## 1AC v1 – CPS

### 1AC: Plan

#### Plan – States ought to expand the Public Trust Doctrine to reduce private actor appropriation of Outer Space.

#### Implementing Public Trust Doctrines in Outer Space limits Appropriation and ensures Outer Space Development is sustainable.

Babcock 19 (, H., 2019. THE PUBLIC TRUST DOCTRINE, OUTER SPACE, AND THE GLOBAL COMMONS: TIME TO CALL HOME ET. [online] Lawreview.syr.edu. Available at: <https://lawreview.syr.edu/wp-content/uploads/2019/09/H-Babcock-Article-Final-Document-v2.pdf#page=67> [Accessed 15 December 2021] Professor Babcock served as general counsel to the National Audubon Society from 1987-91 and as deputy general counsel and Director of Audubon’s Public Lands and Water Program from 1981-87. Previously, she was a partner with Blum, Nash & Railsback, where she focused on energy and environmental issues, and an associate at LeBoeuf, Lamb, Leiby & MacRae where she represented utilities in the nuclear licensing process. From 1977-79, she served as a Deputy Assistant Secretary of Energy and Minerals in the U.S. Department of the Interior. Professor Babcock has taught environmental and natural resources law as a visiting professor at Pace University Law School and as an adjunct at the University of Pennsylvania, Yale, Catholic University, and Antioch law schools. Professor Babcock was a member of the Standing Committee on Environmental Law of the American Bar Association, and served on the Clinton-Gore Transition Team.)-rahulpenu

INTRODUCTION Space exploration is heating up. Governments and private interests are on a fast track to develop technologies to send people and equipment to celestial bodies, like the moon and asteroids, to extract their untapped resources.1 Near-space is rapidly filling up with public and private satellites, causing electromagnetic interference problems and dangerous space debris from collisions and earlier launches.2 The absence of a global management system for the private commercial development of outer space resources will allow these near space problems to be exported further into the galaxy.3 Moreover, without a governing authority or rules controlling entry or limiting despoliation, outer space could turn into the “Wild West” of the twenty-first century.4 Space treaties executed in the last century espoused the principle that space should be developed for the benefit of all mankind and banned both private ownership and militarization of space resources.5 But, they left development of a system for managing non-military activities in outer space to another day.6 Private commercial interests, which would be absorbing the risks and paying the high costs of space development, oppose any management scenario premised on that principle, as it would enable less developed countries to free ride on their investments.7 These interests, unsurprisingly, support privatizing outer space.8 But acceding to their wishes by establishing a system of property-based rules would transport Earth’s current division between haves and have-nots into outer space, and could lead to destabilizing hostilities—the exact consequences that the early treaty drafters hoped to avoid.9 To date, most scholars in this area have focused on developing management systems premised on private ownership or possession of the surface of some celestial body.10 This Article explores an alternative concept, the commons, in which no individual owns the property in question or can exclude others from it. Viewing property as a commons is closer to the principles set out in the various space treaties than implementation of a private property regime, and also offers a workable property regime. This Article demonstrates these conclusions by showing similarities between a large, Earth-bound commons, like the ocean and outer space, and how various commons management scenarios allow equitable use of resources, while preventing their despoliation and devolution into hostile disputes over entitlements to them. However, each of these commons management scenarios is flawed in some way and runs a similar risk to management approaches for private property of allowing the resource to be over-used or inequitably distributed. The public trust doctrine (**PTD**), an ancient doctrine that governments and individuals have used effectively for centuries to protect the public’s interests in terrestrial common pool resources (CPR) **and** to **fill** regulatory **gaps**, can be helpful in both respects.11 An examination of the doctrine identifies **commonalities** **between** outer **space** **and** **terrestrial** public trust **resources**.12 The **ease** and **low** **cost** of its implementation and enforcement, as well as its infinite malleability, are additional reasons to select it as a stopgap measure with some modification.13 This Article’s structure is straight forward. Part I acquaints the reader with the problem. It explains why the need to develop a management regime for space is becoming increasingly critical as advancing technology is allowing more and more private commercial interests to play at the edge of outer space with attendant negative externalities. 14 Soon these technological advances will allow private commercial interests to invade outer space with the potential for similar adverse impacts.15 Part II examines the international legal framework governing those activities and finds it lacks any capacity to regulate activities in outer space, in part because it is riddled with ambiguities and contradictions when it comes to ownership of outer space and its resources. Part III turns to that problem by discussing two types of property: private property and property owned in common with others. It examines the key features of each as well as their positive and negative attributes, how each might function in outer space, and what the consequences might be if one or the other prevailed. Because any property arrangement that results in its appropriation by the owner and the exclusion of others violates international space law, Part III also identifies various less-thanfull fee property arrangement, like leases and easements, to see if these problems can be avoided and concludes they cannot.16 It then examines property held in common to determine its viability under international space law and finds it consistent. Part IV investigates various approaches to managing property in outer space, be it held in private ownership or in common. Different approaches for managing private property in space are explored, including the right of first possession, tradable property claims, and establishing an exclusive economic zone, as well for managing an open access commons, such as the application of stewardship principles, norms, and the PTD. Each approach is evaluated in terms of its consistency with international law; its ability to promote and protect a sustainable, equitable, non-monopolistic, non-hostile environment in outer space; its efficiency; and its cost effectiveness. Only the PTD, which has been used for centuries to protect the public’s interests in CPRs and has demonstrated its ability to adapt to new circumstances, may be able to meet these goals.17 This Article finds commonalities between outer space and Earth-bound public trust resources, like the oceans. Additionally, the doctrine’s open access purpose resonates with language found in international treaties governing activities in outer space.18 This Article concludes that using the PTD will lead to a durable, equitable management regime in a commons where the wealthy are neither able to accumulate and control the resources that outer space has to offer nor over-exploit and deplete them. However, neither the doctrine nor ownership in common supplies any incentives for development, which may lead private enterprises to question whether development of outer space resources is worth the risks and costs.19 But, limited use of private property management approaches, like lotteries and tradable development claims—a form of overlapping hybridity between one type of property, a commons, and a management regime from another, private property—may fill this gap.20 This Article’s contribution to the literature on managing outer space resources and commons theory is using the PTD to bridge the gap between them and to suggest a hybrid management approach that melds commons theory with private property incentives.

#### Exemptions devastate Regulation Credibility – OST proves.

Hickman and Dolman 2 John Hickman and Everett Dolman Volume 21 Number 1 2002 “Resurrecting the Space Age: A State–Centered Commentary on the Outer Space Regime” (associate professor in the Department of Government and International Studies at Berry College in Mt. Berry)//Elmer

Thus a state party need merely announce its intention to withdraw and then wait one year. Withdrawal of a single state party to the treaty, however, would not necessarily terminate the treaty between the other state parties. Yet, the decision of an important state not to be bound by a regime–creating treaty obviously endangers the entire treaty. The decision of the United States or China to withdraw from the OST would have far greater implications for the survival of the international space regime than the same decision by Bangladesh, Burkina Faso, or Papua New Guinea—the equality of states under international law remains nothing more than a useful fiction. For the OST to remain good international law, it must be accepted as such by the major space faring states of the 21st Century: the United States, Russia, the European Union, Japan, and China. One defection from the regime by a member of this group would no doubt lead to its effective collapse, as the remaining space faring states are unlikely to use the kind of coercion necessary to enforce the regime. A more likely response to such a defection is a scramble to make similar claims to sovereignty, based on historical precedent and effective occupation. Similar rushes to stake claims for territory sovereignty in other celestial bodies might follow.

### 1AC: Sustainable Space Advantage

#### The Advantage is Sustainable Space Development:

#### Implementing the PTD for Private Appropriation results in a legally binding regime that curbs unsustainable development – ensures closing of legal loopholes.

Babcock 19 (, H., 2019. THE PUBLIC TRUST DOCTRINE, OUTER SPACE, AND THE GLOBAL COMMONS: TIME TO CALL HOME ET. [online] Lawreview.syr.edu. Available at: <https://lawreview.syr.edu/wp-content/uploads/2019/09/H-Babcock-Article-Final-Document-v2.pdf#page=67> [Accessed 15 December 2021] Professor Babcock served as general counsel to the National Audubon Society from 1987-91 and as deputy general counsel and Director of Audubon’s Public Lands and Water Program from 1981-87. Previously, she was a partner with Blum, Nash & Railsback, where she focused on energy and environmental issues, and an associate at LeBoeuf, Lamb, Leiby & MacRae where she represented utilities in the nuclear licensing process. From 1977-79, she served as a Deputy Assistant Secretary of Energy and Minerals in the U.S. Department of the Interior. Professor Babcock has taught environmental and natural resources law as a visiting professor at Pace University Law School and as an adjunct at the University of Pennsylvania, Yale, Catholic University, and Antioch law schools. Professor Babcock was a member of the Standing Committee on Environmental Law of the American Bar Association, and served on the Clinton-Gore Transition Team.)-rahulpenu

F. The Public Trust Doctrine (PTD) as a Gap Filling, Place-Holding Management Approach506 The PTD offers both an approach for managing an open access commons and a gap-filling tool until a regulatory regime is adopted.507 The doctrine is based on the idea that the “sovereign holds certain common properties in trust in perpetuity for the free and unimpeded use of the general public.”508 The public’s right to access and use trust resources is never lost, and neither the government nor private individuals can alienate or otherwise adversely affect those resources unless for a comparable public purpose.509 The resources the doctrine protects “have long been part of a ‘taxonomy of property’ [that recognizes] the division of natural wealth into private and public property.”510 “The doctrine places on governments ‘an affirmative, ongoing duty to safeguard the long-term preservation of those resources for the benefit of the general public,’”511 thus limiting the sovereign’s power on behalf of both present and future individuals.512 It directs the government to manage trust resources for public benefit, not private gain.513 It applies to private as well as public resources and is used to preserve the public’s access to CPRs.514 Government agencies have the non-rescindable power to revoke uses of trust resources that are inconsistent with the doctrine.515 This effectively places a permanent easement over trust resources that burdens their ownership with an overriding public interest in the preservation of those resources.516 However, trust resources can be alienated in favor of private ownership, if the alienation will still serve the public’s interest in those resources and not interfere with trust uses of the remaining land.517 The PTD, therefore, protects the “people’s common heritage,”518 just as Article 11 of the Moon Treaty protects outer space as part of the common heritage of mankind.519 The doctrine also appears to be infinitely malleable. Original uses of the doctrine were restricted to only that “aspect of the public domain below the low-water mark on the margin of the sea and the great lakes, the waters over those lands, and the waters within rivers and streams of any consequence,”520 and covered only traditional uses of those lands, like fishing and navigation.521 Over time, the scope and application of the doctrine broadened to protect more public resources and different uses.522 Thus, the **doctrine** expanded to protect new trust resources, such as dry sand beaches, inland lakes, groundwater, dry riverbeds, and wildlife,523 and passive uses of those resources, like scientific study.524 The original link to navigable water and tidelands disappeared.525 Supporters of the doctrine successfully advocated that it be applied to “wildlife, parks, cemeteries, and even works of fine art,”526 while arguing more recently its application to the atmosphere.527 A doctrine that imposes a perpetual duty on the sovereign to preserve trust resources, prevents their alienation for private benefit, assures public access to them, and can be invoked by anyone seems particularly useful as a management tool in outer space.528 The fact that **public** **access** to trust resources is so **central** to the doctrine **makes** it **reflective**, not contradictory, **of** international space **law’s** **bar** **against** **appropriation** of outer space and of the principle of space being the “province of all mankind.”529 It **avoids** the problems of alienation and **exclusion** associated with any of the management approaches associated with some form of private property and requires neither the creation of a new administrative authority nor the presence of a close-knit group of like-minded people.530 Members of the public, both rich and poor, can invoke and enforce the doctrine as easily as the sovereign.531 It is cost effective to the extent that no separate apparatus is required to implement it, and the doctrine has shown itself to be highly adaptable and innovative as different needs arise.532 It could also fill the gap in international law with respect to managing celestial property. Therefore, of all the management approaches studied here, the PTD seems the most suited to keep order in space until a regulatory regime is imposed. However, the doctrine provides no incentives for development of trust resources; rather, it might be used to limit or curtail that development, making it an imperfect, perhaps even counter-productive solution by itself to the extent that such development might be beneficial.533 Modifying the doctrine to allow limited use of private property management approaches, like tradable development claims, might buffer that effect—a form of overlapping hybridity between one type of property, a commons, and a management regime from another, private property, enabled by application of the PTD. CONCLUSION “Only a legal system that accommodates both the human need for resources and the necessary preservation of mankind’s common heritage can fulfill these criteria.”534 The future is now with regard to the development of outer space and its resources—it is no longer a question of whether humans will engage in these activities, but how soon they will. Technically advanced countries and private commercial enterprises are probing outer space and preparing for landing on an asteroid or the moon to extract their resources.535 Speculators are selling deeds to the moon’s surface and preparing to exploit the tourism potential that space offers.536 But, the legal framework for managing these initiatives is almost nonexistent.537 International treaties came into being before all this activity began in earnest and national laws that might apply are stunted by jurisdictional quandaries like the absence of national boundaries in outer space.538 Thus, there is an urgency to figure out how to control what happens in outer space before its resources are irreparably damaged or permanently monopolized by powerful countries and individuals. In the absence of regulation, much of the current debate centers on what property regime should be applied in outer space.539 The assumption is that by only allowing private property rights in space, countries and commercial enterprises will undertake the risks and costs of space development.540 However, unless international space law changes, it may prevent this from happening. If it changes, strong management controls will be necessary to prevent destruction or over-consumption of celestial resources, as well as monopolization and competitive behavior by participants, which could lead to hostilities and inequities. This Article examines various private property regimes, including those of less than full fee ownership, to see if any would avoid the conflict with the international prohibition on appropriation of outer space and its resources. It concludes that none will because each retains the right to exclude and each is insensitive to the treaties’ equity concerns. In contrast, considering outer space to be common is consistent with international space law in both respects. Hypothesizing that private property in outer space may yet prevail, this Article investigates different private property management approaches, such as the right of first possession, lotteries, and tradable development rights, to see if any would be cost effective, easy to implement and equitable, and would also prevent over-consumption, monopolization or the slide into rivalrous behavior. The Article concludes that each comes up short in some respect. Social norms as a management tool for property held in common, although compliant with international law, are also not up to the task. Instead, although ancient, the PTD, with its malleability, easy and cost-effective implementation and enforcement, non-consumption principle, and consistency with the goals that animate international space treaties, seems best suited to the task of protecting the public’s interests in the global commons that is outer space as it has done for centuries in Earth-bound commons. But, as its principal terrestrial use has been to protect trust resources from development, the doctrine needs some modification to encourage development of celestial resources. Hence, this Article suggests that modifying the PTD to allow the application of private property management tools, like tradable development rights, will not only allow development, but also will assure that when it happens, it will not be just profitable for a few, but will also be sustainable and equitable.

#### Sustainable development embedded in law solves security, debris, traffic and SSA.

Aganaba-Jeanty 16 (, T., 2016. Space Sustainability and the Freedom of Outer Space. [online] Taylor & Francis. Available at: <https://www.tandfonline.com/doi/full/10.1080/14777622.2016.1148463> [Accessed 15 December 2021] Timiebi is an assistant professor of Space and Society, in the School for the Future of Innovation in Society, an affiliate faculty with the Interplanetary Initiative, a senior global futures scientist with the Global Futures Lab, and holds a courtesy appointment at the Sandra Day O’Connor College of Law, all at Arizona State University. Timiebi was a post-doctoral fellow and is a senior fellow at the Centre for International Governance Innovation (CIGI) based in Waterloo, Ontario Canada where she focused on environmental and space governance. Timiebi was Executive Director of the World Space Week Association coordinating the global response to the UN 1999 declaration that World Space Week should be celebrated Oct 4-10 annually. She is currently on the Advisory Board for the Space Generation Advisory Council supporting the UN Programme on Space Applications. She is also on the Science Advisory Board of World View Enterprises and the SETI Institute. - pp. 10-13.)-rahulpenu

---Critique of status quo polices for space sustainability

---New regimes key

---Sustainability needs to be in law

---Perm VS Global South Ks

Definitions of space sustainability The Secure World Foundation defines **space** **sustainability** as “ensuring that all humanity can continue to use outer space for peaceful purposes and socioeconomic benefit.”39 It is also described as “the ability of all humanity to continue to use outer space for peaceful purposes and socioeconomic benefit over the **long** **term**.” It is proposed that, read together, these broad definitions take as their premise that: (1) all humanity thus far is using space for peaceful purposes and for socioeconomic benefit; (2) this use is threatened; (3) measures must be taken to protect it; and (4) all humanity currently possesses the ability, in the sense of having a skill or the capacity, to ensure space sustainability for peaceful purposes. Under this conceptualization, the negative effect of not using space sustainably is primarily economic.40 Bearing in mind the governmental origins of space exploitation, where market economics did not play a primary role in decision making, the growing focus on the economic perspective in space affairs acknowledges Carolyn Deere’s opinion that problems emerge in the international domain from an absence of powerful economic interests.41 Of course, as more space applications are developed, economic interests become more prevalent in that market protectionism then underlies the rationales for many positions taken. Space sustainability is also conceptualized as defining good behavior, its boundaries, and disincentives for negative behavior in space.42 Space sustainability then becomes a much more limited political concept calling for specific measures to strengthen norms.43 Some notable examples follow: An International Code of Conduct—the European Union proposed a non-binding voluntary code whose purpose is “security, safety, sustainability” for all space activities providing for general measures on space operations and space debris.44 The Scientific and Technical Subcommittee of UNCOPUOS working group objective of establishing guidelines for the long-term sustainability of outer space activities. Proposed International Civil Aviation Organization for Space—the establishment of an international organization focused on space safety and the establishment of binding safety standards similar to the International Civil Aviation Organization.45 Industry efforts for a global space situational awareness database Group of Governmental Experts (GGE) on Transparency and Confidence Building Measures. Depending on the forum for discussion and in line with the previously mentioned initiatives, the concept of space sustainability is also used interchangeably with the following: (1) space security, which entails access to space and freedom from threats;46 (2) space stability addressing space situational awareness;47 (3) space **safety**, which is **protection** **from** all unreasonable levels of **risk** (primarily protection of humans or human activities);48 and (4) responsible uses of space.49 These all reflect the two components of space sustainability as described by the founder of Secure World Foundation: “the first is the physical environment, which includes management of space debris, electromagnetic and physical crowding and congestion, and space weather.... The second component is the political environment, and includes promoting stability and preventing conflict between nations.”50 Bearing this in mind and notwithstanding the potential confusion caused by the interchangeability of terms used, at the core of all proposals conceptualizing space sustainability or related concepts are the notions that: (1) space assets are kept safe and secure, and that the assets are not harmed or interfered with; (2) peaceful space activities continue as free from purposeful/intentional or unintentional harmful interference; (3) the space environment is preserved for peaceful uses; and (4) international cooperative efforts are required. These four points are understood to be the current core conditions for and of space sustainability. It must be acknowledged that space sustainability, in this context, is severed from the ecological roots of sustainable development. Rationale for space sustainability The proposed baseline conditions for the current conception for space sustainability coincide with Gallagher’s analysis of the logic for space cooperation as “Space Governance for Global Security” where all space actors seek “to secure the space domain for peaceful use; to protect space assets from all hazards; and to derive maximum value from space for security, economic, civil, and environmental ends.”51 Based on this understanding, the current conception of and rationale for space sustainability ties more clearly to global security than to sustainable development. This logic emphasizes that “the more different countries, companies, and individuals depend on space for a growing array of purposes, the more they need equitable rules, shared decision-making procedures, and effective compliance mechanisms to **maximize** the **benefits** that they all can gain from space, while **minimizing** **risks** from irresponsible space behaviors or deliberate interference with legitimate space activities.”52 While it is acknowledged that such a need exists, the difficulty in reaching agreement on how to bring it about is one reason why some states are more focused on producing a dialogue on long-term sustainability. This is seen in the proliferation of reports outlining best practices and options that enhance sustainability through increased information sharing, as well as a focus on technical issues rather than on the creation of any new legal regimes. To minimize some of the risks of non-sustainable space use, Weeden53 proposes a three-pillar technical approach to space sustainability: (1) debris mitigation; (2) debris removal; and (3) space traffic management. This is conjoined with an immediate need for data in support of conjunction assessment and collision avoidance. This emphasis on data sharing/collection includes enabling research into potential solutions to the problem of space debris, and enhancing transparency and cooperation among states. Weeden also suggests that this narrow approach to space sustainability serves both to educate space actors about the severity of the space debris problem and to provide stability to reduce the likelihood of conflict. A common approach to data also serves as verification for a potential code of conduct in space, setting the stage for future space governance models. These proposals follow the logic of sustainability for global security**.** While this logic is in line with the dominant conceptualization of benefit sharing and freedom of outer space, the position taken in this article is that it does not adequately speak to sustainability from the perspective ofaspirant space states. To do so requires a significantly broader discussion and solutions aimed towards aligning space law and policy with the sustainable development paradigm, if understood as being an inclusive paradigm and not focused on the individualistic/self-interested nature of the current conception of sustainable development. A systemic, sustainable development law approach calls for a conscious engagement with the web of overlapping social, environmental, cultural, and legal frameworks, as well as cultural considerations, economic policies, expectations, players, and interests.54 Bearing in mind current U.S. space policy,55 such a broad overarching objective may not be achievable as part of the dialogue on the “Long Term Sustainability of Outer Space Activities,” but U.S. policy regarding preservation of the space environment nevertheless offers insights because international initiatives congruent with it are likely to garner the most support. Schrogl56 proposed that sustainability is rendered to threats and risks to satellite operations. This approach acknowledges the intersection of multiple issue areas: environment, security, mobility, knowledge, resources, and energy. This intersection of issue areas is more akin to the wider discourse of sustainability development of and on the Earth, and prompts a discussion of value to emerging and aspirant space actors. Otherwise, the dominant conceptualization of space sustainability removes any focus upon providing for the needs of those not among the most advanced space nations. This problem is highlighted in Peter and Rathgeber’s definition of space sustainability: Sustainable space activities can be seen as activities (in space, from space, through space and towards space) that meet the needs of the present space actors without comprising the ability of future generations to meet their own needs of performing space related operations safely.57 Peter and Rathgeber claim that the emergence of new institutional space actors, particularly from the south, is putting a greater pressure on the space environment and that the participation of the south in space sustainability efforts is unsatisfactory.58 Yet, the role of less-advanced nations in sustainability initiatives is more so on the receiving end in that advanced nations seek to engage newcomers to space during the early phase of the development of future directives and codes of conduct for sustainable space activities; that is**,** not really to seek their input,but toensure compliance by the less-advanced nations.59 Their space activities are judged as either threats to or consistent with space sustainability, rather than as part of articulating the content of space sustainability.60 This indicates that, for national space programs of established space nations, a truly international focus on space sustainability is not a priority**.** It is interesting to note, at this juncture in the discussion, a fundamental provision proposed by a group of developing states during the development of the U.N. Space Benefits Declaration.61 (1) All States should pursue their activities in Outer Space with due regard to the need to preserve Outer Space, in such a way as not to hinder its continued utilization and exploration. (2) States should pay attention to all aspects related to the protection and preservation of the Outer Space environment, especially those potentially affecting the Earth’s environment. (3) States with relevant space capabilities and with programs for the utilization and exploration of outer space should share with developing countries on an equitable basis the scientific and technological knowledge necessary for the proper development of programs oriented to the more rational utilization and exploration of Outer Space.62 Paragraph 3 is fundamental and truly revealing when read in the light of the analysis of Schrogl.63 Schrogl claims that the declaration takes up the problem of space debris, which might endanger future space utilization to a significant extent. However, he also states that “the wish [of the Developing countries] to be informed about debris prevention measures voiced. . . is reasonable but actually needs no mentioning since these technological developments are discussions and documented publicly to the greatest extent.”64

#### Congestion creates rivalrous orbits.

Fabian 19 (Christopher; January 2019; B.S. from the United States Air Force Academy, thesis submitted in partial fulfillment of the requirements for a M.S. from the University of North Dakota, approved by the Faculty Advisory Committee and in coordination with Dr. Michael Dodge, David Kugler, and Brian Urlacher; University of North Dakota Scholarly Commons, “A Neoclassical Realist’s Analysis Of Sino-U.S. Space Policy,” <https://commons.und.edu/theses/2455/>)

b. Defect/Defect The ubiquity of space technology has also yielded the negative externality of overcrowding the space domain. Despite its seemingly unlimited size, there are a limited number of useful earth-centric orbits to optimize terrestrial coverage. It is projected that there are over 300,000 medium sized objects capable of causing catastrophic failure of a satellite upon collision currently in earth’s orbit.159 Of these objects, 20,000 are actively tracked by the comparatively robust space surveillance network (SSN) of the United States Air Force, only 1,000 are active payloads, and even fewer have maneuver capability.160 Recent trends indicate that the problem of orbital congestion will only worsen in the coming decades as the barriers to entry are reduced. Launch service cost is rapidly decreasing due to an increased number of service providers and technology revolutions such as reusable rockets. Also, the miniaturization and simplification of satellite payloads further reduces the cost and infrastructure needed to be a spacefairing nation.161 This is evidenced by the near doubling of state operated satellites from 27 in 2000 to over 50 in 2012, coupled with a near doubling in total space objects from 1997 to 2007.162 The accumulation of space debris is a vital concern to the sustainable development of the space environment due to the increased probability of conjunction between active payloads and all other objects that results from crowded orbits. This increase in collision probability occurs proportionally to the number of objects in a given orbital domain. The tripling of orbital debris projected to occur in the next century, due to routine use and accumulation alone, would cause a tenfold increase in the probability of collision. In the event of a catastrophic collision between two objects, the resulting debris cloud could cause a cascading effect. Each successive collision increases the probability of another occurrence in a given orbit until an instability threshold is reached. At this threshold, debris removal due to decay would be negligible compared to debris created by subsequent collisions. As the propagation of debris continues, the cost of launching a satellite would eventually outweigh the benefits received due to the probability of that asset being destroyed by errant debris, effectively rendering the given orbit unusable. This debris propagation model and the dangers associated with it are colloquially referred to as the Kessler Syndrome. Kessler asserts unstable regions of low earth orbit (LEO) currently exist and that, barring the addition of more debris, a major collision would occur once every 10-20 years. If debris doubles, as it has in the last decade, the collision rate would increase to 2.5 years. Although most models’ time scales are on the order of centuries, it is widely accepted that the current rate of debris accumulation will render critical orbits unusable unless immediate measures are taken to return stability.163 There is near universal acceptance of the danger space debris presents, yet little substantive action has been taken to solve the problem. Current debris accumulation and propagation models show that earth orbiting domains are finite resources. Continued unsustainable development moving forward may preclude future usage, making earth orbits rivalrous goods.164 Furthermore, orbital domains are made a non-excludable good by the OST which states, “Outer space… shall be free for exploration and use by all States without discrimination of any kind.”165 As a non-excludable public good, space succumbs to the tragedy of the commons where the privately beneficial strategy of space utilization differs significantly from the socially optimal strategy promoting orbital stability.166 Understandably, most analysis has focused on solving the problem of orbital instability by addressing the market failure responsible for debris creation. The current reasoning suggests that if actors creating space debris internalize the cost of their actions, a solution can arise. Proposed solutions run the gamut of ideologies from free market tax incentives, to command and control legislation, to restructuring orbital property rights. Scientific solutions have also been proposed, but technological feasibility and cost remain major problems. Furthermore, analogous environments susceptible to the tragedy of the commons have been examined in hopes that they may prove applicable to the problem of orbit instability.167 This analysis is ultimately useful if the problem is to be solved under nominal conditions, but there is an underlying problem that needs to be addressed before any of these proposed solutions can realistically be enacted.

#### That triggers missile radars.

Hoots 15 (Felix; Fall 2015; Distinguished Engineer in the System Analysis and Simulation Subdivision, Ph.D. in Mathematics from Auburn University, M.S. in Mathematics from Tennessee Tech University; Crosslink, “Keeping Track: Space Surveillance for Operational Support,” <https://aerospace.org/sites/default/files/2019-04/Crosslink%20Fall%202015%20V16N1%20.pdf>)

The launch of Sputnik on October 4, 1957, marked the beginning of the Space Age. It also marked the beginning of an intense space race that brought a remarkable rate of rocket launches. In a very short time, the number of objects in orbit grew dramatically. This created a host of strategic challenges, including the need for space surveillance. In particular, the Air Force needed a way to prevent false alarms as satellites came within view of missile-warning radars, while the Navy needed a way to alert deployed units of possible reconnaissance by satellites overhead. These needs led to the establishment of a military mission to maintain a catalog of all Earth-orbiting objects—active payloads, rocket bodies, and debris—along with detailed information about trajectory and point of origin. Such a catalog could be used to filter normal orbital passages from potential incoming missiles and predict the passage of suspected spy satellites. The first catalog was relatively small in comparison with today’s version, which lists more than 22,000 items (as of May 2015). Also, the current version supports much more than the original military mission—and Aerospace is helping to extend its utility even further. The Space Catalog The Space Catalog is maintained by the Joint Space Operations Center (JSpOC) at Vandenberg Air Force Base, part of U.S. Strategic Command. One of the missions of JSpOC is to detect, track, and identify all artificial objects in Earth orbit. A key component of this mission is the Space Surveillance Network, a worldwide system of ground-based radars along with ground-based and orbital telescopes. The radars are used primarily for tracking near-Earth satellites with orbital period of 225 minutes or less, as well as some eccentric orbits that come down to near-Earth altitudes as they go towards their perigee. Ground-based telescopes are used for tracking more distant satellites, with orbital period greater than 225 minutes, and space-based sensors are used to track both near and distant satellites. The JSpOC tasks these sensors to track specific satellites and to record data such as time, azimuth, elevation, and range. This data is used to create orbital element sets or state vectors that represent the observed position of the satellite. The observed position can then be compared with the predicted position. The dynamic models used for predicting satellite motion are not perfect; factors such as atmospheric density variation caused by unmodeled solar activity can cause the predicted position to gradually stray from the true position. The observations are used to correct the predicted trajectory so the network can continue to track the satellite. This process of using observations to correct and refine an orbit in an ongoing feedback loop is called catalog maintenance, and it continues as long as the satellite remains in orbit. Ideally, the process is automatic, with manual inter vention only required when satellites maneuver or get near to reentry due to atmospheric drag. Sometimes, however, more effort is required. For example, a sensor may encounter a satellite trajectory that does not correspond well to anything in the catalog. Such observations are known as partially correlated observations if they are somewhat close to a known orbit or uncorrelated observations (or uncorrelated tracks) if they are far from any known orbit. Also, if a satellite is not tracked for five days, it is placed on an attention list for manual intervention. In that case, an analyst will attempt to match the wayward satellite to one of these partially correlated or uncorrelated tracks. If that effort succeeds, then the element sets are updated, and the object is returned to automatic catalog maintenance. On the other hand, if the satellite cannot be matched to a partially correlated or uncorrelated track, the satellite information continues to age. If it reaches 30 days without a match, the satellite is placed on the lost list. Risk Prediction One of the most visible uses of the catalog is to warn about collision risks for active payloads. This function predicts potential close approaches three to five days in advance to allow time to plan avoidance maneuvers, if necessary. Unplanned maneuvers may disturb normal operations and deplete resources for future maneuvers, so one would like to have high confidence in the collision-risk predictions. The reliability of the predictions depends directly on the accuracy of the orbit calculation, which in turn depends on the quality and quantity of the tracking data, which is limited by the capability of the Space Surveillance Network. Simply put, there are not enough tracking resources in the network to achieve high-quality orbits for every object in the catalog. Furthermore, many smaller objects can only be tracked by the most sensitive radars, and this tracking is infrequent. Most objects in the catalog are considered debris, which can neither maneuver nor broadcast telemetry. On the other hand, some satellite operators depend exclusively on the satellite catalog to know where their satellites are, and users of the satellite orbital data depend on the catalog to know when the satellites will be within view. This situation creates a challenging problem in balancing Space Surveillance Network resources to support the collision-warning task (tracking as many potential hazards as possible) while also providing highly accurate support to operational satellites (tracking the spacecraft as precisely as possible). The practical solution is to perform collision risk assessment using a large screening radius to ensure no close approaches are missed despite lower-quality predictions. Once an object is identified as having a potentially close approach, then the tasking level is raised, with the expectation that more tracking data will be obtained to refine the collision risk calculations. When the danger has passed, the object reverts to a normal tracking level. Collisions and spontaneous breakups do happen. The first satellite breakup occurred on June 29, 1961, when residual fuel in an Ablestar rocket body exploded, creating 296 trackable pieces of debris. Since that time, there have been more than 200 satellite breakups, the most notable being the missile intercept of the Fengyun-1C satellite, which created more than 3300 trackable fragments. In most cases, these breakups are first detected by the phased-array radars in the Space Surveillance Network. When multiple objects are observed where only one was expected, the downstream sensors are alerted, but no tasking is issued because specific debris orbits are not yet established. Tracks are taken and tagged as uncorrelated. Analysts at JSpOC then attempt to link uncorrelated tracks from different sensors to form a candidate orbit. Subsequent tracking improves the orbit to the point that the object can be named and numbered and moved into the catalog for automatic maintenance.

#### Nuclear war.

Rogoway 15 (Tyler; November 12; Defense Journalist and Editor of Time Inc’s The War Zone; Jalopnik, “These Are The Doomsday Satellites That Detected The Explosion Of Metrojet 9268,” <https://foxtrotalpha.jalopnik.com/these-are-the-doomsday-satellites-that-detected-the-exp-1737434876>)

For over 50 years the Pentagon has had early warning satellites in orbit aimed at spotting launches of ballistic missiles, especially the big intercontinental kind that can fly around the globe in less than 30 minutes and bring about nuclear Armageddon. Recently, these satellites have made news for their “secondary capabilities,” spotting the downing of Metrojet Flight 9268 and Malaysian Airlines Flight 17. These are the shadowy satellites that are capable of such amazing feats, and an idea of how they work. In 1960, at the height of the Cold War and at the dawn of the space age, the first Missile Defense Alarm System (MiDAS) satellite was launched into low earth orbit. Six years later there was a constellation of nine of these satellites roaming the heavens, each scanning the Soviet Union for large infrared plumes, the tell-tale sign of a ballistic missile or rocket launch. These fairly crude, low-earth orbit satellites, along with the radar-based Ballistic Missile Early Warning System, would be the basis for a Cold War ballistic missile surveillance system that would become ever more complex and capable as the years went by. If ballistic missile launches were detected and deemed a threat, the decision to retaliate would mean the National Command Authority making the call to do so within half an hour, an act that could bring an the end of humanity’s reign on Earth, permanently. The first really reliable and full coverage space-based ballistic missile early warning capability came with the launch of the first Defense Support Program (DSP) satellite in 1970. These new satellites were much more capable than their MiDAS predecessors. Early DSP satellite design was relatively straight forward, with the satellites’ spinning around their center axis while in geosynchronous orbit. This allows their telescopic infrared sensor to continuously sweep an area of the planet in a relatively brief amount of time, around six times in one minute. If something were detected, the information would immediately be data-linked to controllers on the ground at the 460th Space Wing located at Buckley AFB in in Colorado. A total of 23 of these satellites have been launched over the program’s life, with constant upgrades made along the way. A DSP satellite was launched by the Space Shuttle on STS-44 in 1991, and the last one was launched by a Delta IV Heavy in 2007. Most famously, the Defense Support Program constellation of satellites were used to detect launches of SCUD missiles during Operation Desert Storm.

#### Independently, debris hits on satellites causes Russia War.

Lewis 4 Jeffrey Lewis, in the Advanced Methods of Cooperative Study Program- Worked In the Office of the Undersecretary of Defense for Policy, Center for Defense Information, ‘4, "What if Space Were Weaponized," July 2004 pg online @ www.cdi.org/PDFs/scenarios.pdf)

Accidental Nuclear War Scenario Crisis Over Kalningrad (2010) This is the second of two scenarios that consider how U.S. space weapons might create incentives for America’s opponents to behave in dangerous ways. The previous scenario looked at the systemic risk of accidents that could arise from keeping nuclear weapons on high alert to guard against a space weapons attack. This section focuses on the risk that a single accident in space, such as a piece of space debris striking a Russian early-warning satellite, might be the catalyst for an accidental nuclear war. As we have noted in an earlier section, the United States canceled its own ASAT program in the 1980s over concerns that the deployment of these weapons might be deeply destabilizing. For all the talk about a “new relationship” between the United States and Russia, both sides retain thousands of nuclear forces on alert and conﬁgured to ﬁght a nuclear war. When briefed about the size and status of U.S. nuclear forces, President George W. Bush reportedly asked “What do we need all these weapons for?” 43 The answer, as it was during the Cold War, is that the forces remain on alert to conduct a number of possible contingencies, including a nuclear strike against Russia. This fact, of course, is not lost on the Russian leadership, which has been increasing its reliance on nuclear weapons to compensate for the country’s declining military might. In the mid-1990s, Russia dropped its pledge to refrain from the “ﬁrst use” of nuclear weapons and conducted a series of exercises in which Russian nuclear forces prepared to use nuclear weapons to repel a NATO invasion. In October 2003, Russian Defense Minister Sergei Ivanov reiterated that Moscow might use nuclear weapons “preemptively” in any number of contingencies, including a NATO attack. 44 So, it remains business as usual with U.S. and Russian nuclear forces. And business as usual includes the occasional false alarm of a nuclear attack. There have been several of these incidents over the years. In September 1983, as a relatively new Soviet early-warning satellite moved into position to monitor U.S. missile ﬁelds in North Dakota, the sun lined up in just such a way as to fool the Russian satellite into reporting that half a dozen U.S. missiles had been launched at the Soviet Union. Perhaps mindful that a brand new satellite might malfunction, the ofﬁcer in charge of the command center that monitored data from the early-warning satellites refused to pass the alert to his superiors. He reportedly explained his caution by saying: “When people start a war, they don’t start it with only ﬁve missiles. You can do little damage with just ﬁve missiles.” 45 In January 1995, Norwegian scientists launched a sounding rocket on a trajectory similar to one that a U.S. Trident missile might take if it were launched to blind Russian radars with a high 26 What if Space Were Weaponized? altitude nuclear detonation. The incident was apparently serious enough that, the next day, Russian President Boris Yeltsin stated that he had activated his “nuclear football” – a device that allows the Russian president to communicate with his military advisors and review his options for launching his arsenal. In this case, the Russian early-warning satellites could clearly see that no attack was under way and the crisis passed without incident. 46 In both cases, Russian observers were conﬁdent that what appeared to be a “small” attack was not a fragmentary picture of a much larger one. In the case of the Norwegian sounding rocket, space-based sensors played a crucial role in assuring the Russian leadership that it was not under attack. The Russian command system, however, is no longer able to provide such reliable, early warning. The dissolution of the Soviet Union cost Moscow several radar stations in newly independent states, creating “attack corridors” through which Moscow could not see an attack launched by U.S. nuclear submarines. 47 Further, Russia’s constellation of early-warning satellites has been allowed to decline – only one or two of the six satellites remain operational, leaving Russia with early warning for only six hours a day. Russia is attempting to reconstitute its constellation of early-warning satellites, with several launches planned in the next few years. But Russia will still have limited warning and will depend heavily on its space-based systems to provide warning of an American attack. 48 As the previous section explained, the Pentagon is contemplating military missions in space that will improve U.S. ability to cripple Russian nuclear forces in a crisis before they can execute an attack on the United States. Anti-satellite weapons, in this scenario, would blind Russian reconnaissance and warning satellites and knock out communications satellites. Such strikes might be the prelude to a full-scale attack, or a limited effort, as attempted in a war game at Schriever Air Force Base, to conduct “early deterrence strikes” to signal U.S. resolve and control escalation. 49 By 2010, the United States may, in fact, have an arsenal of ASATs (perhaps even on orbit 24/7) ready to conduct these kinds of missions – to coerce opponents and, if necessary, support preemptive attacks. Moscow would certainly have to worry that these ASATs could be used in conjunction with other space-enabled systems – for example, long-range strike systems that could attack targets in less than 90 minutes – to disable Russia’s nuclear deterrent before the Russian leadership understood what was going on. What would happen if a piece of space debris were to disable [hit] a Russian early-warning satellite under these conditions? Could the Russian military distinguish between an accident in space and the ﬁrst phase of a U.S. attack? Most Russian early-warning satellites are in elliptical Molniya orbits (a few are in GEO) and thus difﬁcult to attack from the ground or air. At a minimum, Moscow would probably have some tactical warning of such a suspicious launch, but given the sorry state of Russia’s warning, optical imaging and signals intelligence satellites there is reason to ask the question. Further, the advent of U.S. on-orbit ASATs, as now envisioned 50 could make both the more difﬁcult orbital plane and any warning systems moot. The unpleasant truth is that the Russians likely would have to make a judgment call. No state has the ability to deﬁnitively determine the cause of the satellite’s failure. Even the Accidental Nuclear War Scenarios 27 United States does not maintain (nor is it likely to have in place by 2010) a sophisticated space surveillance system that would allow it to distinguish between a satellite malfunction, a debris strike or a deliberate attack – and Russian space surveillance capabilities are much more limited by comparison. Even the risk assessments for collision with debris are speculative, particularly for the unique orbits in which Russian early-warning satellites operate. During peacetime, it is easy to imagine that the Russians would conclude that the loss of a satellite was either a malfunction or a debris strike. But how conﬁdent could U.S. planners be that the Russians would be so calm if the accident in space occurred in tandem with a second false alarm, or occurred during the middle of a crisis? What might happen if the debris strike occurred shortly after a false alarm showing a missile launch? False alarms are appallingly common – according to information obtained under the Freedom of Information Act, the U.S.-Canadian North American Aerospace Defense Command (NORAD) experienced 1,172 “moderately serious” false alarms between 1977 and 1983 – an average of almost three false alarms per week. Comparable information is not available about the Russian system, but there is no reason to believe that it is any more reliable. 51 Assessing the likelihood of these sorts of coincidences is difﬁcult because Russia has never provided data about the frequency or duration of false alarms; nor indicated how seriously earlywarning data is taken by Russian leaders. Moreover, there is no reliable estimate of the debris risk for Russian satellites in highly elliptical orbits. 52 The important point, however, is that such a coincidence would only appear suspicious if the United States were in the business of disabling satellites – in other words, there is much less risk if Washington does not develop ASATs. The loss of an early-warning satellite could look rather ominous if it occurred during a period of major tension in the relationship. While NATO no longer sees Russia as much of a threat, the same cannot be said of the converse. Despite the warm talk, Russian leaders remain wary of NATO expansion, particularly the effect expansion may have on the Baltic port of Kaliningrad. Although part of Russia, Kaliningrad is separated from the rest of Russia by Lithuania and Poland. Russia has already complained about its decreasing lack of access to the port, particularly the uncooperative attitude of the Lithuanian government. 53 News reports suggest that an edgy Russia may have moved tactical nuclear weapons into the enclave. 54 If the Lithuanian government were to close access to Kaliningrad in a ﬁt of pique, this would trigger a major crisis between NATO and Russia. Under these circumstances, the loss of an early-warning satellite would be suspicious. It is any military’s nature during a crisis to interpret events in their worst-case light. For example, consider the coincidences that occurred in early September 1956, during the extraordinarily tense period in international relations marked by the Suez Crisis and Hungarian uprising. 55 On one evening the White House received messages indicating: 1. the Turkish Air Force had gone on alert in response to unidentiﬁed aircraft penetrating its airspace; 2. one hundred Soviet MiG-15s were ﬂying over Syria; 3. a British Canberra bomber had been shot down over Syria, most likely by a MiG; and 4. The Russian ﬂeet was moving through the Dardanelles. Gen. Andrew 28 What if Space Were Weaponized? Goodpaster was reported to have worried that the conﬂuence of events “might trigger off … the NATO operations plan” that called for a nuclear strike on the Soviet Union. Yet, all of these reports were false. The “jets” over Turkey were a ﬂock of swans; the Soviet MiGs over Syria were a smaller, routine escort returning the president from a state visit to Moscow; the bomber crashed due to mechanical difﬁculties; and the Soviet ﬂeet was beginning long-scheduled exercises. In an important sense, these were not “coincidences” but rather different manifestations of a common failure – human error resulting from extreme tension of an international crisis. As one author noted, “The detection and misinterpretation of these events, against the context of world tensions from Hungary and Suez, was the ﬁrst major example of how the size and complexity of worldwide electronic warning systems could, at certain critical times, create momentum of its own.” Perhaps most worrisome, the United States might be blithely unaware of the degree to which the Russians were concerned about its actions and inadvertently escalate a crisis. During the early 1980s, the Soviet Union suffered a major “war scare” during which time its leadership concluded that bilateral relations were rapidly declining. This war scare was driven in part by the rhetoric of the Reagan administration, fortiﬁed by the selective reading of intelligence. During this period, NATO conducted a major command post exercise, Able Archer, that caused some elements of the Soviet military to raise their alert status. American ofﬁcials were stunned to learn, after the fact, that the Kremlin had been acutely nervous about an American ﬁrst strike during this period. 56 All of these incidents have a common theme – that conﬁdence is often the difference between war and peace. In times of crisis, false alarms can have a momentum of their own. As in the second scenario in this monograph, the lesson is that commanders rely on the steady ﬂow of reliable information. When that information ﬂow is disrupted – whether by a deliberate attack or an accident – conﬁdence collapses and the result is panic and escalation. Introducing ASAT weapons into this mix is all the more dangerous, because such weapons target the elements of the command system that keep leaders aware, informed and in control. As a result, the mere presence of such weapons is corrosive to the conﬁdence that allows national nuclear forces to operate safely.

#### Unchecked Commercial Appropriation causes Space Conflicts.

Perez 21 Veronica Delgado-Perez. 12/14/21. Argument | The Commercialization of Space Risks Launching a Militarized Space Race. <https://www.theintlscholar.com/periodical/12/14/2020/analysis-commercialization-space-risk-international-law-military-space-race> [Veronica Delgado-Perez is a Staff Writer at The International Scholar.] // CVHS SR

Fundamentals of the Final Frontier It is a geopolitical imperative to determine what, if any, commercial activities and use of extraterrestrial resources are permitted within the confines of international law. Without clear-cut agreements on what activity is recognized by international law, the world will undoubtedly see states push the boundaries ever further in an attempt to gain the edge over geopolitical competitors — even more-so in an era of renewed great power competition. Yet to date, there exists no comprehensive treaty or legal reference to commercial activity in space. However, this should come as no surprise. It has only been since the turn of the century that technology and markets have progressed to the point where commercial space exploration and exploitation has become possible. Only recently have experts and analysts of geopolitics and international law begun to seriously examine questions surrounding the legal framework that would govern extraterrestrial resource-mining and other commercial activities. In the last decade, the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) dealt with commercial aspects in outer space. In one of their last reports, the Committee expressed that the era of the commercial utilization of outer space’s resources is intrinsically linked to the escalation of international competition over resources, which could threaten international peace and security. By encouraging the international community to engage in outer space’s activities for the benefit of humankind as a whole, “some delegations” have expressed that states should avoid the promotion of laws and regulations related to the commercialization of outer space, arguing that it should be considered the heritage of all humanity. In that regard, states must then ensure that domestic law on the use of outer space complies with international space law, which means that states should respect the principles outlined in the Outer Space Treaty and ensure that national regulations do not contravene international provisions. Even though the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies (which entered into force in 1967), refers to the exploration and use of outer space, it does not address questions of a commercial nature, which compromises the ability of states and international actors to address new challenges to extraterrestrial activities. In several provisions, the treaty highlights that these activities may be carried out for peaceful purposes and the benefit of all people, reaffirming that outer space is not subject to national appropriation. Were outer space not considered a global commons, that would imply that the resources and results of commercial exploration may fall within the jurisdiction of a country. It is thus incumbent upon Washington — and its commercial enterprises — to demonstrate how American commercial exploration of space benefits other countries and complies with international space law, or otherwise to adhere to the spirit of past treaties which emphasize the impartiality of outer space until such time as the law is clarified. International Law is Adrift in Space The potential benefits of commercial space exploration cannot be ignored. From an economic standpoint, the space industry would generate a significant economic boon for both states and private companies, due to the abundance and variety of resources — particularly scarce minerals that are difficult to extract on Earth. As one example of the vastness of resources held in outer space, one asteroid has the potential to contain more than the total supply of platinum extracted throughout the history of mankind. It may very well open the door to an advanced era of space navigation, building extraterrestrial infrastructure that facilitates the exploration and use of space’s resources, and extra-planetary human habitation. Inevitably, there are significant drawbacks to the commercialization of space exploration. These can vary, for instance, from the commercial dominance of space’s natural resources only by those states with the technical and financial capital to support space missions, to geopolitical competition over extraterrestrial resources that threatens world peace and security, to the potential for the monopolization of extraterrestrial resources by states and private companies. As was the case during the Cold War, the Soviet Union and the United States began a Space Race in which they struggled to achieve supremacy in space exploration and domination of science. Today, the number of space powers has increased thanks to continual advancements in flight, combustion, and fueling technologies. In the three decades since the end of the Cold War, technologically advanced countries like China, Japan, and France which previously had no space program have successfully navigated to the top tier of space-faring agencies and programs. In 2018, the U.S. allocated $41 billion to space programs, followed by China at $5.8 billion, and Russia at $3.1 billion. Collectively, the three major space powers control almost 65% of the global industry, showing space powers are monopolizing space and reinforcing the inequality gap between states that do not have sufficient economic and technological capacity to invest. With new actors on the game stage, conflicts of interest may arise. There is a risk that each actor adopts a kind of short-term Realist approach to space policy — one which is driven by self-interest in reaping the greatest benefits of extraterrestrial exploration and commercialization while controlling access to others. If unmitigated, states may choose to militarize outer space to gain a strategic edge over competitors and adversaries. This process has already begun. Under the Trump administration, the Pentagon established the U.S. Space Force as a new branch of the Armed Forces to protect the country and allied interests in space. Already, Delta 4 — one of the U.S. Space Force’s missions — conducts strategic and theater missile warnings, manages weapon systems, and provides information to missile defense forces. The measure shows that for the U.S., outer space is not only a domain of scientific exploration but has the potential to become increasingly securitized. With the impending expiration of the Strategic Arms Reduction Treaty (START) between the U.S. and Russia on February 5, 2021, a number of security dilemmas could arise. If the world’s two largest nuclear powers do not edge toward extending the treaty, Washington and Moscow risk returning to the era of unrestricted expansion of launch platforms and strategically-deployed nuclear warheads — potentially with the aid of military infrastructure in space. Although President-elect Biden has expressed his interest in negotiating an extension of New START, how Moscow and Washington might proceed remains an open question. Bilateral progress towards a new arms-control regime would require establishing limits on the number and range of long- and mid-range missiles, establishing measures to limit the expansion of traditional missile deployment to space, and banning the deployment of nuclear weapons and weapons of mass destruction in outer space. More than the risk of the securitization of space, state, and private actors could begin to claim exclusive legal rights over the resources they discover. Indeed, the U.S. Commercial Space Launch Competitiveness Act, which came into force in 2015, expressly recognizes the right of U.S. Citizens to possess, own, transport, use, and sell space resources. By this means, domestic law already acknowledges the legal claim to property by individuals, which is prohibited by international law. Under the Outer Space Treaty, states renounced any traditional form of acquisition of territories and agreed not to foray unilaterally into space to extend their national policies on Earth or to exercise any kind of sovereignty over celestial bodies or resources. The absence of a modern international treaty that addresses these issues should be received with grave concern, as there is significant potential for risk to become reality. Existing UN treaties lack the technological context and foresight to address legal questions regarding the potential for commercial exploration and exploitation of outer space or its resources. During the sixties and seventies, when international instruments like the Outer Space treaty were conceived, the principal aim of states was to support and expand the scale of the state’s national capacity for operation in space and the development of legal instruments to guide state’s international cooperation in the peaceful exploration of outer space. These instruments were never designed to respond to commercial questions over mining or tourism in space, private investment in space activities, or the emergence of non-state private enterprises operating in space. As a result, private enterprises operating in the vacuum of space also float in an unstable legal vacuum which threatens to implode in geopolitical competition. Beyond Stars and States In an increasingly commercial outer space in which there are no set limits to the exploitation of resources or claim to property, states and private companies will inevitably pursue the development of new extraterrestrial industries to suit their geoeconomic interests. If unchecked, the legal protection of outer space as a domain of exploration for the benefit of all humanity would functionally fail. To protect investments and profit from national space industries, states would likely **resort to military force** to protect and secure private assets. Over time, space would ultimately become a fourth border domain over which states claim, exercise, and defend sovereignty — including through the use of force. The challenge is thus to prevent the circumstances that could lead to space-borne conflict before it is made possible. Notwithstanding, commercial exploration and the use of natural resources need not lead to predation among actors involved in space. The potential rewards — both technological and environmental — that could come from investment in the harvesting of resources in space are immense. International law cannot afford to wait for the security dilemma posed by commercial activity in space to manifest before addressing it but must anticipate and proactively adopt measures to address future issues that govern extraterrestrial human activity. The only remedy for the lack of legal governance over commercial activity in space is the creation of new international laws through a comprehensive international treaty on commercial operations in space. The new treaty must expressly regulate commercial activities by states and private companies, enshrine an international liability and compensation regime covering damages caused with workable sanction provisions, and reinforce norms that restrict any militarization of outer space. The international community should focus its efforts on establishing a legal regime, with mandatory provisions (rather than non-binding resolutions, observations, commentaries, and conclusions) which generate both international responsibility and provide enforceable sanctions in the event of violations. The effort should be borne out by expanding the scope and strengthening the oversight powers of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), rather than creating a new organ with redundant bureaucracy. Beyond the tasks of encouraging space research programs, studying space activities, and addressing legal questions, COPUOS should be granted the necessary powers to perform control and oversight monitoring functions. Experience has taught the international community that cooperative arrangements between states and international organizations can prevent competition for resources from escalating to kinetic conflict. Through cooperation, there is a chance to preserve extraterrestrial resources for future generations, secure an equitable allocation of resources and benefits with a mind to each country’s specific needs, and prevent the expansion of geopolitical conflict to the domain of space. Space powers must recognize the value in partnering with other states to advance the development of space programs more efficiently. It should be clear now that all nations could reap the benefits of collective action, exploration, and commercialization of resources from beyond Earth’s atmosphere while preventing a drawn-out international conflict to the final frontier. The will of states not to jeopardize the fundamental basis of international law must be reflected in coordination and surveillance efforts to ensure that the advantages derived from space exploration allow humanity to continue evolving.

#### Space War cause Nuclear War.

Gallagher 15 “Antisatellite warfare without nuclear risk: A mirage” <http://thebulletin.org/space-weapons-and-risk-nuclear-exchanges8346> (interim director of the Center for International and Security Studies in Maryland, previous Executive Director of the Clinton Administration’s CTBT Treaty Committee, an arms control specialist at the State Dept., and a faculty member at Wesleyan)//Elmer

In recent decades, however, as space-based reconnaissance, communication, and targeting capabilities have become integral elements of modern military operations, strategists and policy makers have explored whether carrying out antisatellite attacks could confer major military advantages without increasing the risk of nuclear war. In theory, the answer might be yes. In practice, it is almost certainly no. Hyping threats. No country has ever deliberately and destructively attacked a satellite belonging to another country (though nations have sometimes interfered with satellites' radio transmissions). But the United States, Russia, and China have all tested advanced kinetic antisatellite weapons, and the United States has demonstrated that it can modify a missile-defense interceptor for use in antisatellite mode. Any nation that can launch nuclear weapons on medium-range ballistic missiles has the latent capability to attack satellites in low Earth orbit. Because the United States depends heavily on space for its terrestrial military superiority, some US strategists have predicted that potential adversaries will try to neutralize US advantages by attacking satellites. They have also recommended that the US military do everything it can to protect its own space assets while maintaining a capability to disable or destroy satellites that adversaries use for intelligence, communication, navigation, or targeting. Analysis of this sort often exaggerates both potential adversaries’ ability to destroy US space assets and the military advantages that either side would gain from antisatellite attacks. Nonetheless, some observers are once again advancing worst-case scenarios to support arguments for offensive counterspace capabilities. In some other countries, interest in space warfare may be increasing because of these arguments. If any nation, for whatever reason, launched an attack on a second nation's satellites, nuclear retaliation against terrestrial targets would be an irrational response. But powerful countries do sometimes respond irrationally when attacked. Moreover, disproportionate retaliation following a deliberate antisatellite attack is not the only way in which antisatellite weapons could contribute to nuclear war. It is not even the likeliest way. As was clearly understood by the countries that negotiated the Outer Space Treaty, crisis management would become more difficult, and the risk of inadvertent deterrence failure would increase, if satellites used for reconnaissance and communication were disabled or destroyed. But even if the norm against attacking another country’s satellites is never broken, developing and testing antisatellite weapons still increase the risk of nuclear war. If, for instance, US military leaders became seriously concerned that China or Russia were preparing an antisatellite attack, pressure could build for a pre-emptive attack against Chinese or Russian strategic forces. Should a satellite be struck by a piece of space debris during a crisis or a low-level terrestrial conflict, leaders **might mistakenly assume that a space war had begun and retaliate before they knew what had actually happened.** Such scenarios may seem improbable, but they are no more implausible than the scenarios that are used to justify the development and use of antisatellite weapons.

#### Nuke war causes extinction AND outweighs other existential risks

* Checked

PND 16. internally citing Zbigniew Brzezinski, Council of Foreign Relations and former national security adviser to President Carter, Toon and Robock’s 2012 study on nuclear winter in the Bulletin of Atomic Scientists, Gareth Evans’ International Commission on Nuclear Non-proliferation and Disarmament Report, Congressional EMP studies, studies on nuclear winter by Seth Baum of the Global Catastrophic Risk Institute and Martin Hellman of Stanford University, and U.S. and Russian former Defense Secretaries and former heads of nuclear missile forces, brief submitted to the United Nations General Assembly, Open-Ended Working Group on nuclear risks. A/AC.286/NGO/13. 05-03-2016. <http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/OEWG/2016/Documents/NGO13.pdf> //Re-cut by Elmer

Consequences human survival 12. Even if the 'other' side does NOT launch in response the smoke from 'their' burning cities (incinerated by 'us') will still make 'our' country (and the rest of the world) uninhabitable, potentially inducing global famine lasting up to decades. Toon and Robock note in ‘Self Assured Destruction’, in the Bulletin of Atomic Scientists 68/5, 2012, that: 13. “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. Even a 'small' nuclear war between India and Pakistan, with each country detonating 50 Hiroshima-size atom bombs--only about 0.03 percent of the global nuclear arsenal's explosive power--as air bursts in urban areas, could produce so much smoke that temperatures would fall below those of the Little Ice Age of the fourteenth to nineteenth centuries, shortening the growing season around the world and threatening the global food supply. Furthermore, there would be massive ozone depletion, allowing more ultraviolet radiation to reach Earth's surface. Recent studies predict that agricultural production in parts of the United States and China would decline by about **20 percent** for four years, and by 10 percent for a decade.” 14. A conflagration involving USA/NATO forces and those of Russian federation would most likely cause the deaths of most/nearly all/all humans (and severely impact/extinguish other species) as well as destroying the delicate interwoven techno-structure on which latter-day 'civilization' has come to depend. Temperatures would drop to below those of the last ice-age for up to 30 years as a result of the lofting of up to 180 million tonnes of very black soot into the stratosphere where it would remain for decades. 15. Though human ingenuity and resilience shouldn't be underestimated, human survival itself is arguably problematic, to put it mildly, under a 2000+ warhead USA/Russian federation scenario. 16. The Joint Statement on Catastrophic Humanitarian Consequences signed October 2013 by 146 governments mentioned 'Human Survival' no less than 5 times. The most recent (December 2014) one gives it a highly prominent place. Gareth Evans’ ICNND (International Commission on Nuclear Non-proliferation and Disarmament) Report made it clear that it saw the threat posed by nuclear weapons use as one that at least threatens what we now call 'civilization' and that potentially threatens human survival with an immediacy that even climate change does not, though we can see the results of climate change here and now and of course the immediate post-nuclear results for Hiroshima and Nagasaki as well.

### 1AC: Framing

#### Ethics must begin a-posteriori:

#### 1 – We can’t obtain evidence of goodness without desire.

Sayre-McCord 01

Geoffrey Sayre-McCord, Philosophy, University of North Carolina, Chapel Hill, "Mill's “Proof” Of The Principle of Utility: A More Than Half-Hearted Defense", Social Philosophy and Policy, 2001, accessed: 1 April 2020, <https://www.cambridge.org/core/journals/social-philosophy-and-policy/article/mills-proof-of-the-principle-of-utility-a-more-than-halfhearted-defense/FDBE07CBE08D4E17523930BF8C7BBC32>, R.S.

How is the argument supposed to go, if not by way of these multiple fallacies? Let us start with the principle of evidence and the analogy Mill draws between visibility and desirability. What is the analogy supposed to be if not one that commits Mill to interpreting "desirable" as "capable of being desired"?

When it comes to visibility, no less than desirability, Mill explicitly denies that a "proof" in the "ordinary acceptation of the term" can be offered.25 As he notes, "To be incapable of proof by reasoning is com mon to all first principles; to the first premises of our knowledge, as well as to those of our conduct."26 Nonetheless, support -- that is, evidence, though not proof -- for the first premises of our **knowledge** is **provided by** "our **senses, and** our internal **consciousness.**" Mill's suggestion is that, when it comes to the first principles of conduct, desire play the same epistemic role that the senses play, when it comes to the first principles of knowledge.

To understand this role, it is important to distinguish the fact that someone is sensing something from what is sensed, which is a distinction mirrored in the contrast bet ween the fact that someone is desiring something and what is desired. In the case of our senses, the evidence we have for our judgments concerning sensible qualities traces back to what is sensed, to the content of our sense-experience. Likewise, Mill is suggesting, in the case of value, the evidence we have for our judgments concerning value traces back to what is desired, to the content of our desires. Ultimately, the grounds we have for holding the principles we do must, he thinks, be traced back to our experience, to our senses and desires. Yet the evidence we have is not that we are sensing or desiring something but what it is that is sensed or desired.

When we are having sensations of red, when what we are looking at appears red to us, we have evidence (albeit overrideable and defeasible evidence) that the thing is red. Moreover, if things never looked red to us, we could never get evidence that things were red, and would indeed never have developed the concept of redness. Similarly, when we are desiring things, when what we are considering appears good to us, we have evidence (albeit overrideable and defeasible evidence) that the thing is good. Moreover, **if we never desired** things, **we could never get evidence** that **things were good, and** would indeed **never have developed** the concept of **value.**

Recall that desire, for Mill, like taste, touch, sight, and smell, is a "passive sensibility." All of these, he holds, provide us with both the content that makes thought possible and the evidence we have for the conclusions that thought leads us to embrace. "Desiring a thing" and "thinking of it as desirable (unless for the sake of its consequences)" are treated by Mill as one an d the same, just as seeing a thing as red and thinking of it as red are one and the same. Accordingly, a person who desires x is a person who ipso facto sees x as desirable. Desiring something, for Mill, is a matter of seeing it under the guise of the good. This means that it is important, in the context of Mill's argument, that one not think of desires as mere preferences or as just any sort of motive. They constitute, according to Mill, a distinctive subclass of our motivational states, and are distinguished (at least in part) by t heir evaluative content. Thus, Mill is neither assuming nor arguing that something is good because we desire it; rather, he is depending on our desiring it as establishing that we see it as good.

At the same time, while desiring something is a matter of seeing it as good, one could, on Mill's view, believe that something is good without desiring it, just as one can believe something is red without seeing it as red. While desire is supposed to be the fundamental source of our concept of, and evidence for, desirability, once the concept is in place there are contexts in which we will have reason to think it applies even when the corresponding sensible experience is lacking. Indeed, in Chapter IV, Mill is concerned not with generating a desire, but with justifying the belief that happiness is desirable, and the only thing desirable, as an end, and so concerned with defending the standard for determining what should be desired.

Mill's aim is to take what people already, and he thinks inevitably, see as desirable and argue that those views commit them to the value of the general happiness (whet her or not their desires follow the deliverances of t heir reason). Those who, like Mill, desire the general happiness already hold the view that the general happiness is desirable. They accept the claim that Mill is trying to defend. As Mill knows, however, there are many who do not have this desire -- many who desire only their own happiness, and some who even desire that others suffer. These are the people he sets out to persuade, along with others who are more generous and benevolent, but who nonetheless do not see happiness as desirable, and the only thin g desirable, as an end. Mill's argument is directed at convincing t hem all -- whether their desires follow or not -- that they have grounds for, and are in fact already com mitted to, regarding the happiness of others as valuable as an end.

At the same time, while desiring something is a matter of seeing it as good, one could, on Mill's view, believe that something is good without desiring it, just as one can believe something is red without seeing it as red. While desire is supposed to be the fundamental source of our concept of, and evidence for, desirability, once the concept is in place there are contexts in which we will have reason to think it applies even when the corresponding sensible experience is lacking. Indeed, in Chapter IV, Mill is concerned not with generating a desire but with justifying the belief that happiness is desirable, and the only thing desirable, as an end, and so concerned with defending the standard for determining what should be desired. Mill recognizes that whatever argument he might hope to offer will need to appeal to evaluative claims people already accept (since he takes to heart Hume's caution concerning inferring an 'ought' from an 'is'). The claim Mill thinks he can appeal to -- that one's own happiness is a good (i.e. desirable) -- is something licensed as available by people desiring their own happiness. Yet he is not supposing here that the fact that they desire their own happiness, or anything else, is proof that it is desirable, just as he would not suppose that the fact that someone sees something as red is proof that it is. Rather, he is supposing that if people desire their own happiness, or see something as red, one can rely on t hem having available, as a premise for further argument, the claim that their own happiness is desirable or that the thing is red (at least absent contrary evidence). As he puts it in the third paragraph, "If the end which the utilitarian doctrine proposes to itself were not, in theory and in practice, acknowledged to be an end nothing could ever convince any person that it was so."

Thus, in appealing to the analogy bet ween judgments of sensible qualities and judgments of value, Mill is not trading on an ambiguity, nor does his argument here involve identifying being desirable with being desired or assuming that "desirable" means "desired." He is instead relying consistently on an empiricist account of concepts and their application -- on a view according to which we have the concepts, evidence, and knowledge we do only thanks to our having experiences of a certain sort. In the absence of the relevant experiences, he holds (with other empiricists), we would not only lack the required evidence for our judgments, we would lack the capacity to make the judgments in the first place. **In** the **presence of** the relevant **experience**s, though, **we have** both the concepts and the required **evidence** -- "not only all the proof which the case admits of, but all which it is possible to require."

#### 2 – Indifference – Even if there are apriori moral truths, I can choose to ignore them. Cognition is binding – if I put my hand on a hot stove, I can’t turn off my natural aversion to it.

#### The standard is maximizing expected wellbeing.

#### Prefer:

#### 1 – Pleasure and pain *are* intrinsic value and disvalue – everything else *regresses* – robust neuroscience.

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 – Actor specificity

#### A] Aggregation – every policy benefits some and harms others, which also means side constraints freeze action.

#### B] No act-omission distinction – choosing to omit is an act itself – governments decide not to act which means being presented with the aff creates a choice between two actions, neither of which is an omission

#### C] No intent-foresight distinction – If we foresee a consequence, then it becomes part of our deliberation

#### which makes it intrinsic to our action since we intend it to happen

#### 3 – Degrees of wrongness – breaking a promise to take a dying person to the hospital is worse than breaking a promise to show up to a birthday party. Only the consequence of the first explains why it’s worse than the second.

#### Reject calc indicts –

#### A] Empirically denied—both individuals and policymakers carry out effective cost-benefit analysis which means even if decisions aren’t always perfect it’s still better than not acting at all

#### B] Theory—they’re functionally NIBs that everyone knows are silly but skew the aff and move the debate away from the topic and actual philosophical debate, killing valuable education

#### 3] Extinction first under any framework:

#### A] It precludes the possibility of any kind of moral value – we can’t confer value onto anything if we’re not alive.

#### B] Future generations means infinite magnitude – we have to look towards future lives too

### 1AC: Method

#### 1] Arms Control---Challenging specific treaties on humanitarian grounds builds momentum for broader challenges to other components of the global military order.

Petrova PhD 18, Margarita H. Petrova [Assistant Professor of International Relations and International Peace and Security at the Institut Barcelona Estudis Internacionals (IBEI) (Spain), former Marie Curie Research Fellow and Max Weber Postdoctoral Fellow at the European University Institute (Italy), holds a Ph.D. in Government from Cornell University.] “Weapons prohibitions through immanent critique: NGOs as emancipatory and (de)securitising actors in security governance,” Review of International Studies, Volume 44, Issue 4, October 2018 Justin

But couldn’t NGOs be more imaginative and effective in transforming arms control and disarmament practices? It is true that ultimately their success depended on depoliticising the issues and distancing themselves from radical movements such as those animated by pacifism and a desire for total disarmament. 235 This is a distinction that NGOs involved in banning CMs and landmines often invoke. It is also true that NGOs had to make compromises and calibrate their demands in order to secure state agreement to the treaties and thereby establish the weapon stigmas. 236 A comparison of the two campaigns also shows that over time NGOs have become more professionalised, and one might say, tamed. Although the landmine campaign was never a huge grassroots movement, it still used more public advocacy and confrontational politics compared to the CM campaign. NGO members argue that this is natural as gaining access to decision-making for the most part obviates the need for outsider tactics of influence. 237 As has been pointed out, the close relationship between leading governments and NGOs does not necessarily mean the cooptation of the latter. 238 Instead, it has been key in moving the NGO agenda forward. 239 It does mean that some compromises need to be made and that change would sometimes be late to come, would come in fits and starts, and will not lead to an overhaul of the system. In practice, the success of the landmine and CM campaigns rested on not questioning the legitimacy of the use of force in general. But paradoxically, the inherent limitations of professionalised NGOs also give them a chance to make a difference in desecuritising military practices and securing vulnerable human beings. 240 The landmine and CM campaigns have also been criticised for stigmatising the weapons themselves as the agents causing suffering rather than directing their critiques at the real users and the militarised world order, thus indirectly legitimising high-tech military violence and ‘fix[ing] quite restrictive limits on the range of weapons that might be singled out for prohibition’, 241 namely, a few ‘pariah weapons’. 242 A look at a current campaign against lethal autonomous weapons, however, reveals other ways in which the previous campaigns are much more directly implicated without necessarily legitimising high-tech weaponry. NGOs made CMs and landmines the ultimate evildoers, but an underlying argument was that they were killing on their own even decades after soldiers used them. There was no human control over the ways in which landmines killed unsuspecting civilians. These were the mines banned by the MBT. Mines used in control mode with human decisions about exploding them remained legal. The same argument about the need for human control over the destructive power of weapons and ultimately human responsibility for life and death decisions animates a campaign against autonomous killing weapons led by many of the same NGOs working on landmines and CMs. 243 Although an attempt to fuse agency with the weapons is present in the campaign name, ‘Campaign to Stop Killer Robots’, this is exactly the point – weapons killing on their own should not be allowed. Rather than low-tech weapons, the campaign targets some of the most advanced systems under development in the richest military powers. It is also preventive in character rather than reactive as the landmine, and to a large extent, the CM campaigns were. Although the killer robot campaign leaves the IHL framework unquestioned, arguably it does not legitimise high-tech killing. It remains to be seen how much this campaign would achieve, but so far it has gained some traction despite its much more limited support among NGOs compared to the above cases. 244 A year after its creation in 2012, the NGO campaign managed to insert the issue in the CCW agenda where informal talks on fully autonomous weapons started in 2014. In December 2016, a formal Group of Governmental Experts was established to discuss the issue in 2017 – a step that has previously led to CCW negotiation mandates on landmines and CMs, although no progress in this direction has so far been made regarding autonomous killing weapons. 245 By the end of 2017, 22 states had signalled support for a ban 246 and activists have been optimistic that a treaty would be concluded, though it is unclear when or what it would cover. 247 It is clear, however, that without the path blazed by the previous ban treaties and without the experience campaigners had gained in humanitarian arms control negotiations and the networks they had established, the Campaign to Stop Killer Robots would not have been able to make the headway that it has. 248 Finally, using the precedent of banning landmines and CMs, NGOs ultimately turned their sights towards a total ban on nuclear weapons. In an example of ongoing immanent critique, NGOs have come full circle. At its start, the ICBL distanced itself from a full disarmament agenda and indeed argued that landmines were the real ‘weapons of mass destruction in slow motion’. Twenty years later, the question became, how is it possible that landmines and CMs are banned, but not the most indiscriminate weapons? 249 Rather than legitimating the weapons of great powers (such as advanced autonomous systems and nuclear weapons), the prior landmine and CM bans have created the conditions for challenging them. A group of NGOs energised by the example of the MBT and CCM and some of the same individuals and organisations involved in the respective campaigns have finally brought about a change in nuclear disarmament by reframing the issue around the severe humanitarian effects of any incidental or intentional explosion of nuclear weapons. 250 After a UN First Committee resolution to launch negotiations for a ban on nuclear weapons, in July 2017 a treaty banning the production, stockpiling, transfer, and use of nuclear weapons (including the threat of use) was adopted with 122 votes in favor and against the wishes of the nuclear powers and all NATO members. 251 There are considerable doubts and uncertainty about the new treaty’s ethical implications and effects on the nuclear powers, 252 on the nonproliferation regime, 253 and nuclear politics and existing power structures. 254 However, it is already an achievement in itself that the majority of states committed to negotiating such a treaty in the hopes that it would disrupt the nuclear status quo and add a legal dimension to the normative stigma against the use of nuclear weapons. And in symbolic recognition of the importance of this achievement, the International Campaign to Abolish Nuclear Weapons was awarded the 2017 Nobel Peace Prize. 255

#### 2] Representations--- Extinction isn’t white paranoia and apocalyptic reps are good

Thompson 18 [Nicole Akoukou. Chicago-based creative writer. 4-6-2018. "Why I will not allow the fear of a nuclear attack to be white-washed." RaceBaitR. http://racebaitr.com/2018/04/06/2087/#]

I couldn’t spare empathy for a white woman whose biggest fear was something that hadn’t happened yet and might not. Meanwhile, my most significant fears were in motion: women and men dying in cells after being wrongly imprisoned, choked out for peddling cigarettes, or shot to death during ‘routine’ traffic stops. I twitch when my partner is late, worried that a cantankerous cop has brutalized or shot him because he wouldn’t prostrate himself. As a woman of color, I am aware of the multiple types of violence that threaten me currently—not theoretically. Street harassment, excessively affecting me as a Black woman, has blindsided me since I was eleven. A premature body meant being catcalled before I’d discussed the birds and the bees. It meant being followed, whistled at, or groped. As an adult, while navigating through neighborhoods with extinguished street lights, I noticed the correlation between women’s safety and street lighting—as well as the fact that Black and brown neighborhoods were never as brightly lit as those with a more significant white population. I move quickly through those unlit spaces, never comforted by the inevitable whirl of red and blue sirens. In fact, it’s always been the contrary. Ever so often, cops approach me in their vehicle’s encouraging me to “Hurry along,” “Stay on the sidewalk,” or “Have a good night.” My spine stiffening, I never believed they endorsed my safety. Instead, I worried that I’d be accused of an unnamed accusation, corned by a cop who preys on Black women, or worse. A majority of my 50-minute bus ride from the southside of Chicago to the north to join these women for the birthday celebration was spent reading articles about citywide shootings. I began with a Chicago Tribute piece titled “33 people shot, seven fatally, in 13 hours,” then toppled into a barrage of RIP posts on Facebook and ended with angry posts about police brutality on Tumblr. You might guess, by the time I arrived to dinner I wasn’t in the mood for the “I can’t believe we’re all going to die because Trump is an idiot” shit. I shook my head, willing the meal to be over, and was grateful when the check arrived just as someone was asking me about my hair. My thinking wasn’t all too different from Michael Harriot’s ‘Why Black America Isn’t Worried About the Upcoming Nuclear Holocaust.” While the meal was partly pleasant, I departed thinking, “fear of nuclear demolition is just some white shit.” Sadly, that thought would not last long. I still vibe with Harriot’s statement, “Black people have lived under the specter of having our existence erased on a white man’s whim since we stepped onto the shore at Jamestown Landing.” However, a friend—a Black friend—ignited my nuclear paranoia by sharing theories about when it might happen and who faced the greatest threat. In an attempt to ease my friend’s fear, I leaned in to listen but accidentally toppled down the rabbit hole too. I forked through curated news feeds. I sifted through “fake news,” “actual news,” and foreign news sources. Suddenly, an idea took root: nuclear strike would disproportionately impact Black people, brown people, and low-income individuals. North Korea won’t target the plain sight racists of Portland, Oregon, the violently microaggressive liberals of the rural Northwest, or the white-hooded klansmen of Diamondhead, Mississippi. No, under the instruction of the supreme leader Kim Jong-un, North Korea will likely strike densely populated urban areas, such as Los Angeles, Chicago, Washington D.C., and New York City. These locations stand-out as targets for a nuclear strike because they are densely populated U.S. population centers. Attacking the heart of the nation or populous cities would translate to more casualties. With that in mind, it’s not lost on me that the most populous cities in the United States boast sizeable diverse populations, or more plainly put: Black populations. This shit stresses me out! There’s a creeping chill that follows me, a silent alarm that rings each time my Google alert chimes letting me know that Donald Trump has yet again provoked Kim Jong-Un, a man who allegedly killed his very own uncle. I’ve grown so pressed by the idea of nuclear holocaust that my partner and I started gathering non-perishables, candlesticks, a hand-crank radio, and other must-buy items that can be banked in a shopping cart. The practice of preparing for a nuclear holocaust sometimes feels comical, particularly when acknowledging that there has long been a war on Black people in this country. Blackness is bittersweet in flavor. We are blessed with the melanized skin, the MacGyver-like inventiveness of our foremothers, and our blinding brightness—but the anti-blackness that we experience is also blinding as well as stifling. We are stuck by rigged systems, punished with the prison industrial complex, housing discrimination, pay discrimination, and worse. We get side-eyes from strangers when we’re “loitering,” and the police will pull us over for driving “too fast” in a residential neighborhood. We get murdered for holding cell phones while standing in our grandmother’s backyard. The racism that strung up our ancestors, kept them sequestered to the back of the bus and kept them in separate and unequal schools still lives. It lives, and it’s more palpable than dormant. To me, this means one thing: Trump’s America isn’t an unfortunate circumstance, it’s a homecoming event that’s hundreds of years in the making, no matter how many times my white friends’ say, “He’s not my president.” In light of this homecoming, we now flirt with a new, larger fear of a Black genocide. America has always worked towards Black eradication through a steady stream of life-threatening inequality, but nuclear war on American soil would be swift.

#### 3] Scenario Analysis---develops accurate explanatory models and avoids cognitive biases

Junio and Mahnken 13 (Timothy J. Junio, postdoc @ Stanford Center for International Security and Cooperation, and Thomas G. Mahnken is a Senior Research Professor and the Director of External Programs at the Philip Merrill Center for Strategic Studies, as well as the Jerome E. Levy Chair of Economic Geography and National Security at the US Naval War College, Conceiving of Future War: The Promise of Scenario Analysis for International Relations, International Studies Review, vol. 15 iss. 3, Sep 2013 – brackets in original)

This article introduces political scientists to scenarios—future counterfactuals—and demonstrates their value in tandem with other methodologies and across a wide range of research questions. The authors describe best practices regarding the scenario method and argue that scenarios contribute to theory building and development, identifying new hypotheses, analyzing data-poor research topics, articulating “world views,” setting new research agendas, avoiding cognitive biases, and teaching. The article also establishes the low rate at which scenarios are used in the international relations subfield and situates scenarios in the broader context of political science methods. The conclusion offers two detailed examples of the effective use of scenarios. In his classic work on scenario analysis, The Art of the Long View, Peter Schwartz commented that “social scientists often have a hard time [building scenarios]; they have been trained to stay away from ‘what if?’ questions and concentrate on ‘what was?’” (Schwartz 1996:31). While Schwartz's comments were impressionistic based on his years of conducting and teaching scenario analysis, his claim withstands empirical scrutiny. Scenarios—counterfactual narratives about the future—are woefully underutilized among political scientists. The method is almost never taught on graduate student syllabi, and a survey of leading international relations (IR) journals indicates that scenarios were used in only 302 of 18,764 sampled articles. The low rate at which political scientists use scenarios—less than 2% of the time—is surprising; the method is popular in fields as disparate as business, demographics, ecology, pharmacology, public health, economics, and epidemiology (Venable, Li, Ginter, and Duncan 1993; Leufkens, Haaijer-Ruskamp, Bakker, and Dukes 1994; Baker, Hulse, Gregory, White, Van Sickle, Berger, Dole, and Schumaker 2004; Sanderson, Scherbov, O'Neill, and Lutz 2004). Scenarios also are a common tool employed by the policymakers whom political scientists study. This article seeks to elevate the status of scenarios in political science by demonstrating their usefulness for theory building and pedagogy. Rather than constitute mere speculation regarding an unpredictable future, as critics might suggest, scenarios assist scholars with developing testable hypotheses, gathering data, and identifying a theory's upper and lower bounds. Additionally, scenarios are an effective way to teach students to apply theory to policy. In the pages below, a “best practices” guide is offered to advise scholars, practitioners, and students, and an argument is developed in favor of the use of scenarios. The article concludes with two examples of how political scientists have invoked the scenario method to improve the specifications of their theories, propose falsifiable hypotheses, and design new empirical research programs. Scenarios in the Discipline What do counterfactual narratives about the future look like? Scenarios may range in length from a few sentences to many pages. One of the most common uses of the scenario method, which will be referenced throughout this article, is to study the conditions under which high-consequence, low-probability events may occur. Perhaps the best example of this is nuclear warfare, a circumstance that has never resulted, but has captivated generations of political scientists. For an introductory illustration, let us consider a very simple scenario regarding how a first use of a nuclear weapon might occur: During the year 2023, the US military is ordered to launch air and sea patrols of the Taiwan Strait to aid in a crisis. These highly visible patrols disrupt trade off China's coast, and result in skyrocketing insurance rates for shipping companies. Several days into the contingency, which involves over ten thousand US military personnel, an intelligence estimate concludes that a Chinese conventional strike against US air patrols and naval assets is imminent. The United States conducts a preemptive strike against anti-air and anti-sea systems on the Chinese mainland. The US strike is far more successful than Chinese military leaders thought possible; a new source of intelligence to the United States—unknown to Chinese leadership—allowed the US military to severely degrade Chinese targeting and situational awareness capabilities. Many of the weapons that China relied on to dissuade escalatory US military action are now reduced to single-digit-percentage readiness. Estimates for repairs and replenishments are stated in terms of weeks, and China's confidence in readily available, but “dumber,” weapons is low due to the dispersion and mobility of US forces. Word of the successful US strike spreads among the Chinese and Taiwanese publics. The Chinese Government concludes that for the sake of preserving its domestic strength, and to signal resolve to the US and Taiwanese Governments while minimizing further economic disruption, it should escalate dramatically with the use of an extremely small-yield nuclear device against a stationary US military asset in the Pacific region. This short story reflects a future event that, while unlikely to occur and far too vague to be used for military planning, contains many dimensions of political science theory. These include the following: what leaders perceive as “limited,” “proportional,” or “escalatory” uses of force; the importance of private information about capabilities and commitment; audience costs in international politics; the relationship between military expediency and political objectives during war; and the role of compressed timelines for decision making, among others. The purpose of this article is to explain to scholars how such stories, and more rigorously developed narratives that specify variables of interest and draw on extant data, may improve the study of IR. An important starting point is to explain how future counterfactuals fit into the methodological canon of the discipline. Scenarios as Future Counterfactuals Scenarios may be understood and applied through the existing and widely published framework of counterfactuals. Political scientists almost exclusively focus on historical counterfactuals, but future counterfactuals exist in the same logical space and offer additional advantages to the discipline. Richard Ned Lebow, for example, one of the few IR scholars to enter this methodological domain seriously, writes that “counterfactuals are ‘what if’ statements, usually about the past [emphasis ours]” (Lebow 2000:551). While such a definition leaves room to consider future counterfactuals, Lebow focuses on historical ones in his essay. Similarly, in Counterfactual Thought Experiments in World Politics, editors Philip Tetlock and Aaron Belkin focus on historical analysis in their counterfactuals “best practices” chapter although they are not definitionally bound to the past. For them, counterfactuals are “subjective conditions in which the antecedent is known or supposed for purposes of argument to be false” (Tetlock and Belkin 1996:4).1 Another prominent figure in the counterfactual methods literature is James Fearon, whose foundational work on the subject writes the future out of the definition: “counterfactuals make claims about events that did not actually occur” (Fearon 1991:169). Similarly, while his arguments are oriented toward the past, they are relevant for analyzing the future. For instance, when Fearon speaks of hypotheses that may not be tested due to a lack of historical data (thus requiring counterfactuals), his points are logically applicable to the future—another realm in which the desired data do not (yet) exist. One author, Steven Weber, is exceptional and articulates the perspective of scenarios as future counterfactuals. In Tetlock and Belkin's book, Weber writes of “Counterfactuals: Past and Future.” Weber argues that political scientists have a tendency to treat history as overdetermined and, like Lebow, is skeptical regarding what is considered a “fact” versus “non‐fact” in historical analysis (Lebow 2000:551). Scholars tend to think of past counterfactuals as logically distinct from future counterfactuals, according to Weber, because in the former case things have actually come to pass. Weber argues that past and future counterfactuals should be considered logically equivalent (see Figure 1) (Weber 1996:277). A common goal of counterfactual historical analysis is to manipulate one variable while trying to keep others constant. As Weber points out, manipulating one variable in a complex system often creates nonlinear consequences and interaction effects that are difficult for researchers to discern. The historical counterfactual thus exists in the same logical space as a future counterfactual; there may be greater certainty regarding some boundary conditions in the past (the Earth existed with gravity, the US Government was not overthrown in a revolution, etc.), but much of this background context may be reasonably assumed to be stable in the future. In addition to the reasonableness of such assumptions in probability terms, they are also methodologically sound, because: (i) most background conditions are not dependent or independent variables of interest in the research at hand; and (ii) if background conditions change, such as with a large exogenous shock, political scientists are likely to ask completely different research questions. Many other variables of interest, such as those affecting the stability of political, economic, and social systems, are just as tenuous in past counterfactuals as they are in future ones. Figure 1 Open in figure viewerPowerPoint Counterfactuals in Time (adapted from Weber 1996) If scenarios are counterfactuals about the future, they may be further compartmentalized to advance a methodological discussion. Following the leaders of the literature, we turn to Tetlock and Belkin, who offer a categorization scheme of five categories of counterfactuals: idiographic case studies (usually something like “what if the Black Plague had not hit Europe?”); nomothetic, which “apply well‐defined theoretical or empirical generalizations to well‐defined antecedent conditions”; joint idiographic–nomothetic counterfactuals; computer‐simulation counterfactuals; and mental‐simulation counterfactuals (for example, abstract thought experiments that seek to identify upper and lower bounds of theory) (Tetlock and Belkin 1996:6). Observed scenarios may be matched to these categories to link the literatures. For instance, future warfare and political narrative scenarios generally fall into the joint idiographic–nomothetic category, theory‐building scenarios may be of any kind (the most abstract would fall into the categories of computer or mental simulation), and scenarios inclined toward data generation/projection are largely idiographic. This categorization allows scholars to begin discussing scenarios within the language of the existing counterfactuals literature. Use of Scenarios An important starting point for the advocacy of the scenario method is to analyze how the approach fits into the political science discipline. This article introduces the results of the first extensive survey of the use of scenarios in peer‐reviewed journal articles. This survey reviewed the electronically searchable history of eleven journals (18,764 articles) and collected data on all articles that use the word “scenario” (1,559).2 Of these articles, a large majority (1,057) do not use the word “scenario” in a methodologically meaningful way; a quick rule of thumb for this coding is that an article is discounted if it uses “scenario” in a manner interchangeable with “situation.” For instance, an author writing about the “post–Cold War scenario,” meaning the world after the fall of the Soviet Union, is not using the word “scenario” in a methodologically meaningful way. The use of the word “scenario” to refer to historical counterfactuals also was not included in the survey. The remaining 502 articles were coded along the following criteria: Is the scenario a “future counterfactual”? If so, what kind of future counterfactual is it? Future warfare narrative, other political narrative, quantitative projection, theory developing, and/or theory extending? If the scenario is not a future counterfactual, what method is the author using the word “scenario” to refer to? Formal modeling, game theory, experimentation, or other? Is the scenario a “full” or “vignette” scenario?3 The survey found nine ways in which authors use the word “scenario” to refer to a methodological approach. Of these, six are types of future counterfactuals and thus within the scope of this study. The most prominent is narratives regarding future warfare. The journal International Security, in particular, has published a large number of analyses of scenarios regarding nuclear war and proliferation and during the 1980s published extensively on what a conflict between NATO and Warsaw Pact forces might look like in Central Europe (Mearsheimer 1982; Feaver, Sagan, and Karl 1997; Batcher 2004). Closely related are political narratives, such as those regarding foreign policy (for example, analyzing futures of an expanded European Union) or domestic politics in a country of foreign policy interest (for example, exploring the circumstances under which China may democratize) (Chen 2002; Yeşilada, Efird, and Noordijk 2006; Lynch 2007). Third, a small proportion of articles analyzed how scenarios were used in historical decision making, but these were not themselves scholarly uses of scenarios (Gansler 1982; Stoddart 2008). Fourth, a popular form of scenario analysis was coded as theory extension, or the use of scenarios to demonstrate how a causal process could unfold (Marchetti 2009). Fifth, a small proportion were coded as theory development, or the use of scenarios to identify and understand specified causal relationships (Reiter 1995). Finally, scenarios are sometimes developed using large data sets for quantitative projections of political trends. To build these scenarios, researchers extrapolate historical and contemporary numerical data to create visions of the future and then assess the political implications of living in that kind of world (for example, the effect of different rates of use of natural resources, strain on state capacity due to demography or disease, etc.) (McNamara 1977; Browne 2004). Political scientists also use the word “scenario” to refer to behavior that is distinct from future counterfactuals. The most common is in game theoretic or formal modeling. Political scientists often refer to stages of a game, or the game itself, as a “scenario.” For instance, the Prisoner's Dilemma has been referred to as a scenario (Fader and Hauser 1988). Statistical analyses sometimes refer to models as scenarios; for instance, one might change the values of control variables to test how a predictive model performs when a country is in a rich or poor “scenario” (Smith and Stam 2003). Finally, political experiments, particularly those regarding decision making, involve reading political narratives to survey participants to test for responses under different conditions (Mintz, Redd, and Vedlitz 2006). Researchers often refer to these narratives as scenarios although they are not necessarily counterfactuals or oriented toward the future (Table 1). Table 1. Methods Referred to as “Scenarios” In a Sample of IR Journals Category Proportion (%) Future Counterfactuals Future warfare narratives 25.9 Domestic political narratives 3.8 Foreign policy narratives 17.5 Theory building 3.6 Theory extending 5.2 Quantitative projection 2.8 Formal modeling/game theory 18.3 Experimentation 6.5 Historical analysis of future counterfactuals 14.9 This baseline understanding of the use of word “scenario” in the discipline leads to several additional insights. First, few scholars in the discipline are writing about the implications of theory for the future in a methodologically consistent and replicable way. Qualitative methods to develop and validate theories rely almost exclusively on history, for which there is some data, but which will certainly be different from future political environments. Second, scholars who systematically use future counterfactuals to evaluate theory tend to be from the field of strategic studies. This is visible both from the over‐representation of security studies articles in the survey results and the plurality of “future warfare” among types of scenarios. Third, the surveyed literature demonstrated wide variation in the quality of scenarios, and almost none of the articles that use scenarios cite methods articles. Even articles focused on political narratives and theory building generally fail to draw on the nearest companion literature, that of counterfactuals, to improve the quality of futures analysis. “Best Practices” of Scenario Analysis A common refrain among scenario methodologists is that the use of scenarios should come naturally to anyone, as it is innate, such as in humans' ability to anticipate and fear their deaths. A reasonable question to ask is, if this evolutionary advantage is omnipresent, and people are thinking about future counterfactuals all the time (“what if I lose my job?” “what if my wife finds out I'm cheating?” “what if I win the lottery?” and so on), then why bother spending time discussing how to do it better? Should not political scientists be able to apply the sorts of thought experiments they have in every other boundary of life to their scholarship? An obvious answer to these challenges is that some scenarios are better done than others, and their quality may be evaluated in the same ways as other qualitative methods. A less obvious answer is that political scientists often actively seek to turn off the speculative aspects of their minds, focusing instead on “being taken where the data go.” This is an important problem, because data on many important political questions simply do not yet exist, and the state of the field would be rather disappointing if scholars only focused on data‐rich topics. This is nowhere more obvious than the study of nuclear weapons; while there are only two observations of nuclear explosions in war, the potential for future uses is of the highest consequence. More specifically, there are zero observations of nuclear war through accident or inadvertent outcomes of bureaucratic processes, but influential works have demonstrated that speculation regarding such outcomes is made plausible through the data that are available (Blair 1993; Sagan 1995). Practically all of the extant literature regarding how to do scenario analysis stems from business literature (Chandler and Cockle 1982; Georgantzas and Acar 1995; Ringland 1998; Ogilvy 2002). The foundational work in the field is widely regarded as Peter Schwartz's The Art of the Long View. Schwartz wrote this book informed by his career of doing scenario analysis in the private sector. It is assigned in the rare academic courses that invite scenario analysis, given to civil servants being trained on the scenario method, and is cited in the couple of discussions of scenarios in political science (Weber 1996). Schwartz and other authors from the business field have tailored their recommendations to an audience conducting scenario analysis primarily to improve decision making; that is, the authors have oriented themselves to advising readers on how to have the best possible scenario conversations. In contrast, this article offers best practices for scenarios dedicated to the core interests of political scientists: developing and improving upon theory. Thinking about scenarios in regard to theory building is not entirely distinct from what the business literature seeks to accomplish, but entails a difference in emphasis. Below, we have drawn on the business literature, counterfactual methods work, and the authors' experiences using scenarios to tailor best practices advice. The core scenario process is an adapted version of Peter Schwartz's, which is also recapitulated by Steve Weber in his related book chapter (Weber 1996:279–284). How to Build a Scenario Determine what type of scenario to use As indicated in the preceding section of the article, scenarios are not uniform in their emphasis on theory and empirics. Researchers ought to choose the type of scenario using the scenario/counterfactual characterization schema presented above and based on the research question and dependent variable at hand. A quick rule of thumb is that in the absence of theory, an obvious use of scenarios is to develop theory, or at least to better understand the most important questions to ask. In this regard, scholars may benefit most from idiographic scenario vignettes used to spark a conversation about how the world could have ended up in that place. For instance, a scholar generally interested in space warfare may have few theories to work from, as most relevant thinking has taken place in the policy community, and few in traditional political science departments have considered the unique material context of such competition. The data for studying space warfare do not yet exist in a form usable for social science, and there are no general theories. A researcher, therefore, may wish to write a vignette of a future in which a breakthrough in a new space technology is (i) cheap, (ii) fast, and (iii) on the verge of diffusion from a first mover to the rest of the international system. Thinking through what must have happened to arrive in such a world, and the social and political consequences that follow, would help a scholar to set their research agenda regarding this emergent security environment. For scholars with a theory in mind, the most obvious type of scenario to use is joint idiographic–nomothetic. For instance, an economist seeking to deduce the logical future from current macroeconomic theory would be interested in a narrative that connects theoretical expectations with observed signals in the economy to project a future five years' hence. Deduce driving forces from the theory of interest, or in the absence of theory, work backward from a future story These “drivers” are the independent, intervening, and/or interactive variables of interest to the researcher. The most common drivers in scenario analysis are social, environmental, technological, economic, and political forces. For the purposes of theory building and extension, the drivers should be variables capable of taking on qualitative or quantitative measures. This means that the upper and lower limits of ordinal or continuous variables should be identified, and their maximum and minimum values should be in the same unit. Categorical variables should be clearly defined, exclusive, and finite. In the counterfactual analysis literature, one may think of this as what James Fearon calls a “range of counterfactual variation”; social and material contexts provide boundaries to what alternatives are plausible (Fearon 1991:184). For example, let us consider relative deprivation theory (in a superficial way, with our apologies to Ted Gurr) (Gurr 1970). This theory suggests that social instability follows from a group's discontent when it wants something another group within the society has (income, status, political access, etc.) and believes access to that good is possible. A scenario that seeks to extend this theory to analyze its implications in a particular society would have the relevant independent variables of interest as key drivers. The most basic key driver would be relative income in the society; the maximal value would be an extremely high discrepancy between Groups A and B (in quantitative terms, a value of 0 for some proportion based on indicators of wealth), while the minimal value would be parity (a value of 1). Identify highly probable contextual conditions for the future narrative In short, the contextual conditions are the assumptions and data (both qualitative and quantitative) that are of interest for the scenario, but that are not key drivers. This part of the scenario process asks researchers to identify the aspects of the social system of interest that they feel reasonably confident about. The explicit identification of contextual conditions usually does not include stating parts of the world that are extremely unlikely to change, such as the existence of the United States, but may well include assigning a value to something like the US force disposition in the world. For instance, in a scenario seeking to yield insight into Middle Eastern politics, a large US military presence in the region or a diminished supply of oil may be considered relevant contextual assumptions rather than independent variables. The independent variables, assigned as part of step two, might include something like the distribution of democratic and dictatorial regimes or binary coding of states' possession of nuclear weapons. Identify “critical uncertainties” These are the low‐probability, high‐impact outcomes that may follow from the theory, independent variables, and context. The idea is to identify outcomes that may be logically deduced from the theory, would have dramatic effects on the value of the dependent variable of interest, and are plausible. The interest in identifying critical uncertainties is to avoid surprise by anticipating theoretically consistent low‐probability outcomes. While critical uncertainties are generally regarded as important for policymaking, we contend they are also important for theory building, as they demonstrate logical boundaries for a theory. When these outcomes seem highly counterintuitive, they may signal a theory's limitations, such as within a particular region, or omitted variables. Sketch “plot lines” Plot lines develop the central logic of a scenario. They connect the drivers and theoretical expectations of causation. This may be done one at a time, in the case of particularly important drivers, but most scenarios should explain how multiple drivers interact to create plot lines (as in reality, there is no such thing as only one variable changing at a time in a social system). As Peter Schwartz put it, “in most good scenarios, several plot lines intersect, just as a good film often includes several subplots. The scenario planner looks at converging forces and tries to understand how and why they might intersect—then extends that imagination into coherent pictures of alternative futures” (Schwartz 1996:138). While devising a plot line comprised of multiple drivers quickly increases the complexity of the scenario, and thus the range of possible futures, the process is nevertheless superior to an attempt to be predictive by focusing on a narrow range of futures. In terms of the counterfactuals literature, one may think of plot lines as the equivalent of “principles,” which link antecedents to consequents. Write the scenario Scenario methodologists tend to refer to the scenario process as an art, not a science. Although this article seeks to improve the rigor of scenario analysis, there is a basic truth in this statement, as there is not a best way to write the resulting narrative. Scenarios also are not, as mentioned, easy to replicate. In terms of best practices for theory building, it is clear that the scenario should be explicit in its identification of the theoretical expectations of interest, key drivers, relevant contextual conditions, and hypotheses of how those drivers interact to effect outcomes. This approach at least improves the potential for replicating the scenario analysis, or minimally having a clear understanding of points of disagreement should a peer question any aspects of the variable choices, assigned values, or determined probability distribution of possible outcomes. Generate a list of evidence and structures of evidence that one might gather to assess the degree to which the social system of interest comports with the scenario‐based model, including disconfirming evidence (Schwartz 1996:60) This is, in essence, thinking about what kinds of data (measures of the variables of interest) and structures of data would help researchers to understand the probability distribution of generated futures and how the distribution might change over time. It answers such questions as, is one identified path becoming more likely due to an increase or decrease in the value of one or more of the independent variables? This stage improves (or creates) an empirical framework for analysis of the research question that prompted the scenario analysis. Re‐evaluate or begin to develop theory Finally, the point of most kinds of scenario analysis is, ultimately, to answer difficult social questions with better theories and data collection strategies. The last stage of the scenario process is to re‐evaluate what is known about existing theory given the generated scenarios. Is the theory still logically consistent? Is it able to explain the most important possible outcomes in the social system of interest? Are there key drivers of particular importance to the theory, or did some that seemed important appear to cause little variation in the scenarios? Applying Counterfactual Best Practices to Scenarios Tetlock and Belkin offer six criteria for making counterfactuals more rigorous. First, counterfactuals should have “clarity,” referring to the specification of the hypothesized antecedent and consequent. Tetlock and Belkin recommend manipulating one causal variable at a time, though they recognize it is impossible to hold other factors equal while doing so (Tetlock and Belkin 1996:19). Second, they should possess logical consistency or “cotenability,” which means specifying cotenable principles that link antecedents with consequents. Third, they should have historical consistency (which they also call the “minimal‐rewrite rule”), which suggests the chosen antecedents should alter as few “well‐established” historical facts as possible. In terms of future counterfactuals, this is most relevant to the selection of contextual conditions, which should be as uncontroversial to intended audiences as possible. An easy shorthand is to treat contextual conditions as constants and to assign them values that are well demonstrated in the present. Fourth, counterfactuals should be theoretically consistent, meaning that the connecting principles are consistent with theoretical generalizations that lead to the links between antecedents and consequents. Fifth, they should possess statistical consistency or articulating principles that are consistent with “well‐established” statistical generalizations. Last, they should have projectability or the identification of implications of connecting principles (hypotheses) that may be tested with new data (Tetlock and Belkin 1996:18–31) (Table 2). Table 2. Bridging Tetlock and Belkin's Counterfactual Evaluation Criteria and the Scenario Method Counterfactual evaluation criteria Scenario best practices Clarity Consistent with clearly recording underlying assumptions, key drivers, and relevant context in scenario development Logical consistency/cotenability Consistent with requiring drivers and logics to logically coexist in a scenario Historical consistency Differs from scenario approach. Scenarios are about future “histories”; they are uniquely written, not re‐written Theoretical consistency Consistent with deductive scenario analysis used to extend or build upon existing theory Statistical consistency Not immediately clear Projectability Consistent with our recommended practices of teasing out key drivers and considering new kinds of data (and data structures). We add to this a synergistic view of the drivers; a “logic” to the scenario should include interactions between the newly identified Avoiding Potential Pitfalls The first potential pitfall of scenario analysis is the “garbage in, garbage out” (GIGO) problem. Scenarios are likely to suffer from GIGO problems under several circumstances. First, and most commonly, scenarios are sometimes not used to extend and develop theory, but rather to reinforce the existing views of the author. This may happen should a researcher choose to ignore theoretically relevant values of the independent variables based on a conclusion that such values are “implausible.” Another way of conceiving of this problem is whether or not the scenario process is a recapitulation of the “official future,” as Schwartz has dubbed it (Schwartz 1996:237). The “official future” is a scenario author's operating mind‐set regarding what they perceive as the most probable future.4 Adherence to beliefs about an “official future” is similar to an “anchoring bias,” whereby a subject has difficulty updating original beliefs in the face of new information (discussed further in the next section of this article). Second, the independent variables may be chosen poorly to begin with; this is more of a consequence of not taking the scenario process seriously rather than a cognitive bias toward a particular outcome. Third, in scenarios that use data, the data simply may be bad (for example, pollution projections based on faulty assumptions or bad statistics, bias in a survey design, etc). The simplest way to correct for GIGO is to have other people involved in the scenario‐building process, particularly those from different epistemological and cultural backgrounds. In other words, one should implement a peer review process as part of scenario development. The easiest corrective within reach of political scientists is their students, who are in general less likely to be wedded to particular theoretical/methodological perspectives. Other options include colleagues in other disciplines, who are likely to think about the question of interest in a dramatically different way, thus generating different drivers. A second possible pitfall of the scenario method is poor replicability, a topic of high importance to positivist approaches to social science. Explaining one's coding and other such relevant aspects of research design has now become standard practice, even for qualitative methods that are difficult to replicate. Scenarios are almost surely less replicable than case studies. While case studies at least have footnotes, only the data/contextual aspect of scenarios is replicable. The identification of key drivers and plotlines is a highly subjective process. The best advice in this regard is that a large degree of subjectivity is inherent in the scenario process, and clarity and transparency are absolute necessities. A reader should be able to follow along when reading the scenario and understand the relationship between assumed contextual data, stipulated values on the independent variables, the interaction of those variables, and the logic of how the interaction effects a value on the dependent variable. A third pitfall of scenarios is to try to engage with too many causal processes at once. One of Peter Schwartz's important rules regarding scenarios, which Steve Weber echoes, is to limit the complexity of a scenario such that no more than three or four key drivers are subject to change at once (Schwartz 1996:140; Weber 1996:283). While for some kinds of research (particularly the articulation of world views) it is important to look at these critical intersections of trend lines, scenario methodologists persuasively argue that seeking to do too much in one scenario quickly makes the effort futile. The reason for this is simple and should be resonant to any scholar: the human mind has difficulty handling a large number of causal processes at once. While it is tempting to make highly stylized versions of the future in which many political forces are moving together, a potential problem is to, in Tetlock and Lebow's words, “assign too much subjective probability to too many scenarios” (Tetlock and Lebow 2001). The inability to simultaneously understand many causal processes is a common problem of social science research. Consider, for instance, the dizzying array of causal arguments made regarding the origins of World War I. Competent and bright scholars have argued that the war was instigated by power differentials, alliance systems, the personalities of political leaders at the time, offense dominance, perceptions of offense dominance, rigid military plans, and domestic politics in Germany, among others (Lebow 1981; Sagan 1986; Snyder 1994; Van Evera 1999; Copeland 2000; Mansfield and Snyder 2007). Historical data lend credence to each of these arguments, and scholars must make individual judgments regarding how to rank the causes. The interaction of these various levels of explanation, unfortunately, has proven overly complex for political scientists to handle. Instead, the discipline offers contrasting perspectives (for example, IR professors often focus on system‐level explanations, while historians tend to lean toward individual‐level arguments) (Fearon 1991:189–193).5 Finally, in another form of analytic overreach, scenario authors often excitedly focus on highly improbable, high‐impact events. Richard Ned Lebow has memorably referred to these as “miracle counterfactuals” (Lebow 2000:565). Correcting for this problem is very difficult, as it involves high degrees of subjectivity when estimating the probabilities of many possible outcomes. Another problem is that the very topics the scenario method ought to assist with—those with no data—are often low‐probability, high‐impact events (for example, nuclear warfare, plagues, large‐scale cyber attack, etc.). Consider, for example, the potential to include a highly consequential new technology in a scenario. What makes one technological success more plausible than another? The quickest decision rule is simply to focus on technologies that have a basis in existing materials and understandings of basic sciences and that are presently being researched and developed. For example, a scenario in which humans are able to instantaneously transport anywhere around the globe would not meet a threshold for plausibility, because there is presently no understanding of physics that would allow for such a feat, and this kind of new understanding would have to precede the development of a teleportation device. An example of a plausible breakthrough would be the wide accessibility of a currently available technology (for example, malaria vaccination) due to decreasing costs of production and transportation and/or increasing amounts of funding. This sort of trend line is plausible in terms of materials and biology. An example of a subjective plausibility judgment would involve something like a scenario in which a cheap HIV vaccine were developed. Biological researchers may have the materials and a conceptual framework by which such a vaccine would come to exist (hence early testing of such vaccines), but as the clinical effectiveness remains unproven, one could make a convincing argument against the plausibility of the scenario.6 In the end, then, we may only recommend that researchers remain aware of this pitfall, have thought about decision rules to justify their choices, and offer a clear articulation of those rules (Elster 1978). Advantages of Scenario Analysis for Political Scientists As noted in our discussion of the counterfactuals literature, most scholars writing about the method focus on history. We argue that future counterfactuals may assist scholars in the same ways as historical ones and offer additional benefits. Scenarios may be useful for theory building and development, identifying new hypotheses, analyzing data‐poor research topics, articulating “world views,” setting new research agendas, avoiding cognitive biases, and teaching. Theory Building and Development The structured analysis of future counterfactuals offers a unique approach for the study of causal effects in social systems. The first category, and perhaps most significant, is the ability of researchers to use scenarios to identify variables of interest and consider ways to measure them. This is an approach sometimes recommended for qualitative research; it consists of writing a notional depiction of what a case study might look like. This exercise helps researchers to think through what variables are of greatest interest, what values those variables might take on, and how they interact to cause values of the dependent variable. Scenario analysis is one way in which researchers may conduct such a notional case study. Rather than introduce a timeless or historical vignette regarding fictional circumstances, the researcher may find it beneficial to place their case in the future. This helps orient the research project toward current and anticipated political issues—thus increasing the relevance of the work—even if the actual case studies are historical. Thinking through the causal process in this way helps the researcher to identify a wider range of explanatory variables, including those that have not yet occurred or may be of very low probability (but are still consistent with existing or proposed theoretical arguments). Scenario analysis also helps the researcher to consider the range of values that the identified independent variables may take on, as exploration of different “worlds” pushes the boundaries of the researcher's predispositions going into the research project. Robust scenario analysis thus helps the researcher to identify the upper and lower bounds of their theory. Second, a commonly cited advantage of counterfactual reasoning that is useful for this process of theory building is a researcher's attempt to manipulate one variable in a causal process while holding others constant, thus isolating the effects of different values of the independent variable on the dependent variable. Manipulating one variable at a time to do a better job of analyzing causal processes is often very difficult to do, as, in the real world, interactions between variables often lead to unpredictable and nonlinear outcomes (Jervis 1997:34–60). For instance, a scholar conducting an analysis of tax rates and other domestic legislation regarding oil may use a counterfactual of a different average oil price in the 1970s. Such a counterfactual would have some fairly obvious implications for the domestic political question, but a world in which that one variable were manipulated would have a large number of equally plausible second‐ and third‐order consequences for regional politics in the Middle East. Those consequences could conceivably feed back into domestic US politics, thus affecting the social system under analysis in a way the researcher may not have controlled for in the original scenario. Despite these acknowledged difficulties in using a “manipulate one variable” approach for the purpose of assaying real‐world policy options, it is a useful input to the processes of building theory and research design. The best defense of such an approach is that all forms of modeling involve abstractions from reality, and even highly unrealistic models—such as James Fearon's famous ideal condition in which war should never occur—are useful for studying real events (Fearon 1995). Furthermore, manipulating one variable at a time is more appropriate to some kinds of counterfactual reasoning than others. Consider the three main categories of scenario use: political narratives, game theory and formal modeling, and experimentation. The “manipulate one variable” approach seems least useful to political narratives, which often try to tackle such tough questions as “What is the future of the international system?” Although scenarios offer advantages to developing and extending theory in regard to these sorts of questions, particularly in assessing key drivers and articulating world views (discussed in the next subsections), a scientific approach of controlling for various social factors is unlikely to succeed. In these projects, manipulating one variable at a time serves only to develop one of many possible futures in the interest of extending the range of the theory's explanatory power. On the other hand, the “manipulate one variable” approach offers more direct advantages for formal modeling and experimentation. The reasoning for each follows a comment made by Elinor Ostrom in her 1997 American Political Science Association presidential address. Ostrom suggested that “from…scenarios, one can proceed to formal models and empirical testing in field and laboratory settings” (Ostrom 1998). The experimental method with human subjects benefits strongly from the use of scenarios. In one study of how values factor into Americans' economic decision making, a team of researchers sought to “attribute significant differences in average responses between conditions to the independent variables manipulated in the hypothetical scenario; that is, to the factors intuitive neorealists should weigh heavily and intuitive economists should weigh lightly” (Herrmann, Tetlock, and Diascro 2001). That is to say, one variable related to individuals' world views could be manipulated at once in the experiment, and the researcher may test for the significance of variance between the test and control groups. After using scenarios to better identify variables of interest and the role of their specific values in a causal process, a third category of applications of scenario analysis to theory building is to develop new hypotheses and ways to test them. This follows from using scenarios to identify new independent variables and how their values may effect changes on the dependent variable; each new causal argument may (and should) be expressed as a hypothesis to be tested in the broader research project for which the scenario analysis was developed. Additionally, “day‐after” scenarios that seek to walk back the causal processes that may have led to a consequential event are particularly well suited to developing hypotheses (Holmes and Yoshihara 2008). By definition, this type of scenario analysis seeks to discover causal pathways. For instance, one might seek to chart various paths by which a particular type of social revolution may occur in a country of interest. Each narrative of how such a revolution could come to pass would result in at least one hypothesis regarding the links between the many variables of interest. These hypotheses may then be tested against historical data or used to develop new kinds of data collection methods (discussed further in the next section). Finally, scenario analysis helps to explore completely new theoretical projects in a deductive way, whereas a great deal of qualitative work in political science tends to be inductive from the case study method. The use of scenario analysis may help scholars to pursue an “abductive,” or hybrid, method of theory building that draws on both deductive reasoning and insights from cases (Mayer and Pirri 1995). For example, a data‐poor research subject, such as how states may respond to computer network attack, has few historical precedents (Mahnken 2011; Rid 2012). If a researcher were interested in identifying the circumstances under which states are more likely to resort to violence in response to cyber attack, he would be confounded by the problem that never in history has a state responded with violence to such an attack. Scenario analysis beginning with the value of violent counter‐attack on the dependent variable (the DV being a state's strategy choice) would help the researcher to deduce likely circumstances under which such an outcome may occur. Historical analysis, such as regarding other kinds of information threats, would be helpful for such a project, but the differences between cyber and other kinds of information transmission would result in an incomplete causal narrative based on inductive reasoning alone. Data‐Poor Research Topics Scenarios are a useful method for theory building and research design for topics that, despite being of high importance, lack an empirical base. The best example of this type of research is scholarship on nuclear warfare. An enormous literature evolved during the Cold War regarding how a nuclear war might be fought and how escalation dynamics might occur (Kahn 1962; Brown and Mahnken 2011). This literature was based almost exclusively on future counterfactuals, as there were no nuclear wars to study and a very low “n”—consisting of the Cuban Missile Crisis and very few other crises—for publicly acknowledged “close calls” (Sagan 1995). Indeed, in our survey of the use of scenarios in the discipline, more than 25% were about nuclear warfare. Other topics that are of high importance but have a very low or zero “n” include great-power war, global epidemics, climate change, large-scale cyber attack, and weapon of mass destruction terrorism. The points made earlier regarding the identification of new variables and hypotheses are relevant here. In addition to these advantages to new research topics, scenario analysis helps to identify new sources of data. This is partially because scenarios help to identify new independent variables, thus leading the researcher to think about how to measure their values, but also by helping him to think of proxies for measurement when direct observation is not possible. For instance, a day-after analysis of a scenario of interest would cause the researcher to ask what he would have needed to know to predict the occurrence of the future counterfactuals and in turn help the researcher to think about ways in which the discipline could identify that low-probability process if it begins to happen in the real world.

#### 4] Death bad—non-experience is a negative evil—their evidence doesn’t assume premature death which they cause

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Death might be very bad for the one who is dead. If death deprives ~~him~~ of a lot of pleasure—the pleasure he would have enjoyed if he had not died—the death might be a huge misfortune for someone. More explicitly, death might be extrinsically bad for the one who is dead even though nothing intrinsically bad happens to ~~him~~ as a result. In my view, death would be extrinsically bad for ~~him~~ if ~~his~~ life would have contained more intrinsic value if ~~he~~ had not died then (Ibid, p. 140). This is a tricky issue. On the one hand, someone might claim that even a negative evil has to happen to someone, and the dead person who no longer exists is no longer a “somebody” to experience the evil, so there shouldn’t be any subjective harm. On the other hand, it is a powerful intuition that death deprives the dead of something, somehow. Nagel tries to resolve this problem by claiming that the person who used to exist can be beneﬁted or harmed by death, and tries to show that our intuitions are in harmony with this idea. For instance, he claims we could and would say of someone trapped in a burning building who died instantly from being hit on the head rather than burning to death, that the person was lucky, or better off, for having died quickly. Of course, after dying from the head trauma, there was no one in existence who was spared the pain of burning to death, but Nagel claims that the “him” we refer to in such an example refers to the person who was alive and who would have suffered (Nagel, 1987). Nagel believes the person subjectively beneﬁted, although no subject was there to receive the beneﬁt. It would be easier to understand this objectively in terms of the qualitative assessment of Feldman; however, that is not Nagel’s position. Similarly, if someone dies before seeing the birth of a grandchild, and there is no life after death, there is no person in existence who is presently being deprived of anything at all, including, of course, births of grandchildren. But the person who was alive and who would have seen it, if not for death, has counterfactually and subjectively missed out on something. The same kind of thing could be said about death as a negative evil. When you die, all the good things in your life come to a stop: no more meals, movies, travel, conversation, love, work, books, music, or anything else. If those things would be good, their absence is bad. Of course, you won’t miss them: death is not like being locked up in solitary conﬁnement. But the ending of everything good in life, because of the stopping of life itself, seems clearly to be a negative evil for the person who was alive and is now dead. When someone we know dies, we feel sorry not only for ourselves but for him, because he cannot see the sun shine today, or smell the bread in the toaster (Ibid, p. 93). This is admittedly a confusing concept: the idea that one can be negatively harmed or beneﬁted even when one does not exist, but it is a concept Nagel claims is intuitively powerful for us, and which Feldman supports. It is confusing because of its counterfactual base; that a subject experiences harm or good even though there is no subject. It is intuitive because we do talk and think in terms of what it would have been for someone to experience. What these two articulations may show is that counterfactuals are being used in different ways, with the intuitive version masking a lot of the work of the counterfactual harm version. In response to the problem of locating when death is a problem for someone, Feldman claims that a state of affairs can be bad for someone regardless of when it occurs: “The only requirement is that the value of the life he leads if it occurs is lower than the value of the life he leads if it does not occur” (Feldman, 1992, p. 152). The comparison is between the respective values of two possible lives. The state of affairs pertaining to someone dying at some particular time, is bad for that person, if “the value-for-her of the life she leads where [that state of affairs] occurs is lower than the value-for-her of the life she would have led if [that state of affairs] had not taken place” (Ibid, p. 155). When is it the case that the value-for-her of her life would be comparatively lower? Eternally. Eternally, as opposed to at any particular moment, because “when we say that her death is a bad for her, we are really expressing a complex fact about the relative values of two possible lives” (Ibid, p. 154). Lives taken as a whole, that is. It seems that Feldman is offering an objective qualitative analysis here, which may be addressing a different component than Nagel’s subjective argument does. If we take the two arguments together, they may offer a rather compelling account of why deprivation is a bad thing in an abstracted sense. We should not forget, however, that a possible life is not a life that is lived or being lived. In that way, they both lose a bit of their intuitive force. In another attempt to undermine the Epicurean argument that death is not a bad thing but one that focuses upon one’s actual desires and interests, we may turn to Nussbaum’s work. Adding to an argument already developed by David Furley, Nussbaum argues that death is bad for the one who dies because it renders “empty and vain the plans, hopes, and desires that this person had during life” (Nussbaum, 1994). As an example, consider someone dying of a terminal disease. Subjectively, the terminally ill person is unaware of this fact, though some friends and family do know. This person plans for a future that, unbeknownst to him, will be denied him, and, to the friends and relatives who objectively know, “~~his~~ hopes and projects for the future seem, right now, particularly vain, futile, and pathetic, since they are doomed to incompleteness” (Ibid). Moreover, the futility is not removed by removing the knowing spectators. “Any death that frustrates hopes and plans is bad for the life it terminates, because it reﬂects retrospectively on that life, showing its hopes and projects to have been, at the very time the agent was forming them, empty and meaningless” (Ibid). Nussbaum is making an interesting move here. She is collapsing the subjective and objective views, such that if the agent were aware, ~~his~~ projects would change and mirror reality. ~~He~~ would realize that ~~his~~ interests cannot be realized, and would change ~~his~~ interests, and live out his days with an accurate assessment of his interests and mortality. Nussbaum appreciates this argument because it shows how death reﬂects back on an actual life, and our intuitions do not depend on “the irrational ﬁction of a surviving subject” (Ibid, p. 208). This argument is in harmony with Nagel’s claim that death can be bad for someone—even if that someone no longer exists. And, because it is rooted in the feared futility of our current projects, it is not vulnerable to the “asymmetry problem” (i.e., the alleged irrationality of lamenting the loss of possible experience in the future due to “premature” death, but not lamenting the loss of possible experience in the past due to not having been born sooner) since the unborn do not yet have any projects subject to futility. Nussbaum adds, to this argument, however, by appealing to the temporally extended structure of the relationships and activities we tend to cherish. A parent’s love for a child, a child’s for a parent, a teacher’s for a student, a citizen’s for a city: these involve interaction over time, and much planning and hoping. Even the love or friendship of two mature adults has a structure that evolves and deepens over time; and it will centrally involve sharing futuredirected projects. This orientation to the future seems to be inseparable from the value we attach to these relationships; we cannot imagine them taking place in an instant without imagining them stripped of much of the human value they actually have. . . . Much the same, too, can be said of individual forms of virtuous activity. To act justly or courageously, one must undertake complex projects that develop over time; so too for intellectual and creative work; so too for athletic achievement. . . . So death, when it comes, does not only frustrate projects and desires that just happen to be there. It intrudes upon the value and beauty of temporally evolving activities and relations. And the fear of death is not only the fear that present projects are right now empty, it is the fear that present value and wonder is right now diminished (Ibid, p. 208–209). This argument also helps to explain our intuition that death is especially tragic when it comes prematurely. While we might grieve the death of someone at any age, it seems especially bad when it is a child, or a young adult, that died. We sometimes explicitly state this in terms of the deceased having “so much left to do,” or having their “whole lives ahead of them.” It is not that death is unimportant when it is the elderly who die, but that, in many cases, the elderly have already had a chance to accomplish goals they have set for themselves. Indeed, many times those who face impending death with tranquility are those who can say, of themselves, that they have already lived a long, full life—while the elderly who most lament death are those who regret what they have failed to do in the time they had. “It is those who are most afraid of having missed something who are also most afraid of missing out on something when