurity to less powerful states. China and Russia dealt with growing space insecurity by balancing against the US in space. China has built and tested a broad range of military space capabilities987, developed its own counterspace strategy based on the observed US “informationalised warfare”988, and lobbied for new international space weapons laws through the UN system.989 The EU and China has become less dependent on GPS by investing in the Galileo and Baidu navigation systems, which Bolton argues to be a form of techno-nationalist balancing.990 The two challengers have united to change the international space regime in their advantage by suggesting a ban on space-based weapons instead of Earth-based ASATs like the ones they possess themselves.991 In order to stop the return of an idea like “Brilliant Pebbles”, China emulated the US and Soviet two-track approach. To develop ASATs while negotiating to ban them. Russian re-took control over some of the commercialised space sector, invested in and reorganised military space, and restarted GLONASS launches. The risk of space war in the Second Space Age has so far peaked in 2007 and 2008. Ever since the mid 1980s, before the USSR collapsed and the Second Space Age ended, the two reigning superpowers had abstained from further ASAT testing.992 Suddenly, the old bipolar balance of space power was gone. At first, the balance of space power became unipolar, allowing the US to pull out from a core space treaty like the ABMT.993 China, however, had a larger population and growing wealth from industry and advanced technology. Ever sine the new millennium, China had been developing new space weapons. To prove that it was one the countries with such a capability and realise its potential threat, China decided to begin conducting ASAT tests.994 By studying and emulation US “informationalised warfare”, China developed and demonstrated capabilities which can take advantage of US vulnerabilities in space. This has played into the historical fear of a new “Pearl Harbor” in the US. If a “tit for tat” pattern of ASAT testing had manifested, tensions between China and the US could have escalated into direct confrontation. The gradual shift to multipolarity seems to haves increased the risk of space war during the Second Space Age. For the last decades, new actors – primarily China – have been able to level the playing field, while space capabilities have become cheaper and more easily available.995 As Petroni and Bianchi found, economic leadership has become the foundation of military space supremacy in the multipolar world.996 China benefited greatly from what Mearsheimer's might call latent military space power997 from its rapidly growing commercial satellites industry, but Russia also focused its attention to its commercial sector in the Second Space Age.99899910001001 Multipolarity in space comes with increased complexity and likelihood of miscalculation. In that light, China's balancing act with an ASAT test in 2007 appear even more dangerous. The US answered in turn with their own ASAT test, destroying their own satellite to match the Chinese one circling Earth as scattered debris.1002 Russia's attempt in the last decade to counterbalance against the US has also been reflected in international space politics, in the shape of more state control, military spending and reorganisation, and new alliances. Sino-Russian space cooperation, however, is not running on full throttle, as China is now developing more capabilities at home, while Russia is spending more at home. Wohlforth argues that the current US unipolarity is stable because of the superpower´s preponderance1003 , but judging by the behaviour of China and Russia, the perceived threat seems large enough to trigger balancing behaviour in space. The quest for regional hegemony on Earth has increased the risk of space war. As China grows stronger, US military hegemony, especially in Asia, is being challenged. Satellites have long played an important part in wars far off the US mainland. From Vietnam to the two wars in Iraq, the Balkan Wars, Afghanistan: military space capabilities have been involved involved in all of them. Similarly, the US military presence in the western Pacific also relies on space power to a high degree. The US still enjoys an overwhelming space superiority compared to China and Russia (See Figure 6), but experts believe that China aims to use its rapidly growing arsenal of asymmetric counterspace capabilities to deny US space dominance in case of a conflict in Asia over critical national interests, such as the status of Taiwan.10041005 In a potential war over the Taiwan or Spratlay Islands, China could be tempted to try to delay US aircraft carriers by destroying, blinding or jamming the satellites such carriers rely on for navigation, coordination and precision strikes.1006 The strategy involves denying opponents access to information by interfering with their space capabilities and thereby retarding their command and control. In short, by denying an opponent the ability to use space freely, the PLA would be denying them the ability to achieve information dominance and therefore make them less able to fight an “informationalised war”. O´Hanlon predicts that if “China could find major U.S. naval assets with satellites, it would only need to sneak a single airplane, ship, or submarine into the region east of Taiwan to have a good chance of sinking a ship”1007, thus deterring the US from entering a war to protects its allies. Similarly, Russia has demonstrated operational counterspace capabilities in regional conflicts in Chechnya1008 as well as Ukraine and Syria1009. The risk of space war decreased during the Second Space Age because states still maximised space security to a high degree, and because technological maturity and high costs are still important factors. China's ASAT test in 2007 can not be labelled space security maximisation, but after the US response in 2008, the US approach in space actually shifted to become less confrontational and slight more accepting to a multipolar balance of space power in the international system.10101011 Even at the peak of the unipolar moment in space, with space weapons like “Rod from Gods” on the drawing board, the US never placed weapons permanently in orbit. Instead of using its ASAT weapons when it suddenly became an underdog, Russia cooperated with the US, though much out of necessity. The Columbia accident in 2003, showed that even the state with the most space power – in this case the US – was struggling to develop safe and functioning space capabilities. However, a number of factor predicts a dangerous future in international space politics. The true nature of new space capabilities continued to be blurred due to its dual-use. According to the Pentagon, roughly 95 percent of space technologies can be considered dual use.1012 As Mutschler has argued, space security cooperation must produce balanced gains to stand a chance for success1013, but as Hansel has pointed out, the US, China and Russia have opposing interests on space arms control. 1014 The incentives for striking first in space, which according to Glaser and Kaufmann1015 is an important factor in explaining the likelihood of war in the international system, is made worse by limitations in space situational awareness (SSA)1016. Perhaps more importantly, the US and China – the two most powerful states on Earth – have little to no cooperation in space, leaving slim chances for successful, substantial space cooperation based on balanced, relative gains.1017 Ultimately, as Bahney and Pearl have recently concluded in Foreign Affairs, “[e]ven if it were possible to convince Moscow and Beijing of the benefits of comprehensive space arms control, existing technology makes it extremely difficult to verify compliance with the necessary treaty provisions—and without comprehensive and reliable verification, treaties are toothless”1018.

#### American unipolarity is not mutually exclusive from multilateral cooperation – it creates a new form of institutionally bound multilateralism via benign hegemony

**Stokes ’18** [Doug, Professor in International Security and Strategy in the Department of Politics at the University of Exeter, “Trump, American Hegemony, and the Future of the Liberal International Order”, International Affairs 94: I, 2018 issue, https://www.chathamhouse.org/sites/default/files/images/ia/INTA94\_1\_8\_238\_Stokes.pdf]//pranav

At the end of the Second World War, the United States possessed almost half the world’s manufacturing capacity, the majority of its food supplies, nearly all of its capital reserves and a military power unparalleled in human history. In this context, the US national interest became globalized as America set about using its hegemonic leadership to fashion a new world order. Whereas closed economic blocs had exacerbated the rise of nationalist extremism after the First World War, after 1945 American foreign policy elites sought to use the new US hegemony to create an international order based on economic interdependence, a conditional and institutionally bound multilateralism and strategic alliance networks under US leadership. These networks existed in part to contain Soviet expansionism militarily, but also to dampen geopolitical competition from other centres of world power such as Japan or western Europe.14 The promotion of the LIO thus represented the institutional instantiation of the kind of world order that would allow the United States to thrive while also remaining first among equals in a Pax Americana.15 This order, while allowing the United States to flourish, also carried substantial costs, with the emergence of economic challenges from other states. Both Germany and Japan, formerly locked into an existential struggle for world mastery, emerged as economic challengers to the United States a little over three decades after the cessation of hostilities. This was, then, a remarkably benign form of hegemony, giving rise to the question: why would the United States choose this form of hegemonic leadership, and the often steep concomitant costs in blood and treasure, to maintain a system that, in economic terms at least, allowed other centres of power to emerge? At this point we can usefully turn to IR theory, and in particular hegemonic stability theory (HST), which can help us to understand the structural logic underpinning hegemonic leadership. Broadly speaking, HST argues that the international system is more likely to be stable when a single state is the dominant power within that system. The existence of a hegemon helps eliminate collec- tive action problems associated with the generation of often costly global public goods necessary to world commerce and to the underwriting of the political and strategic contexts of global economic interdependence—problems that have long bedevilled international politics. Aside from the alleged efficacy of world hegemonic leadership, what does HST tell us about why a preponderant power would seek this often costly role of global leadership? The first explanation is most closely associated with Kindleberger, and argues that a hegemon provides leadership as a form of benevolent service to the international community.16 In this sense, the hegemon seeks to promote not only its own interests but also the collective interests of the states that it leads: a form of noblesse oblige. In so far as hegemonic leadership is ‘thought of as the provision of the public good of responsibility, rather than exploitation of followers or the private good of prestige, it remains a positive idea’. Importantly, hegemonic leadership can help to pacify forms of economic rivalry inherent within the global economy. That is, leadership can help ‘pool sovereignties to limit the capacity of separate countries to work against the general interest; such pooling is virtually attained today in some of the functions needed to stabilize the world economic system’ and is ‘necessary in the absence of delegated authority’.17 The hegemon is benign as its net resource transfers to the rest of the international community through the costs of the public goods it supplies, including security public goods in the form of alliance networks such as NATO, are extremely costly. This implies that the United States is not predominantly seeking either its own immediate advantage or its own one-sided long-term strength *vis-à-vis* other economic centres. Instead, it is promoting change in the collective interests of world prosperity through the exercise of a benign hegemony.

#### China *peaked* - decline inevitable which causes lash out conflict, but strong American *hegemony deters* – history proves our thesis

Brands & Beckley ’21 [Hal Brands - Henry Kissinger distinguished professor of global affairs at Johns Hopkins University’s School of Advanced International Studies, Michael Beckley - associate professor of political science at Tufts University, a Jeane Kirkpatrick visiting scholar at the American Enterprise Institute, “China Is a Declining Power—and That’s the Problem”, 09-24-2021, Foreign Policy, https://foreignpolicy.com/2021/09/24/china-great-power-united-states/]//pranav

This is the real trap the United States should worry about regarding China today—the trap in which an aspiring superpower peaks and then refuses to bear the painful consequences of descent.

China’s rise is no mirage: Decades of growth have given Beijing the economic sinews of global power. Major investments in key technologies and communications infrastructure have yielded a strong position in the struggle for geoeconomic influence; China is using a multi-continent Belt and Road Initiative to bring other states into its orbit. Most alarming, think tank assessments and U.S. Defense Department reports show China’s increasingly formidable military now stands a real chance of winning a war against the United States in the Western Pacific.

It is unsurprising, therefore, that China has also developed the ambitions of a superpower: Xi has more or less announced that Beijing desires to assert its sovereignty over Taiwan, the South China Sea, and other disputed areas, becoming Asia’s preeminent power and challenging the United States for global leadership. Yet if China’s geopolitical window of opportunity is real, its future is already starting to look quite grim because it is quickly losing the advantages that propelled its rapid growth.

From the 1970s to the 2000s, China was nearly self-sufficient in food, water, and energy resources. It enjoyed the greatest demographic dividend in history, with 10 working-age adults for every senior citizen aged 65 or older. (For most major economies, the average is closer to 5 working-age adults for every senior citizen.) China had a secure geopolitical environment and easy access to foreign markets and technology, all underpinned by friendly relations with the United States. And China’s government skillfully harnessed these advantages by carrying out a process of economic reform and opening while also moving the regime from stifling totalitarianism under former Chinese leader Mao Zedong to a smarter—if still deeply repressive—form of authoritarianism under his successors. China had it all from the 1970s to the early 2010s—just the mix of endowments, environment, people, and policies needed to thrive.

Since the late 2000s, however, the drivers of China’s rise have either stalled or turned around entirely. For example, China is running out of resources: Water has become scarce, and the country is importing more energy and food than any other nation, having ravaged its own natural resources. Economic growth is therefore becoming costlier: According to data from DBS Bank, it takes three times as many inputs to produce a unit of growth today as it did in the early 2000s.

China is also approaching a demographic precipice: From 2020 to 2050, it will lose an astounding 200 million working-age adults—a population the size of Nigeria—and gain 200 million senior citizens. The fiscal and economic consequences will be devastating: Current projections suggest China’s medical and social security spending will have to triple as a share of GDP, from 10 percent to 30 percent, by 2050 just to prevent millions of seniors from dying of impoverishment and neglect.

To make matters worse, China is turning away from the package of policies that promoted rapid growth. Under Xi, Beijing has slid back toward totalitarianism. Xi has appointed himself “chairman of everything,” destroyed any semblance of collective rule, and made adherence to “Xi Jinping thought” the ideological core of an increasingly rigid regime. And he has relentlessly pursued the centralization of power at the expense of economic prosperity.

State zombie firms are being propped up while private firms are starved of capital. Objective economic analysis is being replaced by government propaganda. Innovation is becoming more difficult in a climate of stultifying ideological conformity. Meanwhile, Xi’s brutal anti-corruption campaign has deterred entrepreneurship, and a wave of politically driven regulations has erased more than $1 trillion from the market capitalization of China’s leading tech firms. Xi hasn’t simply stopped the process of economic liberalization that powered China’s development: He has thrown it hard into reverse.

The economic damage these trends are causing is starting to accumulate—and it is compounding the slowdown that would have occurred anyway as a fast-growing economy matures. The Chinese economy has been losing steam for more than a decade: The country’s official growth rate declined from 14 percent in 2007 to 6 percent in 2019, and rigorous studies suggest the true growth rate is now closer to 2 percent. Worse, most of that growth stems from government stimulus spending. According to data from the Conference Board, total factor productivity declined 1.3 percent every year on average between 2008 and 2019, meaning China is spending more to produce less each year. This has led, in turn, to massive debt: China’s total debt surged eight-fold between 2008 and 2019 and exceeded 300 percent of GDP prior to COVID-19. Any country that has accumulated debt or lost productivity at anything close to China’s current pace has subsequently suffered at least one “lost decade” of near-zero economic growth.

All of this is happening, moreover, as China confronts an increasingly hostile external environment. The combination of COVID-19, persistent human rights abuses, and aggressive policies have caused negative views of China to reach levels not seen since the Tiananmen Square massacre in 1989. Countries worried about Chinese competition have slapped thousands of new trade barriers on its goods since 2008. More than a dozen countries have dropped out of Xi’s Belt and Road Initiative while the United States wages a global campaign against key Chinese tech companies—notably, Huawei—and rich democracies across multiple continents throw up barriers to Beijing’s digital influence. The world is becoming less conducive to easy Chinese growth, and Xi’s regime increasingly faces the sort of strategic encirclement that once drove German and Japanese leaders to desperation.

Case in point is U.S. policy. Over the past five years, two U.S. presidential administrations have committed the United States to a policy of “competition”—really, neo-containment—vis-à-vis China. U.S. defense strategy is now focused squarely on defeating Chinese aggression in the Western Pacific; Washington is using an array of trade and technological sanctions to check Beijing’s influence and limit its prospects for economic primacy. “Once imperial America considers you as their ‘enemy,’ you’re in big trouble,” one senior People’s Liberation Army officer warned. Indeed, the United States has also committed to orchestrating greater global resistance to Chinese power, a campaign that is starting to show results as more and more countries respond to the threat from Beijing.

In maritime Asia, resistance to Chinese power is stiffening. Taiwan is boosting military spending and laying plans to turn itself into a strategic porcupine in the Western Pacific. Japan is carrying out its biggest military buildup since the end of the Cold War and has agreed to back the United States if China attacks Taiwan. The countries around the South China Sea, particularly Vietnam and Indonesia, are beefing up their air, naval, and coast guard forces to contest China’s expansive claims.

Other countries are pushing back against Beijing’s assertiveness as well. Australia is expanding northern bases to accommodate U.S. ships and aircraft and building long-range conventional missiles and nuclear-powered attack submarines. India is massing forces on its border with China while sending warships through the South China Sea. The European Union has labeled Beijing a “systemic rival,” and Europe’s three greatest powers—France, Germany, and the United Kingdom—have dispatched naval task forces to the South China Sea and Indian Ocean. A variety of multilateral anti-China initiatives—the Quadrilateral Security Dialogue; supply chain alliances; the new so-called AUKUS alliance with Washington, London, and Canberra; and others—are in the works. The United States’ “multilateral club strategy,” hawkish and well-connected scholar Yan Xuetong acknowledged in July, is “isolating China” and hurting its development.

No doubt, counter-China cooperation has remained imperfect. But the overall trend is clear: An array of actors is gradually joining forces to check Beijing’s power and put it in a strategic box. China, in other words, is not a forever-ascendant country. It is an already-strong, enormously ambitious, and deeply troubled power whose window of opportunity won’t stay open for long.

In some ways, all of this is welcome news for Washington: A China that is slowing economically and facing growing global resistance will find it exceedingly difficult to displace the United States as the world’s leading power—so long as the United States doesn’t tear itself apart or otherwise give the game away. In other ways, however, the news is more troubling. History warns the world should expect a peaking China to act more boldly, even erratically, over the coming decade—to lunge for long-sought strategic prizes before its fortunes fade.

What might this look like? We can make educated guesses based on what China is presently doing.

Beijing is already redoubling its efforts to establish a 21st century sphere of economic influence by dominating critical technologies—such as artificial intelligence, quantum computing, and 5G telecommunications—and using the resulting leverage to bend states to its will. It will also race to perfect a “digital authoritarianism” that can protect an insecure Chinese Communist Party’s rule at home while bolstering Beijing’s diplomatic position by exporting that model to autocratic allies around the world.

In military terms, the Chinese Communist Party may well become increasingly heavy-handed in securing long, vulnerable supply lines and protecting infrastructure projects in Central and Southwest Asia, Africa, and other regions, a role some hawks in the People’s Liberation Army are already eager to assume. Beijing could also become more assertive vis-à-vis Japan, the Philippines, and other countries that stand in the way of its claims to the South and East China Seas.

Most troubling of all, China will be sorely tempted to use force to resolve the Taiwan question on its terms in the next decade before Washington and Taipei can finish retooling their militaries to offer a stronger defense. The People’s Liberation Army is already stepping up its military exercises’ intensity in the Taiwan Strait. Xi has repeatedly declared Beijing cannot wait forever for its “renegade province” to return to the fold. When the military balance temporarily shifts further toward China’s favor in the late 2020s and as the Pentagon is forced to retire aging ships and aircraft, China may never have a better chance of seizing Taiwan and dealing Washington a humiliating defeat.

To be clear, China probably won’t undertake an all-out military rampage across Asia, as Japan did in the 1930s and early 1940s. But it will run greater risks and accept greater tensions as it tries to lock in key gains. Welcome to geopolitics in the age of a peaking China: a country that already has the ability to violently challenge the existing order and one that will probably run faster and push harder as it loses confidence that time is on its side.

The United States, then, will face not one but two tasks in dealing with China in the 2020s. It will have to continue mobilizing for long-term competition while also moving quickly to deter aggression and blunt some of the more aggressive, near-term moves Beijing may make. In other words, buckle up. The United States has been rousing itself to deal with a rising China. It’s about to discover that a declining China may be even more dangerous.

### Framing

The standard is maximizing expected well-being.

Prefer:

**[1] Pleasure and pain are intrinsic value and disvalue**

**Blum et al. 18**

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**Pleasure** is not only one of the three primary reward functions but it also **defines reward.** As homeostasis explains the functions of only a limited number of rewards, the principal reason why particular stimuli, objects, events, situations, and activities are rewarding may be due to pleasure. This applies first of all to sex and to the primary homeostatic rewards of food and liquid and extends to money, taste, beauty, social encounters and nonmaterial, internally set, and intrinsic rewards. Pleasure, as the primary effect of rewards, drives the prime reward functions of learning, approach behavior, and decision making and provides the **basis for hedonic theories** of reward function. We are attracted by most rewards and exert intense efforts to obtain them, just because they are enjoyable [10]. Pleasure is a passive reaction that derives from the experience or prediction of reward and may lead to a long-lasting state of happiness. The word happiness is difficult to define. In fact, just obtaining physical pleasure may not be enough. One key to happiness involves a network of good friends. However, it is not obvious how the higher forms of satisfaction and pleasure are related to an ice cream cone, or to your team winning a sporting event. Recent multidisciplinary research, using both humans and detailed invasive brain analysis of animals has discovered some critical ways that the brain processes pleasure [14]. Pleasure as a hallmark of reward is sufficient for defining a reward, but it may not be necessary. A reward may generate positive learning and approach behavior simply because it contains substances that are essential for body function. When we are hungry, we may eat bad and unpleasant meals. A monkey who receives hundreds of small drops of water every morning in the laboratory is unlikely to feel a rush of pleasure every time it gets the 0.1 ml. Nevertheless, with these precautions in mind, we may define any stimulus, object, event, activity, or situation that has the potential to produce pleasure as a reward. In the context of reward deficiency or for disorders of addiction, homeostasis pursues pharmacological treatments: drugs to treat drug addiction, obesity, and other compulsive behaviors. The theory of allostasis suggests broader approaches - such as re-expanding the range of possible pleasures and providing opportunities to expend effort in their pursuit. [15]. It is noteworthy, the first animal studies eliciting approach behavior by electrical brain stimulation interpreted their findings as a discovery of the brain’s pleasure centers [16] which were later partly associated with midbrain dopamine neurons [17–19] despite the notorious difficulties of identifying emotions in animals. Evolutionary theories of pleasure: The love connection BO:D Charles Darwin and other biological scientists that have examined the biological evolution and its basic principles found various mechanisms that steer behavior and biological development. Besides their theory on natural selection, it was particularly the sexual selection process that gained significance in the latter context over the last century, especially when it comes to the question of what makes us “what we are,” i.e., human. However, the capacity to sexually select and evolve is not at all a human accomplishment alone or a sign of our uniqueness; yet, we humans, as it seems, are ingenious in fooling ourselves and others–when we are in love or desperately search for it. It is well established that modern biological theory conjectures that **organisms are** the **result of evolutionary competition.** In fact, Richard Dawkins stresses gene survival and propagation as the basic mechanism of life [20]. Only genes that lead to the fittest phenotype will make it. It is noteworthy that the phenotype is selected based on behavior that maximizes gene propagation. To do so, the phenotype must survive and generate offspring, and be better at it than its competitors. Thus, the ultimate, distal function of rewards is to increase evolutionary fitness by ensuring the survival of the organism and reproduction. It is agreed that learning, approach, economic decisions, and positive emotions are the proximal functions through which phenotypes obtain other necessary nutrients for survival, mating, and care for offspring. Behavioral reward functions have evolved to help individuals to survive and propagate their genes. Apparently, people need to live well and long enough to reproduce. Most would agree that homo-sapiens do so by ingesting the substances that make their bodies function properly. For this reason, foods and drinks are rewards. Additional rewards, including those used for economic exchanges, ensure sufficient palatable food and drink supply. Mating and gene propagation is supported by powerful sexual attraction. Additional properties, like body form, augment the chance to mate and nourish and defend offspring and are therefore also rewards. Care for offspring until they can reproduce themselves helps gene propagation and is rewarding; otherwise, many believe mating is useless. According to David E Comings, as any small edge will ultimately result in evolutionary advantage [21], additional reward mechanisms like novelty seeking and exploration widen the spectrum of available rewards and thus enhance the chance for survival, reproduction, and ultimate gene propagation. These functions may help us to obtain the benefits of distant rewards that are determined by our own interests and not immediately available in the environment. Thus the distal reward function in gene propagation and evolutionary fitness defines the proximal reward functions that we see in everyday behavior. That is why foods, drinks, mates, and offspring are rewarding. There have been theories linking pleasure as a required component of health benefits salutogenesis, (salugenesis). In essence, under these terms, pleasure is described as a state or feeling of happiness and satisfaction resulting from an experience that one enjoys. Regarding pleasure, it is a double-edged sword, on the one hand, it promotes positive feelings (like mindfulness) and even better cognition, possibly through the release of dopamine [22]. But on the other hand, pleasure simultaneously encourages addiction and other negative behaviors, i.e., motivational toxicity. It is a complex neurobiological phenomenon, relying on reward circuitry or limbic activity. It is important to realize that through the “Brain Reward Cascade” (BRC) endorphin and endogenous morphinergic mechanisms may play a role [23]. While natural rewards are essential for survival and appetitive motivation leading to beneficial biological behaviors like eating, sex, and reproduction, crucial social interactions seem to further facilitate the positive effects exerted by pleasurable experiences. Indeed, experimentation with addictive drugs is capable of directly acting on reward pathways and causing deterioration of these systems promoting hypodopaminergia [24]. Most would agree that pleasurable activities can stimulate personal growth and may help to induce healthy behavioral changes, including stress management [25]. The work of Esch and Stefano [26] concerning the link between compassion and love implicate the brain reward system, and pleasure induction suggests that social contact in general, i.e., love, attachment, and compassion, can be highly effective in stress reduction, survival, and overall health. Understanding the role of neurotransmission and pleasurable states both positive and negative have been adequately studied over many decades [26–37], but comparative anatomical and neurobiological function between animals and homo sapiens appear to be required and seem to be in an infancy stage. Finding happiness is different between apes and humans As stated earlier in this expert opinion one key to happiness involves a network of good friends [38]. However, it is not entirely clear exactly how the higher forms of satisfaction and pleasure are related to a sugar rush, winning a sports event or even sky diving, all of which augment dopamine release at the reward brain site. Recent multidisciplinary research, using both humans and detailed invasive brain analysis of animals has discovered some critical ways that the brain processes pleasure. Remarkably, there are pathways for ordinary liking and pleasure, which are limited in scope as described above in this commentary. However, there are **many brain regions**, often termed hot and cold spots, that significantly **modulate** (increase or decrease) our **pleasure or** even **produce the opposite** of pleasure— that is disgust and fear [39]. One specific region of the nucleus accumbens is organized like a computer keyboard, with particular stimulus triggers in rows— producing an increase and decrease of pleasure and disgust. Moreover, the cortex has unique roles in the cognitive evaluation of our feelings of pleasure [40]. Importantly, the interplay of these multiple triggers and the higher brain centers in the prefrontal cortex are very intricate and are just being uncovered. Desire and reward centers It is surprising that many different sources of pleasure activate the same circuits between the mesocorticolimbic regions (Figure 1). Reward and desire are two aspects pleasure induction and have a very widespread, large circuit. Some part of this circuit distinguishes between desire and dread. The so-called pleasure circuitry called “REWARD” involves a well-known dopamine pathway in the mesolimbic system that can influence both pleasure and motivation. In simplest terms, the well-established mesolimbic system is a dopamine circuit for reward. It starts in the ventral tegmental area (VTA) of the midbrain and travels to the nucleus accumbens (Figure 2). It is the cornerstone target to all addictions. The VTA is encompassed with neurons using glutamate, GABA, and dopamine. The nucleus accumbens (NAc) is located within the ventral striatum and is divided into two sub-regions—the motor and limbic regions associated with its core and shell, respectively. The NAc has spiny neurons that receive dopamine from the VTA and glutamate (a dopamine driver) from the hippocampus, amygdala and medial prefrontal cortex. Subsequently, the NAc projects GABA signals to an area termed the ventral pallidum (VP). The region is a relay station in the limbic loop of the basal ganglia, critical for motivation, behavior, emotions and the “Feel Good” response. This defined system of the brain is involved in all addictions –substance, and non –substance related. In 1995, our laboratory coined the term “Reward Deficiency Syndrome” (RDS) to describe genetic and epigenetic induced hypodopaminergia in the “Brain Reward Cascade” that contribute to addiction and compulsive behaviors [3,6,41]. Furthermore, ordinary “liking” of something, or pure pleasure, is represented by small regions mainly in the limbic system (old reptilian part of the brain). These may be part of larger neural circuits. In Latin, hedus is the term for “sweet”; and in Greek, hodone is the term for “pleasure.” Thus, the word Hedonic is now referring to various subcomponents of pleasure: some associated with purely sensory and others with more complex emotions involving morals, aesthetics, and social interactions. The capacity to have pleasure is part of being healthy and may even extend life, especially if linked to optimism as a dopaminergic response [42]. Psychiatric illness often includes symptoms of an abnormal inability to experience pleasure, referred to as anhedonia. A negative feeling state is called dysphoria, which can consist of many emotions such as pain, depression, anxiety, fear, and disgust. Previously many scientists used animal research to uncover the complex mechanisms of pleasure, liking, motivation and even emotions like panic and fear, as discussed above [43]. However, as a significant amount of related research about the specific brain regions of pleasure/reward circuitry has been derived from invasive studies of animals, these cannot be directly compared with subjective states experienced by humans. In an attempt to resolve the controversy regarding the causal contributions of mesolimbic dopamine systems to reward, we have previously evaluated the three-main competing explanatory categories: “liking,” “learning,” and “wanting” [3]. That is, dopamine may mediate (a) liking: the hedonic impact of reward, (b) learning: learned predictions about rewarding effects, or (c) wanting: the pursuit of rewards by attributing incentive salience to reward-related stimuli [44]. We have evaluated these hypotheses, especially as they relate to the RDS, and we find that the incentive salience or “wanting” hypothesis of dopaminergic functioning is supported by a majority of the scientific evidence. Various neuroimaging studies have shown that anticipated behaviors such as sex and gaming, delicious foods and drugs of abuse all affect brain regions associated with reward networks, and may not be unidirectional. Drugs of abuse enhance dopamine signaling which sensitizes mesolimbic brain mechanisms that apparently evolved explicitly to attribute incentive salience to various rewards [45]. Addictive substances are voluntarily self-administered, and they enhance (directly or indirectly) dopaminergic synaptic function in the NAc. This activation of the brain reward networks (producing the ecstatic “high” that users seek). Although these circuits were initially thought to encode a set point of hedonic tone, it is now being considered to be far more complicated in function, also encoding attention, reward expectancy, disconfirmation of reward expectancy, and incentive motivation [46]. The argument about addiction as a disease may be confused with a predisposition to substance and nonsubstance rewards relative to the extreme effect of drugs of abuse on brain neurochemistry. The former sets up an individual to be at high risk through both genetic polymorphisms in reward genes as well as harmful epigenetic insult. Some Psychologists, even with all the data, still infer that addiction is not a disease [47]. Elevated stress levels, together with polymorphisms (genetic variations) of various dopaminergic genes and the genes related to other neurotransmitters (and their genetic variants), and may have an additive effect on vulnerability to various addictions [48]. In this regard, Vanyukov, et al. [48] suggested based on review that whereas the gateway hypothesis does not specify mechanistic connections between “stages,” and does not extend to the risks for addictions the concept of common liability to addictions may be more parsimonious. The latter theory is grounded in genetic theory and supported by data identifying common sources of variation in the risk for specific addictions (e.g., RDS). This commonality has identifiable neurobiological substrate and plausible evolutionary explanations. Over many years the controversy of dopamine involvement in especially “pleasure” has led to confusion concerning separating motivation from actual pleasure (wanting versus liking) [49]. We take the position that animal studies cannot provide real clinical information as described by self-reports in humans. As mentioned earlier and in the abstract, on November 23rd, 2017, evidence for our concerns was discovered [50] In essence, although nonhuman primate brains are similar to our own, the disparity between other primates and those of human cognitive abilities tells us that surface similarity is not the whole story. Sousa et al. [50] small case found various differentially expressed genes, to associate with pleasure related systems. Furthermore, the dopaminergic interneurons located in the human neocortex were absent from the neocortex of nonhuman African apes. Such differences in neuronal transcriptional programs may underlie a variety of neurodevelopmental disorders. In simpler terms, the system controls the production of dopamine, a chemical messenger that plays a significant role in pleasure and rewards. The senior author, Dr. Nenad Sestan from Yale, stated: “Humans have evolved a dopamine system that is different than the one in chimpanzees.” This may explain why the behavior of humans is so unique from that of non-human primates, even though our brains are so surprisingly similar, Sestan said: “It might also shed light on why people are vulnerable to mental disorders such as autism (possibly even addiction).” Remarkably, this research finding emerged from an extensive, multicenter collaboration to compare the brains across several species. These researchers examined 247 specimens of neural tissue from six humans, five chimpanzees, and five macaque monkeys. Moreover, these investigators analyzed which genes were turned on or off in 16 regions of the brain. While the differences among species were subtle, **there was** a **remarkable contrast in** the **neocortices**, specifically in an area of the brain that is much more developed in humans than in chimpanzees. In fact, these researchers found that a gene called tyrosine hydroxylase (TH) for the enzyme, responsible for the production of dopamine, was expressed in the neocortex of humans, but not chimpanzees. As discussed earlier, dopamine is best known for its essential role within the brain’s reward system; the very system that responds to everything from sex, to gambling, to food, and to addictive drugs. However, dopamine also assists in regulating emotional responses, memory, and movement. Notably, abnormal dopamine levels have been linked to disorders including Parkinson’s, schizophrenia and spectrum disorders such as autism and addiction or RDS. Nora Volkow, the director of NIDA, pointed out that one alluring possibility is that the neurotransmitter dopamine plays a substantial role in humans’ ability to pursue various rewards that are perhaps months or even years away in the future. This same idea has been suggested by Dr. Robert Sapolsky, a professor of biology and neurology at Stanford University. Dr. Sapolsky cited evidence that dopamine levels rise dramatically in humans when we anticipate potential rewards that are uncertain and even far off in our futures, such as retirement or even the possible alterlife. This may explain what often motivates people to work for things that have no apparent short-term benefit [51]. In similar work, Volkow and Bale [52] proposed a model in which dopamine can favor NOW processes through phasic signaling in reward circuits or LATER processes through tonic signaling in control circuits. Specifically, they suggest that through its modulation of the orbitofrontal cortex, which processes salience attribution, dopamine also enables shilting from NOW to LATER, while its modulation of the insula, which processes interoceptive information, influences the probability of selecting NOW versus LATER actions based on an individual’s physiological state. This hypothesis further supports the concept that disruptions along these circuits contribute to diverse pathologies, including obesity and addiction or RDS.

#### [2] Extinction outweighs.

Pummer 15 [Theron, Junior Research Fellow in Philosophy at St. Anne's College, University of Oxford. “Moral Agreement on Saving the World” Practical Ethics, University of Oxford. May 18, 2015] AT

There appears to be lot of disagreement in moral philosophy. Whether these many apparent disagreements are deep and irresolvable, I believe there is at least one thing it is reasonable to agree on right now, whatever general moral view we adopt: that it is very important to reduce the risk that all intelligent beings on this planet are eliminated by an enormous catastrophe, such as a nuclear war. How we might in fact try to reduce such existential risks is discussed elsewhere. My claim here is only that we – whether we’re consequentialists, deontologists, or virtue ethicists – should all agree that we should try to save the world. According to consequentialism, we should maximize the good, where this is taken to be the goodness, from an impartial perspective, of outcomes. Clearly one thing that makes an outcome good is that the people in it are doing well. There is little disagreement here. If the happiness or well-being of possible future people is just as important as that of people who already exist, and if they would have good lives, it is not hard to see how reducing existential risk is easily the most important thing in the whole world. This is for the familiar reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. There are so many possible future people that reducing existential risk is arguably the most important thing in the world, even if the well-being of these possible people were given only 0.001% as much weight as that of existing people. Even on a wholly person-affecting view – according to which there’s nothing (apart from effects on existing people) to be said in favor of creating happy people – the case for reducing existential risk is very strong. As noted in this seminal paper, this case is strengthened by the fact that there’s a good chance that many existing people will, with the aid of life-extension technology, live very long and very high quality lives. You might think what I have just argued applies to consequentialists only. There is a tendency to assume that, if an argument appeals to consequentialist considerations (the goodness of outcomes), it is irrelevant to non-consequentialists. But that is a huge mistake. Non-consequentialism is the view that there’s more that determines rightness than the goodness of consequences or outcomes; it is not the view that the latter don’t matter. Even John Rawls wrote, “All ethical doctrines worth our attention take consequences into account in judging rightness. One which did not would simply be irrational, crazy.” Minimally plausible versions of deontology and virtue ethics must be concerned in part with promoting the good, from an impartial point of view. They’d thus imply very strong reasons to reduce existential risk,

at least when this doesn’t significantly involve doing harm to others or damaging one’s character. What’s even more surprising, perhaps, is that even if our own good (or that of those near and dear to us) has much greater weight than goodness from the impartial “point of view of the universe,” indeed even if the latter is entirely morally irrelevant, we may nonetheless have very strong reasons to reduce existential risk. Even egoism, the view that each agent should maximize her own good, might imply strong reasons to reduce existential risk. It will depend, among other things, on what one’s own good consists in. If well-being consisted in pleasure only, it is somewhat harder to argue that egoism would imply strong reasons to reduce existential risk – perhaps we could argue that one would maximize her expected hedonic well-being by funding life extension technology or by having herself cryogenically frozen at the time of her bodily death as well as giving money to reduce existential risk (so that there is a world for her to live in!). I am not sure, however, how strong the reasons to do this would be. But views which imply that, if I don’t care about other people, I have no or very little reason to help them are not even minimally plausible views (in addition to hedonistic egoism, I here have in mind views that imply that one has no reason to perform an act unless one actually desires to do that act). To be minimally plausible, egoism will need to be paired with a more sophisticated account of well-being. To see this, it is enough to consider, as Plato did, the possibility of a ring of invisibility – suppose that, while wearing it, Ayn could derive some pleasure by helping the poor, but instead could derive just a bit more by severely harming them. Hedonistic egoism would absurdly imply she should do the latter. To avoid this implication, egoists would need to build something like the meaningfulness of a life into well-being, in some robust way, where this would to a significant extent be a function of other-regarding concerns (see chapter 12 of this classic intro to ethics). But once these elements are included, we can (roughly, as above) argue that this sort of egoism will imply strong reasons to reduce existential risk. Add to all of this Samuel Scheffler’s recent intriguing arguments (quick podcast version available here) that most of what makes our lives go well would be undermined if there were no future generations of intelligent persons. On his view, my life would contain vastly less well-being if (say) a year after my death the world came to an end. So obviously if Scheffler were right I’d have very strong reason to reduce existential risk. We should also take into account moral uncertainty. What is it reasonable for one to do, when one is uncertain not (only) about the empirical facts, but also about the moral facts? I’ve just argued that there’s agreement among minimally plausible ethical views that we have strong reason to reduce existential risk – not only consequentialists, but also deontologists, virtue ethicists, and sophisticated egoists should agree. But even those (hedonistic egoists) who disagree should have a significant level of confidence that they are mistaken, and that one of the above views is correct. Even if they were 90% sure that their view is the correct one (and 10% sure that one of these other ones is correct), they would have pretty strong reason, from the standpoint of moral uncertainty, to reduce existential risk. Perhaps most disturbingly still, even if we are only 1% sure that the well-being of possible future people matters, it is at least arguable that, from the standpoint of moral uncertainty, reducing existential risk is the most important thing in the world. Again, this is largely for the reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. (For more on this and other related issues, see this excellent dissertation). Of course, it is uncertain whether these untold trillions would, in general, have good lives. It’s possible they’ll be miserable. It is enough for my claim that there is moral agreement in the relevant sense if, at least given certain empirical claims about what future lives would most likely be like, all minimally plausible moral views would converge on the conclusion that we should try to save the world. While there are some non-crazy views that place significantly greater moral weight on avoiding suffering than on promoting happiness, for reasons others have offered (and for independent reasons I won’t get into here unless requested to), they nonetheless seem to be fairly implausible views. And even if things did not go well for our ancestors, I am optimistic that they will overall go fantastically well for our descendants, if we allow them to. I suspect that most of us alive today – at least those of us not suffering from extreme illness or poverty – have lives that are well worth living, and that things will continue to improve. Derek Parfit, whose work has emphasized future generations as well as agreement in ethics, described our situation clearly and accurately: “We live during the hinge of history. Given the scientific and technological discoveries of the last two centuries, the world has never changed as fast. We shall soon have even greater powers to transform, not only our surroundings, but ourselves and our successors. If we act wisely in the next few centuries, humanity will survive its most dangerous and decisive period. Our descendants could, if necessary, go elsewhere, spreading through this galaxy…. Our descendants might, I believe, make the further future very good. But that good future may also depend in part on us. If our selfish recklessness ends human history, we would be acting very wrongly.” (From chapter 36 of On What Matters)