# 1NC Doubles Emory

## 1

#### Space Tourism makes low-gravity research accessible which results in critical physiological science innovation.

Caplan and Lindsay 17 Nick Caplan and Kirsty Lindsay 7-29-2017 "Space Tourism Could Help Boost Science and Health Research — Here's How" <https://www.space.com/37503-space-tourism-could-help-boost-science-health-research.html> (Nick graduated from the University of Birmingham with a PhD in Biomechanics)//Elmer

Perhaps one day we will see research teams launching groups of participants to spend a few weeks or months aboard a space hotel in order to study medical interventions that would slow the ageing process on Earth, and to help the human species colonise the Moon or even Mars. Research dating back to the early years of the space race has led to technologies that benefit us all. Many scientific discoveries have come since the arrival of inhabitable space stations that act as orbital laboratories. NASA’s first space station Skylab helped understand the effects on the human body of spending months in space and paved the way for the International Space Station. A huge number of research studies have been completed on the ISS since the year 2000 in the areas of human physiology, biology, biotechnology, physical science and earth and space science. These studies have led to discoveries such as enhanced protein crystal growth for drug development, efficient combustion of fuel droplets, and an understanding of the effects of long duration exposure to microgravity on the human body, revealing that spaceflight has effects similar to ageing on Earth. Despite much human physiological research being carried out in space, it has one major limitation – there are simply not enough humans currently going to space to act as research participants, leading to difficulties in research design. In fact, only 550 or so humans have ever been into space since Russian cosmonaut Yuri Gagarin first orbited the Earth in 1961. Human physiological experiments in space tend to have very small participant numbers (for example, the NASA twins study) or they have to take place over many years. Could the boom in commercial human spaceflight accelerate the speed of human physiological discoveries in space? We certainly think so.

#### Physiology key to manage new Diseases.

APS 20 5-21-2020 "How Physiologists Are Helping Patients Recover from COVID-19" <https://ispyphysiology.com/2020/05/21/how-physiologists-are-helping-patients-recover-from-covid-19/> (American Physiology Society)//Elmer

Understanding Physiology Is Critical to Fighting COVID-19 For each of the new treatments and devices created to combat COVID-19, it is critical to make sure they are safe to use in people. This is where understanding of human physiology is very important. For instance, treatment with remdesivir can reduce the amount of the virus in your body and has helped people who are severely ill with COVID-19 recover faster. But the drug is known to damage the liver and the immune system, so it is very important to know how well a patient’s liver and immune system are functioning before using it as a treatment. Even as I write this, there are new findings that COVID-19 directly affects not only the lungs but also the brain, kidneys, blood vessels and blood cells. This makes treatment of COVID-19 very difficult. Scientists and bioengineers need to take into consideration how the different organs of the body coordinate to keep you alive and healthy—the knowledge of how all the organs, tissues and cell work together in health and disease is the basis of physiological study. The trouble with finding the best treatment for COVID-19 is that the symptoms are so different from one person to the next. Children seem to be less vulnerable to COVID-19, older people are more vulnerable and some young adults are dying from strokes caused by the coronavirus rather than respiratory issues. As we find out more about how COVID-19 affects the body, it is clear that there will be more than one best way to fight it. In my eyes, the COVID-19 pandemic has highlighted the value of scientific research, especially research that helps us understand human physiology. In a few short months, scientists have sequenced the genome of the virus, discovered how SARS-CoV-2 infects cells by attaching its “spikes” to a protein on cells and developed new potential treatments. It will be the research physiologist’s job to study and understand how to best use these medicines and devices to treat COVID-19 patients.

#### Disease causes Extinction.

Bar-Yam 16 Yaneer Bar-Yam 7-3-2016 “Transition to extinction: Pandemics in a connected world” <http://necsi.edu/research/social/pandemics/transition> (Professor and President, New England Complex System Institute; PhD in Physics, MIT)//Elmer

Watch as one of the more aggressive—brighter red — strains rapidly expands. After a time it goes extinct leaving a black region. Why does it go extinct? The answer is that it spreads so rapidly that it kills the hosts around it. Without new hosts to infect it then dies out itself. That the rapidly spreading pathogens die out has important implications for evolutionary research which we have talked about elsewhere [1–7]. In the research I want to discuss here, what we were interested in is the effect of adding long range transportation [8]. This includes natural means of dispersal as well as unintentional dispersal by humans, like adding airplane routes, which is being done by real world airlines (Figure 2). When we introduce long range transportation into the model, the success of more aggressive strains changes. They can use the long range transportation to find new hosts and escape local extinction. Figure 3 shows that the more transportation routes introduced into the model, the more higher aggressive pathogens are able to survive and spread. As we add more long range transportation, there is a critical point at which pathogens become so aggressive that the entire host population dies. The pathogens die at the same time, but that is not exactly a consolation to the hosts. We call this the phase transition to extinction (Figure 4). With increasing levels of global transportation, human civilization may be approaching such a critical threshold. In the paper we wrote in 2006 about the dangers of global transportation for pathogen evolution and pandemics [8], we mentioned the risk from Ebola. Ebola is a horrendous disease that was present only in isolated villages in Africa. It was far away from the rest of the world only because of that isolation. Since Africa was developing, it was only a matter of time before it reached population centers and airports. While the model is about evolution, it is really about which pathogens will be found in a system that is highly connected, and Ebola can spread in a highly connected world. The traditional approach to public health uses historical evidence analyzed statistically to assess the potential impacts of a disease. As a result, many were surprised by the spread of Ebola through West Africa in 2014. As the connectivity of the world increases, past experience is not a good guide to future events. A key point about the phase transition to extinction is its suddenness. Even a system that seems stable, can be destabilized by a few more long-range connections, and connectivity is continuing to increase. So how close are we to the tipping point? We don’t know but it would be good to find out before it happens. While Ebola ravaged three countries in West Africa, it only resulted in a handful of cases outside that region. One possible reason is that many of the airlines that fly to west Africa stopped or reduced flights during the epidemic [9]. In the absence of a clear connection, public health authorities who downplayed the dangers of the epidemic spreading to the West might seem to be vindicated. As with the choice of airlines to stop flying to west Africa, our analysis didn’t take into consideration how people respond to epidemics. It does tell us what the outcome will be unless we respond fast enough and well enough to stop the spread of future diseases, which may not be the same as the ones we saw in the past. As the world becomes more connected, the dangers increase. Are people in western countries safe because of higher quality health systems? Countries like the U.S. have highly skewed networks of social interactions with some very highly connected individuals that can be “superspreaders.” The chances of such an individual becoming infected may be low but events like a mass outbreak pose a much greater risk if they do happen. If a sick food service worker in an airport infects 100 passengers, or a contagion event happens in mass transportation, an outbreak could very well prove unstoppable.

## 2

#### Interp: If the affirmative defends anything other than “Resolved: The appropriation of outer space by private entities is unjust.” then they must provide a counter-solvency advocate for their specific advocacy in the 1AC. (To clarify, you must have an author that states we should not do your aff, insofar as the aff is not a whole res phil aff)

#### Violation

#### Prefer

#### 1. Limits – there are infinite things you could defend outside the exact text of the resolution which pushes you to the limits of contestable arguments, even if your interp of the topic is better, the only way to verify if it’s substantively fair is proof of counter-arguments. Nobody knows your aff better than you, so if you can’t find an answer, I can’t be expected to. Our interp narrows out trivially true advocacies since counter-solvency advocates ensure equal division of ground for both sides.

#### 2. Research – Forces the aff to go to the other side of the library and contest their own view points, as well as encouraging in depth-research about their own position. Having one also encourages more in-depth answers since I can find responses. Key to education since we definitionally learn more about positions when we contest our own.

#### No regresss, on wiki

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#### Education is a voter since it is the only portable and durable skill that influences our subject formation. Fairness is a voter since a] debate is a game, competition equity matters proven by desire for wins, b] is worthless without rules and equal access.

#### Drop the debater – a] deters future abuse through a loss and b] set better norms for debate since you are less likely to repeat a practice you can lose for

#### Competing interps – [a] reasonability is arbitrary and encourages judge intervention since there’s no clear model of debate, [b] it creates a race to the top where we create the best possible norms for debate through offense [c] offense defense paradigm is the best method for evaluation since you can compare benefits under both interps easier.

#### No RVIs – a] illogical, you don’t win for proving that you meet the burden of being fair, if logic isn’t true then you should hack against them, b] RVIs incentivize baiting theory and prepping it out which leads to maximally abusive practices

## 3

#### We’re hijacking utilitarianism - Consequentialism means determinism is true

#### 1] Induction if x action leads to y result then x action must be influenced by prior action which means a causal chain of events structure my action rather than my will

#### 2] Focus on end states necessitates determinism because scientific models assume x will happen if y – anything else means you can’t predict the end point of any actions

#### 3] The best neuroscientific, psychological, and medical evidence show free will doesn’t exist.

Andrea Lavazza, Neuroethics, Centro Universitario Internazionale, Arezzo, Italy, Free Will and Neuroscience: From Explaining Freedom Away to New Ways of Operationalizing and Measuring It, 2016, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4887467/> ///AHS PB BRACKETED FOR CLARITY recut emi

More recently, studying the activity of the frontal and parietal cortex, other neuroscientists of the group coordinated by Soon et al. (2008, 2013) have managed to detect the “rise” of a behavioral or abstract choice/decision (to move either the right finger or the left one; to perform a mathematical operation or another with two numbers) a few seconds before the subject becomes aware of it. An unconscious brain process has already “decided” what to do when the subject still does not know what she would choose and thinks she still has the power to decide. More precisely, Soon et al. (2008) studied “free decisions” between many behavioral options using the multivariate pattern classification analysis (MVPA) which, combined with fMRI, allows one to identify specific contents of cognitive processes. “A pattern classifier, usually adopted from machine learning, can be trained on exemplars of neural patterns acquired when participants make different decisions and can learn to distinguish between these. If the activation patterns contain information about the decisions, the trained classifier can then successfully predict decision outcomes from independent data” (Bode et al., 2014). In Soon et al.’s (2008) experiment, subjects carried out a freely paced motor-decision task (choosing to press a button with either the left or the right index finger) while their brain activity was being measured using fMRI. The subjects then had to report the moment of the decision, not by using a clock as in Libet’s experiment, but by selecting a letter in a stream that was being presented during the task. Soon et al. (2008) used fMRI signals to find local neural patterns and draw from such patterns all possible information decoded second by second thanks to the statistical techniques of pattern recognition. The brain areas that were mostly involved in the performance of the actions are the primary M2 and the SMA, while two other brain regions encoded the subject’s motor decision ahead of time and with high accuracy. Indeed, the frontopolar cortex (BA10) and a portion of the cingulate cortex can be monitored to understand what kind of choice will be made by the person before they are conscious of having taken a specific decision in the task they were given. The prediction can be made, with a relevant approximation (60% mean accuracy), up to 7 s before the conscious choice is experienced by the subject, thanks to the fMRI signals detected in the BA10 (one should take into account that the subjects are asked to think hard about the choice before making it, whereas usually simple choices do not require long subjective reflection). “The temporal ordering of information suggests a tentative causal model of information flow, where the earliest unconscious precursors of the motor decision originated in frontopolar cortex, from where they influenced the buildup of decision-related information in the precuneus and later in SMA, where it remained unconscious for up to 10 s” (Soon et al., 2008).This seems to revive the old issue of God’s foreknowledge that forced theologians to wonder if man can be considered free, if someone already knows his future choices. Indeed, the authors speak of “free” decisions determined by brain activity ahead of time by placing “free” between inverted commas, as freedom is taken to be a commonsensical hypothesis. In this regard, the authors claim: “we found that the outcome of a decision can be encoded in brain activity of prefrontal and parietal cortex up to 10 s before it enters awareness. This delay presumably reflects the operation of a network of high-level control areas that begin to prepare an upcoming decision long before it enters awareness” (Soon et al., 2008). Another interesting study is that conducted by Alexander et al. (2016): using a new experimental design, it found that the RP also occurs in the absence of movement. It suggests that “the RP measured here is unlikely to reflect preconscious motor planning or preparation of an ensuing movement, and instead may reflect decision-related or anticipatory processes that are non-motoric in nature” (Alexander et al., 2016). The experimental design used a modified version of Libet’s task. Subjects had to choose between four letters whenever they wanted, by taking note of the exact moment of their choice. Later, in half the trials, the subjects had to push a button as soon as they made the decision, whereas in the other half subjects had to do nothing to mark their choice. At the end of the task, all subjects had to report when they had made their decision. In this way, by EEG, electrooculography (EOG) and electromyography (EMG), it was possible to see the RP of the decision-making both in motor and non-motor contexts. The authors did not find any strong differences between the two RPs, thereby affirming that there is a pure cognitive contribution to RP that does not reflect processes related to movement. They thus suggest that cognitive RP might reflect action preparation, general anticipation and spontaneous neural fluctuations. Interestingly, they exclude that the RP reflects action preparation since it is a non-motor processing. And as to anticipation they cannot exclude that RP may be specifically associated with free choice. So the RP could merely reflect the average of spontaneous fluctuations (see “Other Neuroscientific Hypotheses on Free Will” Section) All these experiments seem to indicate that free will is an illusion. Yet, these relevant experiments can be interpreted in many ways. A possible view is that, in some way, determinism can be observed directly within ourselves. This interpretation might lead to the conclusion that free will is just an illusion. In fact, if one considers as a condition of free will the fact that it should be causa sui (i.e., it should be able to consciously start new causal chains), such a condition is incompatible with determinism as it is usually defined. For it, in fact, all events are linked by casual relations in the form of natural laws, which started long before we were born and which we cannot escape. However, determinism has generally been regarded as a metaphysical claim, not refutable by empirical findings. One could properly talk of automatism in the brain, not of determinism, based on the evidence available. (In any case, endorsing indeterminism might lead to consider our behavior as the causal product of choices that every time produce different results, as if we rolled a dice. This doesn’t seem to make us any freer than if determinism were overturned; cf. Levy, 2011). Most importantly, another feature of freedom seems to be a pure illusion, namely the role of consciousness. The experiments considered thus far heavily question the claim that consciousness actually causes voluntary behavior. Neural activation starts the decisional process culminating in the movement, while consciousness “comes after”, when “things are done”. Therefore, [and] consciousness cannot trigger our voluntary decisions. But the role of consciousness in voluntary choices is part of the definition of free will (but the very definition of consciousness is a matter of debate, cf. Chalmers, 1996). Empirical research in psychology also shows that our mind works and makes choices without our conscious control. As proposed by psychologist Wegner (2002, 2003, 2004) and Aarts et al. (2004), we are “built” to have the impression to consciously control our actions or to have the power to freely choose, even though all that is only a cognitive illusion. Many priming experiments show that people act “mechanically” (even when their behavior might appear suited to the environment and even refined). Automatic cognitive processes, of which we aren’t always aware, originate our decisions, and they were only discovered thanks to the most advanced scientific research. Ultimately, consciousness, which should exercise control and assess the reasons for a choice, is thus allegedly causally ineffective: a mere epiphenomenon, to use the terminology of the philosophy of mind. This is what has been called Zombie Challenge, “based on an amazing wealth of findings in recent cognitive science that demonstrate the surprising ways in which our everyday behavior is controlled by automatic processes that unfold in the complete absence of consciousness” (Vierkant et al., 2013).

#### I defend the squo and that negates

#### 1] Actions are predetermined which means we aren’t culpable for actions we don’t take

#### New 1AR framework warrants are a voting issue for 1NC sandbagging, skews 1NC offs and pre round strategy if they can restart with a 7-6 skew which categorically decks neg engagement since NC AC should always be viable.

## 4

#### **Interp: Debaters must not defend the hypothetical implementation of an explicit actor or action**

#### 1 – Jurisdiction – it’s NSDA rules.

**NSDA 21** – 2021-22 Lincoln-Douglas Ballot, https://www.speechanddebate.org/wp-content/uploads/Sample-Lincoln-Douglas-Debate-Ballot-Blank.pdf // JB

Each **debater** has the burden to **prove** their **side** of the resolution **more valid** as a **general principle**. It is **unrealistic** to expect a debater to prove **complete validity or invalidity** of the resolution. The **better debater** is the one who, on the whole, proves their side of the resolution **more valid** as a general principle.

#### Outweighs – It’s on the LD ballot which means whenever a judge submits the ballot it’s what they contractually abide by – operating outside of the rules would forfeit the judge’s ability to submit a decision.

#### 2 – Precision:

#### Resolved in LD means statement of values

UPitt ND University Of Pittsburgh Communications Services Webteam, copyright 2015-21, "Basic Definitions," Department of Communication , <https://www.comm.pitt.edu/basic-definitions> CHO

Affirmative/Pro. The side that “affirms” the resolution (is “pro” the issue). For example, the affirmative side in a debate using the resolution of policy, Resolved: The United States federal government should implement a poverty reduction program for its citizens, would advocate for federal government implementation of a poverty reduction program. Argument. A statement, or claim, followed by a justification, or warrant. Justifications are responses to challenges, often linked by the word “because.” Example: The sun helps people, because the sun activates photosynthesis in plants, which produce oxygen so people can breathe. Constructive Speech. The first speeches in a debate, where the debaters “construct” their cases by presenting initial positions and arguments. Cross-examination. Question and answer sessions between debaters. Debate. A deliberative exercise characterized by formal procedures of argumentation, involving a set resolution to be debated, distinct times for debaters to speak, and a regulated order of speeches given. Evidence. Supporting materials for arguments. Standards for evidence are field-specific. Evidence can range from personal testimony, statistical evidence, research findings, to other published sources. Quotations drawn from journals, books, newspapers, and other audio-visuals sources are rather common. Negative/Con. The side that “negates” the resolution (is “con” the issue). For example, the negative side in a debate using the resolution of fact, Resolved: Global warming threatens agricultural production, would argue that global warming does not threaten agricultural production. Preparation Time. Debates often necessitate time between speeches for students to gather their thoughts and consider their opponent's arguments. This preparation is generally a set period of time and can be used at any time by either side at the conclusion of a speech. Rebuttal Speech. The last speeches in a debate, where debaters summarize arguments and draw conclusions about the debate. Resolution. A specific statement or question up for debate. Resolutions usually appear as statements of policy, fact or value. Statement of policy. Involves an actor (local, national, or global) with power to decide a course of action. For example, Resolved: The United States federal government should implement a poverty reduction program for its citizens. Statement of fact. Involves a dispute about empirical phenomenon. For example, Resolved: Global warming threatens agricultural production. Statement of value. Involves conflicting moral dilemmas. For example, Resolved: The death penalty is a justified method of punishment. Topic. A general issue to debate. Topics could be “The Civil War,” “genetic engineering,” or “Great Books.”

#### Is means is Definition of is (Entry 1 of 4) present tense third-person singular of BE **dialectal present tense** first-person and third-person singular **of BE** dialectal present tense plural of BE

Webster ND Definition of IS," Merriam Webster, <https://www.merriam-webster.com/dictionary/is> IS

#### Dialectical present tense means logical coherence which implies no implementation

Your Dictionary ND, "Dialectical Meaning," No Publication, <https://www.yourdictionary.com/dialectical> Cho

The definition of dialectical is a discussion that includes logical reasoning and dialogue, or something having the sounds, vocabulary and grammar of a specific way of speaking. An example of something dialectical is a Lincoln Douglass style of debate, where both parties argue a point in a logical order. Of, or pertaining to dialectic; logically reasoned through the exchange of opposing ideas.

#### “BE” is a linking verb, not an action verb so implementation is incoherent

Grammar Monster ND "Linking Verbs," Grammar Monster, <https://www.grammar-monster.com/glossary/linking_verbs.htm> CHO

What Are Linking Verbs? (with Examples) A linking verb is used to re-identify or to describe its subject. A linking verb is called a linking verb because it links the subject to a subject complement (see graphic below). Infographic Explaining Linking Verb A linking verb tells us what the subject is, not what the subject is doing. Easy Examples of Linking Verbs In each example, the linking verb is highlighted and the subject is bold. Alan is a vampire. (Here, the subject is re-identified as a vampire.) Alan is thirsty. (Here, the subject is described as thirsty.)

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#### Unjust means unjust adjective US /ʌnˈdʒʌst/ **not morally right; not fair**: New laws will protect employees against unjust dismissals. (Definition of unjust from the Cambridge Academic Content Dictionary © Cambridge University Press)

That’s Cambridge Dictionary ND [“Meaning of unjust in English” Cambridge Dictionary, [https://dictionary.cambridge.org/us/dictionary/english/unjust]](https://dictionary.cambridge.org/us/dictionary/english/unjust%5d)

#### Violation: They defend “\_\_\_\_\_\_\_” as the actor and implement an \_\_\_\_\_\_ which isn’t resolutional OR they are extra T

#### 1] Limits and Ground - justifies infinite unpredictable aff advantage ground and extra topical enforcement mechanisms which wreck research burdens while spiking core generics.

#### 2] Precision – the counter-interp justifies them arbitrarily doing away with random words in the resolution which decks ground and prep because the aff is no longer bounded by the resolution. Independent voter for jurisdiction – the judge doesn’t have the jurisdiction to vote aff if there wasn’t a legitimate aff.

#### 3] Clash - the resolution serves as a predictable stasis point to enhance accessible research and equitable ground, removing that makes negative preparation impossible since any ground we receive is self-serving and concessionary, ---the impact is resolutional clash. Generics don’t check since affs use their advocacy and enforcement to get a competitive edge

#### 4] Phil Ed – creates better ethical subjectivity and critical thinking that o/ws on uniqueness to LD, switch to policy and LARP on the water topic – solves all your offense

#### TVA: Read a phil aff that affirms that private appropriation is unjust with a util FW and don’t defend implementation

## 5

#### Interp - Appropriation means permanent control over a region of space.

Trapp 13, Timothy Justin. "Taking up Space by Any Other Means: Coming to Terms with Nonappropriation Article of the Outer Space Treaty." U. Ill. L. Rev. (2013): 1681. (JD Candidate at UIUC Law School)//Re-cut by Elmer

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 try3ing to accomplish, albeit through different means.219

#### 2] Violation – Space Tourism is travel over a short duration – the events are neither permanent nor limit other uses by other actors of a particular region of space – even if they win singular examples of tourism that could be appropriation, they explicitly include travel that is temporary which makes the Aff Extra-Topical.

Henderson and Tsui 19 Henderson, I. L., and W. H. K. Tsui. "The role of niche aviation operations as tourist attractions." Air transport: A tourism perspective (2019): 233-244. (Massey University School of Aviation, Palmerston North, New Zealand)//Elmer

17.5 Space Tourism Space tourism is another niche segment of the aviation industry that seeks to give tourists the ability to become astronauts and experience space travel for recreational, leisure, or business purposes. Since space tourism is extremely expensive, it is a case of a very small segment of consumers that are able and willing to purchase a space experience. There are several options for space tourists. For example, Crouch et al. (2009) investigate the choice behaviour between four types of space tourism: high altitude jet fighter flights, atmospheric zero-gravity flights, short-duration suborbital flights, and longer duration orbital trips into space. Reddy et al. (2012) find the following motivational factors behind space tourism (in order of importance): vision of earth from space, weightlessness, high speed experience, unusual experience, and scientific contribution. Currently, only high-altitude jet fighter flights and atmospheric zero-gravity flights are commercially available to tourists in the space tourism sector. Accordingly, this section provides an example of each, whilst the potential for suborbital and longer duration orbital trips into space are discussed later in this chapter. Case Study 17.3 Examples of Space Tourism MiG-29 Edge of Space Flight One current option for space tourists is to be taken up into the stratosphere in a supersonic fighter jet (see MiGFlug, 2017a). MiGFlug acts as a sales agent for this unique space tourism activity, which usually involves reaching an altitude of 20–22 km. At such an altitude, the curvature of the earth can be seen, the sky is dark, and it is possible to see into space. As part of this space travel experience, tourists are also given an opportunity to control the aircraft and there are a number of aerobatic manoeuvres that are performed by an experienced pilot. This operation is based out of Russia. The Mikoyan MiG-29 Fulcrum is a Russian military fighter jet that allows for rates of climb of 330 m/s and a top speed of Mach 2.25 (2390 km/h). MiGFlug sells three different services in this aircraft. For €12,500 a passenger can enjoy a 25-min flight featuring a number of aerobatic manoeuvres but without supersonic flight. For €14,500 a passenger can enjoy a 45-min flight that includes higher aerobatics and supersonic flight. The ‘Edge of Space’ flight includes aerobatics, supersonic flight, and the experience of being taken up into the stratosphere and is sold for €17,500.

#### 3] Standards –

#### a] Limits – Expanding the Topic to include temporary actions explodes Topic Ground – Aff’s can affect temporary docking of private actors on the ISS, using lunar bases in a temporary manner for broader space exploration efforts, satellites that go up temporarily in orbit – this devastates predictable topic division.

#### b] Ground – Allowing affs to argue temporary actions means the Negative cannot argue private appropriation good since it assumes permanence which means we lose internal link magnitude since the plan only effects a small amount of time.

#### c] Extra-Topicality – Allowing Aff’s to affects other aspects of outer space gives them access to extra impacts and advantages that they can leverage proven by their ozone offense and we can’t turn it since it wasn’t grounded in the resolution.

## 6

#### Reject 1AR Theory arguments – 1) double bind – either you can put minor ink next to answer of my responses and extend your arguments to auto-win or the judge has to intervene to see if the 2ar answers to the 2n are good enough. Intervention o/w since it takes the round out of debater’s hands 2) they have 2 speeches on theory while I have 1 which means they can structurally preempt my answers and respond to them and I can’t do either 3) infinite abuse in the context of aff abuse doesn’t make sense since you can read 1ac theory and uplayer with other 1ar offs like Ks 4) they have 1 more minute on the theory debate due to a 7-6 skew which o/w since theory is mainly about substance 5) they can blow up dropped arguments , we cant frame them out but they can which means only dropped arguments for them are game over.

#### Resolvability OW infinite abuse

#### 1] Jurisdiction- If the judge can’t resolve an argument they don’t have the jurisdiction to vote on it because there is a risk of an incorrect decision

#### 2] Magnitude- resolvability means judge intervention which is worse than a shell with reasonability on it

#### 3] Probability- Judge intervention is 100% likely because no matter what 2NR responses don’t get answered to but you can resolve the theory debate with DTA

#### 4] Irreversibility- Judge intervention is the worst violation of fairness because it takes the debate out of the hands of the debaters which is irreversible since the decision would be incorrect

#### All theory paradigm issues the aff thinks are good must be in the 1ac since they have 1 more speech than me on theory so they should take a stance sooner so I don’t have to answer all of them in one speech while they can go for them in multiple – 2n issues are reciprocally answered by the 2ar.

## Case

### Ozone

#### Rockets don’t matter

AFP 13 5-13-2013 "Space Tourism Won't Hurt Environment: Branson" <https://www.industryweek.com/the-economy/environment/article/21960227/space-tourism-wont-hurt-environment-branson> (Agence France-Presse)//Elmer

SINGAPORE - British billionaire Richard Branson said Monday that rocket-powered space tourism flights by his firm Virgin Galactic would have only a minor impact on climate change. More than 500 people have already reserved seats -- and paid deposits on the $200,000 ticket price -- for a minutes-long suborbital flight on the SpaceShipTwo (SS2) set to begin by the end of this year. "We have reduced the (carbon emission) cost of somebody going into space from something like two weeks of New York's electricity supply... to less than the cost of an economy round-trip from Singapore to London," Branson told reporters in Singapore. See Also: 'Experience of a Lifetime': Billionaire Branson Achieves Space Dream The founder of the diversified Virgin group was in the Southeast Asian city-state to attend a summit organized by the Carbon War Room, an environmental charity organization he founded in 2009. "New technology can dramatically reduce the carbon output and that is the challenge we have set ourselves," added Branson. The SS2's lightweight carbon-fiber body will also "reduce fuel burn dramatically," he said. The SS2, with two pilots, is designed to be launched by a transport plane called White KnightTwo and will be guided by a rocket motor before gliding back to Earth. Branson, whose Virgin group includes airlines Virgin Atlantic and Virgin Australia, said the aviation industry could do more to cut its carbon output and shift to cleaner fuels. Rising carbon emissions caused by industry, transport and deforestation have been blamed for global warming. "If you have clean fuels, you got a competitor to the dirty fuels and you could hopefully reduce the cost of the fuel, which means you can reduce the price of the ticket," he said. Branson's Virgin Group and Virgin Green Fund last October announced plans to form a $200 million emerging markets fund with Russia's Rosnano Capital to invest in innovations and green technologies. The Carbon War Room, which he founded with other global entrepreneurs, aims to empower industries to find market-based incentives to reduce carbon emissions.

#### No pollution

NSS 21 7-23-2021 "Why Space Tourism?" <https://space.nss.org/why-space-tourism/> (National Space Society)//Elmer

Space Tourism Will Not Be a Pollution Disaster It is possible to accept all the benefits above, and still express concern about the potential that a really successful space tourism industry will pollute the air and contribute to global warming. Fortunately, Blue Origin’s New Shepard produces only water as an exhaust, so neither is going to be an issue even if there are 1,000s of flights per year. Some have claimed that space tourism will be more polluting per passenger mile since there are fewer passengers per vehicle at the current time, but (a) New Shepard has zero carbon/zero pollution, and (b) over time space tourism vehicles will grow in capacity, just like airliners did. The Virgin Galactic engine is more problematic, but will most likely be replaced by a more sustainable engine before flight volumes become large. Some might be more worried about SpaceX’s StarShip/SuperHeavy driving global warming when used for point-to-point travel on the Earth, and for space tourism. Elon Musk has declared his intention to produce the methane fuel it uses directly from the atmosphere using solar power, assuring that the fuel cycle is carbon-neutral. In terms of air pollution, StarShip in a point-to-point mode will to a large degree replace airplanes currently flying while using cleaner burning methane, potentially resulting in less pollution than is the case currently. In any case, trips to space will likely always remain a minor part of point-to-point travel on the Earth. Currently, in the U.S. alone, there are about 5,700 passenger flights PER DAY. Even if we are simultaneously supporting dozens of orbital hotels, building a city on Mars, and constructing a network of space solar power satellites, we will be hard pressed to generate more than a tiny fraction of that traffic level.

#### Ozone Layer is increasing – flips U/Q.

Horton 21 Helena Horton 9-15-2021 "‘Larger than usual’: this year’s ozone layer hole bigger than Antarctica" <https://www.theguardian.com/environment/2021/sep/16/larger-than-usual-ozone-layer-hole-bigger-than-antarctica> (Environmental Journalist for the Guardian)//Elmer

The hole in the ozone layer that develops annually is “rather larger than usual” and is currently bigger than Antartica, say the scientists responsible for monitoring it. Researchers from the Copernicus Atmosphere Monitoring Service say that this year’s hole is growing quickly and is larger than 75% of ozone holes at this stage in the season since 1979. Ozone exists about seven to 25 miles (11-40km) above the Earth’s surface, in the stratosphere, and acts like a sunscreen for the planet, shielding it from ultraviolet radiation. Every year, a hole forms during the late winter of thesouthern hemisphere as the sun causes ozone-depleting reactions, which involve chemically active forms of chlorine and bromine derived from human-made compounds. In a statement Copernicus said that this year’s hole “has evolved into a rather larger than usual one”. Vincent-Henri Peuch, the service’s director, told the Guardian: “We cannot really say at this stage how the ozone hole will evolve. However, the hole of this year is remarkably similar to the one of 2020, which was among the deepest and the longest-lasting – it closed around Christmas – in our records since 1979.

#### Thumpers:

#### 1] Copper

Berkeley 1/13 (Robert Rhew and Berkeley geo chemists, [UC Berkeley professor of geography and of environmental science, policy and management], 1-13-2022, “Copper-based chemicals may be contributing to ozone depletion: Some ozone-destroying chemicals are unaccounted for. Are copper-based fungicides producing them?“, ScienceDaily, accessed: 1-15-2022, https://www.sciencedaily.com/releases/2022/01/220113151441.htm) ajs

In a paper appearing this week in the journal Nature Communications, UC Berkeley geochemists show that copper in soil and seawater acts as a catalyst to turn organic matter into both methyl bromide and methyl chloride, two potent halocarbon compounds that destroy ozone. Sunlight worsens the situation, boosting production of these methyl halides by a factor of 10. The findings answer, at least in part, a long-standing mystery about the origin of much of the methyl bromide and methyl chloride in the stratosphere. Since the worldwide ban on chlorofluorocarbon (CFC) refrigerants and brominated halons used in fire extinguishers starting in 1989, these methyl halides have become the new dominant sources of ozone-depleting bromine and chlorine in the stratosphere. As the long-lived CFCs and halons slowly disappear from the atmosphere, the role of methyl halides increases. "If we don't know where methyl bromide and methyl chloride are coming from, then how can we make sure that those compounds are reduced along with CFCs?" said the paper's senior author, Robert Rhew, UC Berkeley professor of geography and of environmental science, policy and management. "By 2050, we should be back to relatively normal ozone, but things like the continued emissions of methyl bromide and methyl chloride are road bumps in the road to recovery. Copper usage in the environment is projected to increase rapidly in the next few years, and this should be considered when predicting future halogen load and ozone recovery."

#### 2] Illegal CFC sources

Mcglaun 21 (Shane Mcglaun, [Slash Gear Writer], 5-19-2021, “MIT study suggests illegal production of CFCs has continued“, SlashGear, accessed: 1-15-2022, https://www.slashgear.com/mit-study-suggests-illegal-production-of-cfcs-has-continued-19673398/) ajs

Researchers at MIT have discovered that ozone-depleting chlorofluorocarbons known as CFCs stay in the atmosphere for less time than previously estimated. CFCs were phased out globally in 2010, and the research suggests they should be in the atmosphere in much lower concentrations than recent measurements suggest. The study suggests that new and illegal production of CFCs has likely occurred in recent years. The study specifically points out [new emissions](https://news.mit.edu/2021/cfc-atmosphere-ozone-0518) of CFC-11, CFC-12, and CFC-113 that would represent a violation of the Montréal Protocol. That protocol was designed to phase out the production and consumption of CFCs along with other ozone-damaging chemicals. The study estimates that new global CFC-11 emissions is higher than previous studies reported. MIT’s study is also the first to quantify new global emissions of CFC-12 and CFC-113. Lead study author Megan Lickley says the team found total emissions coming from new production is around 20 gigagrams a year for each of those molecules. The study also identified new emissions of CFC-12 and CFC-113, which Lickley says were previously overlooked. In the past, CFCs were used commonly in manufacturing refrigerants, aerosol sprays, chemical solvents, and building insulation. When they are emitted into the atmosphere, the chemicals can stay in the stratosphere interacting with ultraviolet light and releasing chlorine atoms that erode the protective ozone layer surrounding the earth. Today, most CFCs are emitted by “banks,” old refrigerators, air conditioners, and insulation manufactured before the ban. For the study, the researchers calculated the amount of CFCs remaining in banks today by developing a model analyzing industry production of CFCs over time and how quickly various types of equipment release CFCs. That value was then incorporated in the current recommended values for the lifetime of the chemicals to calculate concentrations of bank-derived CFCs that could be expected in the atmosphere over time. The team says the calculated lifetimes for CFC-11, 12, and 113 are 49 years, 85 years, and eight years respectively, compared to current values of 52, 100, and 85 years respectively. The results imply emissions are likely higher than the best estimates have suggested.

### Debris

#### Collision risk is infinitesimally small

Fange 17 Daniel Von Fange 17, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 5/21/2017, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/

The orbital area around earth can be broken down into four regions. Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over. High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue. Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here. GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here. How bad could Kessler Syndrome in High LEO be? Let’s imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000.

#### Low risk of collisions – it’s overhyped

Albrecht 16 [Mark Albrecht, chairman of the board of USSpace LLC, head of the White House National Space Council from 1989 to 1992, and Paul Graziani, CEO and founder of Analytical Graphics, a company that develops software and provides mission assurance through the Commercial Space Operations Center (ComSpOC), Congested space is a serious problem solved by hard work, not hysteria, 2016, https://spacenews.com/op-ed-congested-space-is-a-serious-problem-solved-by-hard-work-not-hysteria/]

Popular culture has embraced the risks of collisions in space in films like Gravity. Some participants have dramatized the issue by producing graphics of Earth and its satellites, which make our planet look like a fuzzy marble, almost obscured by a dense cloud of white pellets meant to conceptualize space congestion. Unfortunately, for the sake of a good visual, satellites are depicted as if they were hundreds of miles wide, like the state of Pennsylvania (for the record, there are no space objects the size of Pennsylvania in orbit). Unfortunately, this is the rule, not the exception, and almost all of these articles, movies, graphics, and simulations are exaggerated and misleading. Space debris and collision risk is real, but it certainly is not a crisis. So what are the facts? On the positive side, space is empty and it is vast. At the altitude of the International Space Station, one half a degree of Earth longitude is almost 40 miles long. That same one half a degree at geostationary orbit, some 22,000 miles up is over 230 miles long. Generally, we don’t intentionally put satellites closer together than one-half degree. That means at geostationary orbit, they are no closer than 11 times as far as the eye can see on flat ground or on the sea: That’s the horizon over the horizon 10 times over. In addition, other than minute forces like solar winds and sparse bits of atmosphere that still exist 500 miles up, nothing gets in the way of orbiting objects and they behave quite predictably. The location of the smallest spacecraft can be predicated within a 1,000 feet, 24 hours in advance. Since we first started placing objects into space there have been 11 known low Earth orbit collisions, and three known collisions at geostationary orbit. Think of it: 135 space shuttle flights, all of the Apollo, Gemini and Mercury flights, hundreds of telecommunications satellites, 1,300 functioning satellites on orbit today, half a million total objects in space larger than a marble, and fewer than 15 known collisions. Why do people worry?

#### No Escalation over Satellites:

#### 1] Planning Priorities

Bowen 18 Bleddyn Bowen 2-20-2018 “The Art of Space Deterrence” <https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/> (Lecturer in International Relations at the University of Leicester)//Elmer

Space is often an afterthought or a miscellaneous ancillary in the grand strategic views of top-level decision-makers. A president may not care that one satellite may be lost or go dark; it may cause panic and Twitter-based hysteria for the space community, of course. But the terrestrial context and consequences, as well as the political stakes and symbolism of any exchange of hostilities in space matters more. The political and media dimension can magnify or minimise the perceived consequences of losing specific satellites out of all proportion to their actual strategic effect.

#### 2] Military Precedent

Zarybnisky 18, Eric J. Celestial Deterrence: Deterring Aggression in the Global Commons of Space. Naval War College Newport United States, 2018. (Senior Materiel Leader at United States Air Force)//Elmer

PREVENTING AGGRESSION IN SPACE While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F 6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F 7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used highpowered lasers against American intelligence-gathering satellites8F 8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

#### Deterrence and interdependence check

Kyle L. Evanoff 19, Research Associate for International Institutions and Global Governance at the Council on Foreign Relations, “Big Bangs, Red Herrings, and the Dilemmas of Space Security”, Council on Foreign Relations, 6/27/2019, https://www.cfr.org/blog/big-bangs-red-herrings-and-dilemmas-space-security

Analysts pointed to Mission Shakti as a vivid example of growing contestation in the outer space domain. Traditional U.S. dominance in space has eroded as a litany of foreign actors (collaborator and competitor alike) have increased their spacefaring prowess, including through the development and use of ASAT weapons and dual-use uncrewed orbiters capable of space rendezvous and proximity operations [PDF]. Pundits fear that such space technologies could alter the calculus of deterrence to inauspicious effect or, worse, become instruments in an adversary’s enactment of a “space Pearl Harbor.” These fears are valid in some senses, overblown and misleading in others. Developments in space pose significant challenges for strategic stability. Obsessive concern with the remote contingency of kinetic warfare in orbit, however, detracts from efforts to address more pressing space security issues and makes catastrophic outcomes more, not less, probable.

Missiles and Lasers and Viruses, Oh My

Recent years have witnessed burgeoning democratization in the outer space domain as plummeting costs—both for manufacturing satellites and placing them in orbit—and proliferating technologies have enabled new spacefaring actors to deploy assets in Earth orbit. The number of active satellites has ballooned to more than two thousand, and their integration into military operations and civil life has deepened in tandem. Recognition of the indispensability of these orbital assets to numerous areas of strategic competition, and defense planners’ emphasis on offensive capabilities as a deterrence measure, has led states to invest large sums in the development of ASAT weapons of various stripes.

In their April Space Threat Assessment 2019 [PDF] report, Todd Harrison, Kaitlyn Johnson, and Thomas G. Roberts of the Center for Strategic and International Studies outline four categories of counterspace operations: kinetic physical attacks, non-kinetic physical attacks, electronic attacks, and cyberattacks. This litany of potential threats, which vary in their severity, reversibility, ease of attribution, and other aspects, makes U.S. policymakers uneasy. After over half a century of spacefaring pre-eminence, the United States has come to depend on the remote-sensing, telecommunications, and positioning, navigation, and timing capabilities that satellites provide. The resounding defeat of the Iraqi military by American and coalition forces during the Gulf War of the early 1990s underscored the substantial battlefield advantages that orbital capabilities confer, and numerous subsequent conflicts have affirmed the U.S. military’s tactical and strategic reliance on space assets. Proliferating counterspace systems heighten the potential for adversaries to disrupt American command, control, and communications networks, as well as surveillance and reconnaissance operations. In attacking these critical space systems, U.S. adversaries could compromise large segments of the national defense enterprise.

Indeed, an insecure orbital environment poses significant challenges for broader strategic stability. Actors in possession of counterspace capabilities can threaten or attack vital elements of ballistic missile launch detection architectures and other systems integral to national and international security, which opens new avenues for intentional, inadvertent, or accidental dispute or conflict escalation. In this sense, novel satellite vulnerabilities add layers of technical and psychological complexity to already labyrinthine deterrence calculations. The effect compounds in light of the deep integration of satellites into information and communications networks: cyber intrusions into space systems are a tantalizing option for state and nonstate actors, and such operations carry their own elaborate deterrence considerations, not least the difficulty of attribution. The net result is a convoluted deterrence landscape, rife with uncertainty and in constant motion thanks to the rapid clip and often competitive character of technological innovation.

Swords of Many Edges

For staunch deterrence advocates, this uncertainty justifies expanding counterspace arsenals. In their view, preventing a space Pearl Harbor in which a U.S. adversary launches a crippling surprise attack against American orbital assets requires evincing the certainty of a devastating counterattack. One way of accomplishing this is through the unambiguous demonstration of effective counterspace capabilities. The clearer the demonstration, the better. In this sense, ASAT missile tests, which are easy to attribute and spectacular in nature, hold great allure as a means of signaling orbital strike capabilities.

Such tests, however, come with significant drawbacks. The most obvious of these is that they generate large amounts of dangerous space debris, which pose serious hazards to spacecraft. Each new fragment requires monitoring and, in cases of potential collisions, risk assessment and avoidance maneuvers. Debris-generating military operations, in this sense, are a self-defeating proposition. ASAT missile tests also come with nebulous reputational costs, as the corpus of international space law, including the 1967 Outer Space Treaty, emphasizes that uses of space should be peaceful in nature. Likewise, UN Debris Mitigation Guidelines [PDF] affirm the importance of minimizing space junk, a dictum inconsistent with kinetic weapons testing. Western media heaped scorn on India for its violation of the important, if incipient, norm against debris generation, even after the country took pains to destroy a low-altitude satellite in order to minimize the lifespan of the bulk of the fragments.

Another important consideration for would-be ASAT testers lies in the potential for space militarization to ignite or exacerbate international arms races. Although military activities have been a persistent feature of the Space Age, those activities have often furthered peaceful as much as warlike pursuits, as has been the case with many remote-sensing operations and the opening of the U.S. Global Positioning System to civilian use. Militarization is a process rather than a state of affairs, and one that takes various forms at that. Deterrence implications notwithstanding, the development and deployment of counterspace capabilities can drive potential adversaries to develop and deploy similar capabilities, contributing to the erosion of norms of peaceful use.

Some military planners and policymakers’ assertions to the contrary, space is at present less a domain of warfighting than a domain of deep interdependence. The value of combat support functions performed from space, as important as they are to battlefield success, pales in comparison to that of other satellite-facilitated services, which are vital to myriad aspects of contemporary global society. Common space security interests include minimizing debris-generation, coordinating on satellite placement and radio-frequency spectrum use, monitoring terrestrial and space weather and the global environment, ensuring the integrity of global navigation satellite systems, tracking licit and illicit ground, air, and maritime movements, scanning for hazardous comets and asteroids, and conducting scientific observations and experiments. Many of these require states to work together to maximize benefits and minimize risks. Perceptions that one or more countries are attempting in systematic fashion to exert dominance and preclude other actors’ access to the domain and its benefits, then, carry significant dangers. They bend state behavior toward aggression and actual warfighting.

Security in the Heavens and on Earth

National governments, including that of the United States, should be careful not to make active contributions to such perceptions. Although low-level grey zone aggression has become commonplace for space-linked systems due to the relative ease and reversibility of many cyber and electronic attacks, space remains free of kinetic combat at present, as a recent Secure World Foundation report [PDF] emphasizes. Rather than responding to limited attacks by expanding counterspace arsenals, which carries the risk of contributing to arms race dynamics, U.S. and allied policymakers should accept some amount of limited aggression as more or less inevitable. They should place more emphasis on diplomacy—not weaponry—as a tool in mitigating these sorts of attacks. The United States should work with other spacefaring powers to reach consensus on non-binding rules of the road for space, using the International Code of Conduct for Outer Space Activities [PDF] that the European Union proposed in 2008 as a rough starting point. While new international law could be a greater boon still, formal UN discussions on the Prevention of an Arms Race in Outer Space have yielded little progress since the mid-1980s. A joint Chinese-Russian proposal for a Treaty on the Prevention of the Placement of Weapons in Outer Space, for instance, has significant shortcomings and has drawn open condemnation from the United States. Such paralysis, in tandem with the Trump administration’s and U.S. Senate Republicans’ disdain of multilateral treaties, makes a formal agreement a farfetched proposition for now.

More important, U.S. policymakers should avoid making decisions on the basis of a possible, though highly improbable, space Pearl Harbor. They should recognize that latent counterspace capabilities—as exemplified in 2008’s Operation Burnt Frost, which saw the United States repurpose a ballistic missile interceptor to destroy a satellite—are more than sufficient to deter adversaries from launching a major surprise attack in almost all scenarios, especially in light of the aforementioned deep interdependence in the space domain. Adding to the deterrence effect are uncertain offensive cyber capabilities. The United States continues to launch incursions into geopolitical competitors’ critical systems, such as the Russian power grid, and has demonstrated a willingness to employ cyberattacks in the wake of offline incidents, as it did after Iran shot down a U.S. drone last week. Unlike in the nuclear arena, where anything short of the prospect of nuclear retaliation holds limited dissuasive power, space deterrence can stem from military capabilities in various domains. For this reason, an attack on a U.S. satellite could elicit any number of responses. The potential for cross-domain retaliation, combined with the high strategic value of space assets, means that any adversary risks extreme escalation in launching a major assault on American space architectures. Again, well-conceived diplomatic efforts are useful in averting such scenarios altogether.

#### Space systems are distributed and resilient---the U.S. knows that and won’t jump straight to the nuclear rung of the escalation ladder

Zack Cooper 18, Senior Fellow for Asian Security at the Center for Strategic and International Studies, and Thomas G. Roberts, Research Assistant and Program Coordinator for the Aerospace Security Project at CSIS, “DETERRENCE IN THE LAST SANCTUARY”, War on the Rocks, 1/2/2018, https://warontherocks.com/2018/01/deterrence-last-sanctuary/

Until recently, resilience in space was largely an afterthought. It was assumed that a conflict in space would likely lead to or precede a major nuclear exchange. Therefore, the focus was on cost-effective architectures that maximized satellite capabilities, often at the cost of resilience. Recently, however, some have hoped that new architectures could enhance resilience and prevent critical military operations from being significantly impeded in an attack. Although resilience can be expensive, American investments in smaller satellites and more distributed space architectures could minimize adversary incentives to carry out first strikes in space.

In the late 20th century, minor escalations against space systems were treated as major events, since they typically threatened the superpowers’ nuclear architectures. Today, the proliferation of counter-space capabilities and the wide array of possible types of attacks means that most attacks against U.S. space systems are unlikely to warrant a nuclear response. It is critical that policymakers understand the likely break points in any conflict involving space systems. Strategists should explore whether the characteristics of different types of attacks against space systems create different thresholds, paying particular attention to attribution, reversibility, the defender’s awareness of an attack, the attacker’s ability to assess an attack’s effectiveness, and the risks of collateral damage (e.g., orbital debris). Competitors may attempt to use non-kinetic weapons and reversible actions to stay below the threshold that would trigger a strong U.S. response. The 2017 National Security Strategy warns:

Any harmful interference with or an attack upon critical components of our space architecture that directly affects this vital U.S. interest will be met with a deliberate response at a time, place, manner, and domain of our choosing.

In order to fulfill this promise, the United States will want to ensure that it has capabilities to respond both above and below various thresholds to ensure a full-spectrum of deterrence options for the full range of potential actors.

#### Dependence on space creates a de facto taboo

Bonnie Triezenberg 17, Senior engineer at RAND. Previously, she was the senior technical fellow at the Boeing Company, specializing in agile systems and software development. “Deterring Space War: An Exploratory Analysis Incorporating Prospect Theory into a Game Theoretic Model of Space Warfare,” RAND Corporation. 2017. <https://www.rand.org/pubs/rgs_dissertations/RGSD400.html>

The above discussion suggests that a likely means to achieve deterrence of acts of war in outer space is to increase civilian dependence on space to support day-to-day life—if everyone on earth is equally dependent on space, no one has an incentive to destroy space. Largely by accident, this dependence appears to have, in fact, occurred. The space age was born in an age of affluence and rapid economic expansion; space quickly became a domain of international commerce as well as a domain of national military use. Space assets and the systems they enable have transformed social, infrastructure and information uses perhaps more visibly than they have transformed military uses. In fact, in the current satellite database published by the Union of Concerned Scientists, of the 1461 satellites in orbit 40% support purely commercial ventures, while only 16% have a strictly military use.46 The first commercial broadcast by a satellite in geo-synchronous orbit was of international news between Europe and the United States.47 The first telephony uniting the far flung islands of Indonesia was enabled by satellite48. Those of us who are old enough remember the 1960s “magic” of intercontinental phone calls and international “breaking news” delivered by satellite. Today, most social and infrastructure uses of space are taken for granted – even in remote locales of Africa, people expect to be able to monitor the weather, communicate seamlessly with colleagues and to find their way to new and unfamiliar locations using the GPS in their phones. All of us use space every day.49 These unrestricted economic and social uses of space may be the best deterrent, making everyone on all sides of combat equally dependent on space and heightening the taboo against weaponizing space or threatening space assets with weapons.

#### No space war

**Hall 15** [Luke Penn-Hall, Analyst at The Cipher Brief, M.A. from the Johns Hopkins School for Advanced International Studies, B.A. in International Relations and Religious Studies from Claremont McKenna College, “5 Reasons “Space War” Isn’t As Scary As It Sounds”, The Cipher Brief, Aug 18, 2015, <https://www.thecipherbrief.com/article/5-reasons-%E2%80%9Cspace-war%E2%80%9D-isn%E2%80%99t-scary-it-sounds>]

The U.S. depends heavily on military and commercial satellites. If a less satellite-dependent opponent launched an anti-satellite (ASAT) attack, it would have far greater impact on the U.S. than the attacker. However, it’s not as simple as that – for the following reasons: 1. An ASAT attack would likely be **part of a larger, terrestrial attack**. An attack on space assets would be no different than an attack on territory or other assets on earth. This means that no space war would stay limited to space. An ASAT campaign would be part of a larger conventional military conflict that would play out on earth. 2. Every country with ASAT capabilities also needs **sat**ellite**s**. While the United States is the most dependent on military satellites, most other countries need satellites to participate in the global economy. All countries that have the technical ability to play in this space – the U.S., Russia, China and India - also have a **vested interest** in preventing the militarization of space and protecting their own satellites. If any of those countries were to attack U.S. satellites, it would likely **hurt them** far more than it would hurt the United States. 3. Destruction of satellites could create a damaging chain reaction. Scientists warn that the violent destruction of satellites could result in an effect called an ablation cascade. High-velocity debris from a destroyed satellite could crash into other satellites and create more high-velocity debris. If an ablation cascade were to occur, it could render certain orbital levels completely unusable for centuries. 4. Any country that threatened access to space would threaten the global economy. Even if a full-blown ablation cascade didn’t occur, an ASAT campaign would cause debris, making operating in space more hazardous. The global economy relies on satellites and any disruption of operations would be met with worldwide disapproval and severe economic ramifications. 5. International **Prohibits** the Use of ASAT Weapons. Several international treaties expressly **prohibit signatory nations** from attacking other countries’ space assets. It is generally accepted that space should be treated as a global common area, rather than a military domain. While it remains necessary for military planners to create contingency plans for a, space war it is a **highly unlikely** scenario. All involved parties are **incentivized against** attacking. However, if a space war did occur, it would be **part of** a larger conflict **on Earth**. Those concerned about the potential for war in space should be more concerned about the potential for war, period.

#### Collisions now spur global cooperation on resilience for the future.

Muresan & Georgescu 15—(Muresan - leads the Eurisc Foundation, a research institute for risk management, studied at the NATO Defense College in Rome, PHD in Economics from the Academy of Economic Studies in Bucharest). Mureşan, Liviu, and Alexandru Georgescu. 2015. “The Road to Resilience in 2050: Critical Space Infrastructure and Space Security.” The RUSI Journal 160 (6): 58–66. <https://doi.org/10.1080/03071847.2015.1123948>. Accessed 9/20/19.

Resilience in 2050, Starting from Today By extrapolating these trends to 2050, mindful of potential technological breakthroughs, it is possible to paint a picture of how space systems will both add to and detract from the goal of ensuring societal resilience. By that point, every country developed to at least the economic and technological level of the developed world in the early twentyfirst century will have become critically dependent on space systems, especially for emerging countries which have leapfrogged over technological stages to directly use space services. Countries will be richer and safer from a host of potential disasters and disruptions through ubiquitous surveillance, information gathering and co-ordination at an accessible price through space systems. However, the benefits of space systems can only accrue through a rate of adoption that engenders a critical dependence. By 2050, the world will be at the height of its vulnerability to space debris and space-weather phenomena. When it comes to deliberate threats, there will be a cautious détente between spacefaring nations maintained by crosscutting issues of dependence, if not on the same systems, then at least on the health and safety of the ‘global commons in space’. Due to the development and propagation of cost-effective technologies with anti-satellite applicability masked by legitimate uses, this will also be a time of opportunity for non-state actors looking to disrupt world affairs to target space systems and commit a ‘victimless’ crime. It is arguable that space systems will themselves have become more resilient – even to deliberate threats, especially of the kind accessible to non-state actors (cybernetics, jamming and so forth) – but security actors must also take into account the financial and market impact of temporary disruptions, based on the psychological effects of prevailing uncertainty, which are beyond the security decision-makers’ ability to affect. The main barrier to a world that is more resilient in many more respects than today is the task of creating a global governance framework

underpinned by real powers to regulate space activity in a way that increases resilience. The current framework, based on voluntary associations between space agencies and other actors, as well as the voluntary adoption of technical standards without power and authority to penalise actors who deviate from these norms, is woefully inadequate. The UN’s Committee on the Peaceful Uses of Outer Space has been developing such technical standards, but with little power of enforcement.33 Different treaties are supported by a mosaic of states, which are at various stages of adopting them, while other treaties lack the support of the most powerful space players, who are holding out for a framework that is to their specific advantage34 (as happened, for instance, with the failed Space Asset Protocol proposed by Unidroit, a private institution dedicated to harmonising commercial law35). Organisations such as the International Telecommunication Union, which regulates and assigns communication frequency bands to avoid ‘frequency fratricide’ between nearby satellites (which can also potentially be used as an ASAT weapon), show that the ‘orbital commons’ can be adequately regulated.36 Looking to the future, a global governance framework conducive to such resilience should: regulate the production and disposal of new space debris; regulate oversaturated orbital bands, preferably through market mechanisms; incentivise the development and application of methods for clearing up orbital debris; promote the adoption of resilient satellite design, taking advantage of new technologies and lower costs of launch (for shielding) to increase lifespan and decrease failures, as well as ensure the greatest possible interoperability; develop a multi-stakeholder model of governance, focused especially on co-opting private actors (who will own the bulk of future satellites) in a security conscious process while addressing their needs for an environment more conducive to commercial exploitation. Such discussions should also incorporate non-spacefaring states, which must nevertheless take space security into account when devising critical infrastructure protection strategies and activities. This is especially important since, in an interconnected world, one weak link also undermines other countries through cascading disruption, even though they might have considered themselves to be adequately protected from threats. A key part of this will be a comprehensive effort at disseminating knowledge, best practices, and critical technologies and standards, while co-opting as many members as possible into arrangements such as early-warning networks and rapid-intervention initiatives. Last, but certainly not least, a focus on terrestrial infrastructure will also be essential, particularly in hardening it against threats such as space-weather phenomena – this involves not only investments and upgrades on the ground, but the use of space systems for the provision of early warning and further research into the patterns, causes and even warning signs of such phenomena. In the end, space systems are a critical tool in negotiating the often conflicted relationship between economic development and security concerns. Their use helps to achieve a greater measure of resilience against certain kinds of disasters (such as weather patterns more extreme than ever before), but at the cost of exposure to new threats. By 2050, they will not only be integrated into existing and future critical-infrastructure protection frameworks at national, European and global levels, but they will have also gone through a number of challenges that will have strengthened resilience. Experts studying the various cases of low-intensity space-weather phenomena that have, nonetheless, caused damage have remarked on their utility as stress tests of existing infrastructure, highlighting the need to address the exposed weaknesses. As a result, the various examples of space system disruption and destruction so far have been a positive incentive for security-conscious development. This relates to the concept of ‘anti-fragility’, 37 where repeated low-level crises actually strengthen a system against a major threat which could have otherwise destroyed the system entirely. The philosophy is now being applied to critical-infrastructure protection and to space-security issues. By 2050, the effects of past incidents will have already spawned a more resilient society, but it will have become obvious that the road to resilience extends much further into the future, as long as societies continue to develop and avoid stagnation. Resilience, in this respect, is not a destination for security experts and decision-makers, but rather a continual journey.