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#### The portrayal of space debris is rooted in a militarized approach to the future that culminates in the full-spectrum dominance of the globe.

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(Joshua Ozias, PhD from the University of Michigan: “The Wrong Stuff”, chapter 4 of Military Waste: The Unexpected Consequences of Permanent War Readiness Univ of California Press, Feb 4, 2020 Pg. 127-130)DR 19

**Space debris** can be dangerous to orbiting vessels and, as such, it represents an ever-growing hazard to human uses of Earth space. But these objects are hard to track and easy to mistake for something else, even for people who spend all of their time looking up at the night sky. Like space exploration itself, this is a difficult problem to solve, so it is not surprising that **only the most powerful and prominent space agencies imagine they are capable of finding space debris**, let alone clearing it from orbital environments. A core dimension of that power and prominence, moreover, is about having military ambitions that extend beyond the surface of the planet. And, **from the very beginnings**, doing so has meant enrolling amateur or civilian scientists in DoD plans for outer-space. Historically, **solving space-related challenges has meant getting funds and resources from wealthy and powerful nations**. **With the growth of** a permanent war economy, **such expenditure** is very often **tied** **to** imagined or real military applications. Consequently, the history of space exploration has been and continues to be shaped by tensions and networks between **civilian and military** scientific objectives. But these seemingly opposed **groups** also align and become indistinguishable, especially insofar as they embrace a fascination with developing the latest technology and an unrelenting faith in its ability to solve all problems. This is also known as techno-solutionism. Evgeny Morozov (2013) developed this idea related to utopian appraisals of the internet. His account draws heavily on **Hannah Arendt’s** *On Violence* (1970), a book which openly criticizes **US administrations** that thought they could solve global problems through technically ingenuous forms of death and destruction. Broadly defined, techno-solutionism is faith that technical fixes can solve any problem…even when they are targeting a realm like **outer space**, one that is already saturated with the leftovers of generations of technological problem-solving. According to Gökçe Günel (2019, 129), any technical adjustment is not only about “functionality, effectiveness, or use, but rather the ways in which its materially and conceptually indeterminate existence mobilizes potential towards a technically adjusted future.” In this sense, **technical fixes for space debris are more about extending the possibility of future technical intervention in orbital environments**, rather than, for instance, **encouraging ethical reflection** on whether people should create debris at all. Space debris is not just any problem, it is **one that originated** **with** and threatens **space science** and, as such, shows the limits of technical solution-making in general. If it is problematic to see space debris as a technical glitch, as noise in an otherwise perfectly rendered human design, that is because such a view can **mislead us** into thinking that all it takes is a little more ingenuity, a bit more mastery, to solve the problem entirely. But, following Virilio (2007), every new technical innovation and improvement brings a new disaster, an unprecedented act of contamination. If **space debris represents inevitable traces** that human artifacts and projects leave behind in the space beyond Earth, then, whatever the future may hold, this problem is unavoidable. If people want to continue to escape their earthly confines, space debris will have to be reckoned with. Space debris is a possibility that haunts all uses of space *tout court*, rather than an incidental by-product of space exploration and travel. A focus on technical mastery links the cause of space debris with its proposed cure. As a counterpoint, I discuss how amateur astronomers and ham radio operators have engaged with space debris in a different manner and with altogether different goals. Specifically, they tend to look for ways to become attuned with and enliven debris that has been abandoned. Militarizing Civilian Science The possibility of a semiautonomous civilian space agency had defined space exploration from the start, but by the 1970s and ‘80s, funding had dropped precipitously from the heyday of the Apollo missions. By that time, NASA had come under widespread criticism as the country entered recession and other big programs (such as the CIA) and national initiatives (the War on poverty, Civil Rights Legislation, the Vietnam War) were attacked by political representatives and activists across the political spectrum. The prominent images that NASA members used to promote the organization during the 1960s was that of pragmatism, that space efforts would yield scientific benefits. This failed to improve the prestige of the organization within the government, until the Reagan era, when there was a resurgence of nationalist and romanticist rhetoric from earlier in NASA’s history. With the Reagan administration there was an effort, first, to block international efforts to ban weapons use in outer space and, second, to invest new symbolic importance and new financial resources in the militarization of space. Since that time, **solving space debris has become a common pursuit** of space agencies all over the world, both the more militarized and the more civilian among them. By the early 1980s, **satellites were central infrastructure**, particularly for the United States. The militarization of space had already occurred, in other words, and **without extravagant laser weapons**. Consequently, among the most central issues of the time was the testing and development of antisatellite weaponry (ASAT). The use of experimental ASAT has been partly responsible for reorienting international attention to space debris, since ASAT is a spectacular technology, the goal of which is to transform working satellites into unusable waste. Since satellites were so vulnerable to attack, and space treaties did not allow for the defense of particular regions of space as sovereign territory, satellites could be destroyed simply by sending “space mines” to collide with them. This constitutes one clear reason why DARPA and the Air Force are so intent on tracking space debris—they want to know whether satellites colliding with unidentified objects represent coincidental hazards or deliberate attacks. Being able to tell the difference between space debris and an actively launched space mine would be like knowing whether an ocean vessel sank because of an iceberg or a submarine. Even if one cannot capture space debris, being able to detect and identify it might be **necessary to predict or avoid war**. The ambiguities of witnessing discussed in the previous section, not knowing what one is seeing, therefore take on perilous consequences. While Reagan’s “Star Wars” and Trump’s “Space Force” have been heavily discussed and derided, other administrations have had similar designs. Perhaps most enduring has been the Clinton-era concept of *full-spectrum dominance*, first outlined in the United States Space Command “Vision for 2020” released in 1997. This relationship between outer space and defense and security has been so central to US policy that prominent advocates for science, notably Neil deGrasse Tyson, have authored reports suggesting that **NASA could be restored to its former glory by becoming more like DARPA**, that is, the militaristic organization it was partly created ***not to become***. In many ways the DoD’s Defense Advanced Research Projects Agency (**DARPA) is the epitome of techno-solutionist practice**. Though the term *defense* was only added to the acronym later (it was termed ARPA until 1972), **the agency was always closely linked to military interests and problem-solving**. In management studies, the concept of problems that are “DARPA-hard” has become widespread, with websites baiting visitors to see whether their company’s challenges would come close to qualifying. According to Leifer and Steinert (2011, 159), there are four criteria for the agency to consider something DARPA-hard: 1. Technically challenging (beyond current limits); 2. Actionable (proof of concept or prototype); 3. Multidisciplinary (complex); and 4. Far-reaching (advances on a grand scale, radical). At the turn of the century, **DARPA** clearly **determined that solving orbital space debris met these criteria**. Space debris fragments **exceeded the capabilities of the Air Force’s Space Surveillance Network** (SSN), it would take work with specialists from various fields, and the achievement of a solution would be legitimately global in impact. The only thing missing was proof of concept. Their first attempt at a solution was to work with MIT aeronautics labs to develop a specialized telescope to detect faint objects. In 2011, DARPA unveiled a massive new telescope, the Space Surveillance Telescope (SST), specially developed with MIT labs to identify space debris. In contrast with what DARPA spokespersons described as the “soda straw approach” of existing telescopes, the SST would allow wide-angle shots of the night sky, made possible by a much larger aperture and an advanced visual processing system. **In at least one report** provided to NBC, moreover, cleaning up space debris was linked directly with military objectives.

#### Security is a psychological construct- the aff’s scenarios for conflict are products of paranoia that project our violent impulses onto the other. Claims of war and conflict create a false dichotomy between the good us and the evil them, ignoring our role in provoking the aggression.

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(John, former Professor of Psychology at Harvard and Pulitzer Prize Winner, <http://johnemackinstitute.org/1988/08/the-enemy-system-short-version/>) BW

The threat of nuclear annihilation has stimulated us to try to understand what it is about mankind that has led to such self-destroying behavior. Central to this inquiry is an exploration of the adversarial relationships between ethnic or national groups. It is out of such enmities that war, including nuclear war should it occur, has always arisen. Enmity between groups of people stems from the interaction of psychological, economic, and cultural elements. These include fear and hostility (which are often closely related), competition over perceived scarce resources,[3] the need for individuals to identify with a large group or cause,[4] a tendency to disclaim and assign elsewhere responsibility for unwelcome impulses and intentions, and a peculiar susceptibility to emotional manipulation by leaders who play upon our more savage inclinations in the name of national security or the national interest. A full understanding of the “enemy system”[3] requires insights from many specialities, including psychology, anthropology, history, political science, and the humanities. In their statement on violence[5] twenty social and behavioral scientists, who met in Seville, Spain, to examine the roots of war, declared that there was no scientific basis for regarding man as an innately aggressive animal, inevitably committed to war. The Seville statement implies that we have real choices. It also points to a hopeful paradox of the nuclear age: threat of nuclear war may have provoked our capacity for fear-driven polarization but at the same time it has inspired unprecedented efforts towards cooperation and settlement of differences without violence. The Real and the Created Enemy Attempts to explore the psychological roots of enmity are frequently met with responses on the following lines: “I can accept psychological explanations of things, but my enemy is real. The Russians [or Germans, Arabs, Israelis, Americans] are armed, threaten us, and intend us harm. Furthermore, there are real differences between us and our national interests, such as competition over oil, land, or other scarce resources, and genuine conflicts of values between our two nations. It is essential that we be strong and maintain a balance or superiority of military and political power, lest the other side take advantage of our weakness”. This argument does not address the distinction between the enemy threat and one’s own contribution to that threat-by distortions of perception, provocative words, and actions. In short, the enemy is real, but we have not learned to understand how we have created that enemy, or how the threatening image we hold of the enemy relates to its actual intentions. “We never see our enemy’s motives and we never labor to assess his will, with anything approaching objectivity”.[6] Individuals may have little to do with the choice of national enemies. Most Americans, for example, know only what has been reported in the mass media about the Soviet Union. We are largely unaware of the forces that operate within our institutions, affecting the thinking of our leaders and ourselves, and which determine how the Soviet Union will be represented to us. Ill-will and a desire for revenge are transmitted from one generation to another, and we are not taught to think critically about how our assigned enemies are selected for us. In the relations between potential adversarial nations there will have been, inevitably, real grievances that are grounds for enmity. But the attitude of one people towards another is usually determined by leaders who manipulate the minds of citizens for domestic political reasons which are generally unknown to the public. As Israeli sociologist Alouph Haveran has said, in times of conflict between nations historical accuracy is the first victim.[8] The Image of the Enemy and How We Sustain It Vietnam veteran William Broyles wrote: “War begins in the mind, with the idea of the enemy.”[9] But to sustain that idea in war and peacetime a nation’s leaders must maintain public support for the massive expenditures that are required. Studies of enmity have revealed susceptibilities, though not necessarily recognized as such by the governing elites that provide raw material upon which the leaders may draw to sustain the image of an enemy.[7,10] Freud[11] in his examination of mass psychology identified the proclivity of individuals to surrender personal responsibility to the leaders of large groups. This surrender takes place in both totalitarian and democratic societies, and without coercion. Leaders can therefore designate outside enemies and take actions against them with little opposition. Much further research is needed to understand the psychological mechanisms that impel individuals to kill or allow killing in their name, often with little questioning of the morality or consequences of such actions. Philosopher and psychologist Sam Keen asks why it is that in virtually every war “The enemy is seen as less than human? He’s faceless. He’s an animal”.” Keen tries to answer his question: “The image of the enemy is not only the soldier’s most powerful weapon; it is society’s most powerful weapon. It enables people en masse to participate in acts of violence they would never consider doing as individuals”.[12] National leaders become skilled in presenting the adversary in dehumanized images. The mass media, taking their cues from the leadership, contribute powerfully to the process. The image of the enemy as less than human may be hard to dislodge. For example, a teacher in the Boston area reported that during a high school class on the Soviet Union a student protested: “You’re trying to get us to see them as people”. Stephen Cohen and other Soviet experts have noted how difficult it is to change the American perception of the Soviet Union, despite the vast amount of new information contradicting old stereotypes.” Bernard Shaw in his preface to Heartbreak House, written at the end of World War I, observed ironically: “Truth telling is not compatible with the defense of the realm”. Nations are usually created out of the violent defeat of the former inhabitants of a piece of land or of outside enemies, and national leaders become adept at keeping their people’s attention focused on the threat of an outside enemy.[14] Leaders also provide what psychiatrist Vamik Volkan called “suitable targets of externalization”[10] – i.e., outside enemies upon whom both leaders and citizens can relieve their burdens of private defeat, personal hurt, and humiliation.[15] All-embracing ideas, such as political ideologies and fixed religious beliefs act as psychological or cultural amplifiers. Such ideologies can embrace whole economic systems, such as socialism or capitalism, or draw on beliefs that imply that a collectivity owes its existence to some higher power in the universe. It was not Stalin as an individual whom Nadezhda Mandelstam blamed for the political murder of her poet husband Osip and millions of other citizens but the “craving for an all-embracing idea which would explain everything in the world and bring about universal harmony at one go”.[16] Every nation, no matter how bloody and cruel its beginnings, sees its origins in a glorious era of heroes who vanquished less worthy foes. One’s own race, people, country, or political system is felt to be superior to the adversary’s, blessed by a less worthy god. The nuclear age has spawned a new kind of myth. This is best exemplified by the United States’ strategic defense initiative. This celestial fantasy offers protection from attack by nuclear warheads, faith here being invested not in a god but in an anti-nuclear technology of lasers, satellites, mirrors, and so on in the heavens.

#### Catastrophe scenarios program us affectively to accept violence and dehumanization

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Anybody who has experienced immunization will appreciate the violence of the encounter. The whole process begins with the awareness of some vaguely looming threat which promises in the worst case an extremely violent ending. To pre-empt this happening, the subject is physically penetrated by the alien body with a controlled level of the lethal substance which, although producing violent sickness, is a fate less than death. Such violence unto oneself offers to counter violence with violence such that life may carry on living in spite of the dangers we are incapable of securing ourselves against. It is to give over to a form of self-harm albeit in a way that is actively desired and positively conceived. How else may we live otherwise? Resilience follows a similar logic. It encourages that we partake in the violence of the world to keep death at bay. For in the process of learning to live through the insecurity of the times, the subject is asked to incorporate the catastrophic intellectually, viscerally and affectively, thereby providing certain immunization against a more endangering fate. Indeed, since the ultimate litmus test is to bring to question the worst case scenario, the future cannot appear to us as anything other than completely monstrous. What, however, is actually slain as the future is wagered by the violence of the present may only become revealed with the passage of time. None of this operates outside of the realm of power politics. We only have to consider here (a) the moral judgements and political stakes associated with HIV as a pandemic that is more than simply biological, and (b) the development of viral analogies to explain more generally the problems ‘infecting’ societies from terror to criminality to evidence the point. Immunization is precisely about exposing oneself to something that is potentially lethal, thereby raising the threshold level for existence such that violence is normalized on account of our vulnerabilities to that which may be tempered but remains undefeatable. We are drawn here to Stellan Rye's (1913) silent horror movie The Student from Prague (Der Student von Prag) which has inspired a number of compelling literary and cinematic classics. In this tragic tale of poverty and violence, the impoverished student, Balduin, makes a bargain with the Devil as he exchanges the reﬂection of image for more immediate compensations. Upon eventually seeing himself, however, the student is avenged by an angry double that begins to wreak havoc as it seeks out revenge in light of its betrayal. Following an eventual violent confrontation the student has with his double, Balduin shatters the mirror that is central to the plot, and invariably destroys the fantasy of endangerment which also became the source of his afflicted curse. Inevitably, however, since the double was an essential element of this Faustian agreement, in killing the violent double, so the student kills himself. Otto Rank famously related this to the narcissistic self whose very sense of loneliness and alienation is caused by an anguish of a fear of death; even though it is precisely the violence of the pact which pushes the subject further towards the precipice. Whilst it is tempting to read this in familiar dialectical terms, there is a more sophisticated double move at work here, as the violence is already encoded within the initial act of demonic violation before the tragic encounter. For the double merely highlights the self-propelling tendency, from the fantasy of endangerment to the reality of the catastrophic. There is also a semantic interchange at work in Rye's Doppelganger as it stakes out the choice between a violated/violent life and eventual death. Since reason or logic prove utterly incapable of explaining the condition of Balduin's existence, let alone offering any promise of salvation from the oppressive situation to which he is fatefully bound, the double serves as an important metaphor for the narcissism of the times, as the subject wilfully accepts a violation and all the violence this entails in exchange for an illusion or fantasy of security which proves in the end to have been imbued with the catastrophic from the outset. Our understanding of the fundamental tenets of violence is invariably transformed such that we are forced to think about forms of violation/ intervention prior to any sense of dialectical enmity. Premetic Violence René Girard's thesis Violence and the Sacred offers a theory of violence that is exclusively bound to the desire to ‘overcome’ tragedy. To develop this theory, Girard speciﬁcally relates to the classic Greek play by Sophocles, Oedipus Rex, which he uses to illustrate the relationship between tragic dispossession and violence. It is through the tale of Oedipus and his return to reclaim the realm from which he was abandoned that we uncover a genesis of sacriﬁcial violence that is linked to some ‘past tragedy’.3\_9 Oedipus thus epitomizes the motif of the lost prince whose modes of contestation can be understood through competing claims to the ‘same object of desire: The story follows that when two uncompromising entities vie over the same object of desire, violence necessarily erupts. Through Girard's decoding of the Oedipus myth, what we therefore ﬁnd is any attempt to re-possess the object of desire necessarily requires the guilt of those currently in possession - a sacriﬁcial victim. Thus, to overcome tragedy one must come from the ‘outside’ - a violently destined return that can only be justiﬁed by making a claim to the original sin, or what Girard terms a return to the ‘original scene: However, as Sophocles tells it, such violence is more than simply a reclamation of that which has been taken. The violence of the already dispossessed desires to re-establish the authentic order which has been falsely appropriated - the paradise lost. Importantly, for Girard, such violence is not a relation of difference but is more deﬁned by the logic of mimesis: ‘At ﬁrst, each of the protagonists believes that he can quell the violence; at the end each succumbs to it. All are drawn unwittingly into a violent reciprocity - which they always think they are outside of, because they all initially came from outside and mistake this positional and temporary advantage for a permanent and fundamental superiority.40 Plunging into an opposition which ‘reduces the protagonists into a uniform condition of violence’, all claims to ‘difference’ are effectively ‘eclipsed’ by ‘a resurgence of reciprocity.41 It has been common to read Rye's doubling as a clear example of mimetic behaviour. This has found clear applications from Hegelian-inspired revolutionary accounts of dialectical reasoning, to Frantz Fanon's theory of (post)colonial brutality, onto the exceptional violence of Schmitt's sovereign decisionism. While accepting how this logic has played a structural role in the demar- cation of certain regimes of violence which came to hallmark distinct marks of separation, we need to depart from this logic if we are to make sense of the violence of the catastrophic imaginary. What, in other words, becomes of violence once we reconceptualize the idea of the original scene and its logics of exposure such that violence itself becomes virtually ordained? That is to say, what becomes of violence once it begins to precede any dialectical arrangement? Mimetic violence, we have noted, is obj ectiﬁable. Based upon establishing various forms of mystical foundations, it has a distinct materiality to it that permits clear lines of demarcation and embodiment. These work both spatially and temporally. The object for violence is locatable, while the time of its occurrence offers clear (if sometimes contested) conceptions as to its beginning and ending. It beneﬁts, then, from the guarantees of identiﬁcation and the ability to represent that which must be vanquished at a given moment ‘in timei The virtual nature of the violence endured by the resilient subject offers no such guarantees. Collapsing the space-time continuum of mimetic rivalry, it is merely projected into the future without the prospect of bounce-back. Internalized, however, into the very living conditions of the subject now permanently under siege, the violence is no less real. As any author of horror ﬁction will tell, the mind can be a terrifying place to inhabit. Once the source of endangerment becomes unknowable by deﬁnition, everything becomes the potential source of a violent encounter. Resilience challenges the logic of mimetic violence, therefore, in two fundamental ways. Firstly, it shows us that our only way of dealing with endangerment is to absorb its lethal tendencies. That which has the potential to destroy must become part ofsociety's make-up and its epistemic fabric. We too, in the process, become more lethally endowed as a result. Invariably, the more lethal we become, the more we end up embracing the biophysical conditions of our potential undoing as a principle form of human conditioning. The body accepts the lethality on account of preparedness. Secondly, there is an outward projection against that which could potentially threaten our existence. But this projection doesn't connect to any mimetic rival. We have no clear sense of what it is that so endangers in its particular guise, only a generalizable indication that something which is part of the integral whole will eventually bring about our ﬁnal demise. Deprived, then, of the potential to ‘at last stand’ upon a terrain whose forms of endangerment were known in advance, we continue to walk through a veritable mineﬁeld of potential disasters of a multi-dimensional nature, not knowing when the explosion will happen, with little comfort provided by the intellectual comforts of the past, and with no fence on the horizon beyond which relative security may be achieved and freedom from endangerment realized. The only solution, we are told, remains to expose oneself to all its disastrous permutations so that we may be better prepared against those already charged and yet to detonate, along with those yet to even be inserted into this catastrophic topography. But what does it mean to say that violence is now beyond representation? And what type of reality are we producing if we are calling into question the depths of ﬁeld that once gave qualitative and quantitative meaning to our relations to violence? For Paul Virilio, whose work we may connect to the premetic, this inaugurates ‘the futurism of the instant’ whose kairos shatters all metaphysical meaning: This spells disorientation in knowledge acquired over the course of millennia regarding the spatial environment and the cycle of seasons; an integral accident in knowledge of history as well as of the usual concrete geography that goes with it, the unity of place and time of a secular history. No doubt this is the fatal novelty of the historic tragedy befalling humanity and a progress that will no longer be exclusively technologistical and extra-planetary, but merely human, ‘all too human’. Masochism vis-a-vis an abhorred past that no longer passes muster is now symmetrically doubled with a masochism in relation to a future where, for want of fear, we will, this time, have space, all the space of a miniscule planet reduced to nothing, or as good as, by the progress of our discoveries.2 Nihilism Unbound Writing in the nineteenth century, Nietzsche argued that nothing was more deeply characteristic of the modern world than the power of nihilism.E Nietzsche's intervention here allowed us to move beyond the well-rehearsed attack upon Platonic reason or Christian faith, to focus instead upon ‘the radical repudiation of value, meaning and desirabilityiﬁ Nihilism, thus understood, referred to the triumph of reactive thinking. It was all about the negation of life as it appeared to be incapable of afﬁrming that which is properly and creatively different to human existence. Hence, for Nietzsche, nihilism was not simply reducible to some historical event in time, i.e. an exceptional moment in history which could be shamefully written into annals of human suffering. Nihilism was the recurring motor of history as the operation of power leads to a will to nothingness that strips life of any purposeful meaning. Crucially, as Nietzsche understood, this repudiation of the afﬁrmative realm of experience is something we create for ourselveaﬁ Nihilism, in other words, is to be understood through a sophisticated manipulation of desires such that the individual subject depreciates itself to such an extent that it actively participates in a custom of political self- annihilation. Central to Nietzsche's thinking on the perpetuation of nihilism is the notion of ressentiment. In his On the Genealogy of Morality, Nietzsche explains this in terms of the slave mentality. This produces a feeling of impotence which not only translates into vengefulness, but more problematic still, teaches the slave that the only way it can become free is to give over to the prevailing reason mastery has set in place. Sloterdijk equates this ressentiment with rage, the basis of all great theisms.4i Such a condition, as Nietzsche understood, was ‘paralysing’ insomuch as it annuls the possibility of thinking and acting otherwise, and it was ‘exhausting’ insomuch as life was forced to compromise with the very lethality that put its condition originally into question. Through a ‘spirit of revenge’ what is lacking is therefore produced in a double movement, for lack is not some original gesture, it derives out of the ressentiment to deny us the opportunity to bring something different into the world. This raises a number of pressing questions: Could it be that not only have we become slaves to our biological existence, but in claiming false mastery of the earth we have given to ourselves an illusionary sovereignty? For how can we have mastery if that which we claim to be able to dominate as the principle force makes us increasingly vulnerable with each passing moment? Have we not, then, become slaves to ourselves and slaves to the earth, and resentful of them as a result? Nihilism has never been alien to liberal biopolitics. It is arguably its most potent expression. Its early development can be traced to Kant's Copernican revolution of the mind. Placing life at the centre of its universe, Kant forced us to look for meaning beyond the realms of theological destiny. Whilst this moved us beyond the suffering and lament of the Christian subject which so irked Nietzsche, Kant's universal substitute proved to be no substitute at all. The universal was actually denied to us due to the limits of our reason and our imperfections as ﬁnite beings - imperfections that signiﬁcantly proved incapable of moving us beyond the reductionism of metaphysical idealism and its crude representations, towards a more afﬁrmative form of meta- physics that worked in practice. As Drucilla Cornell writes, ‘Martin Heidegger famously wrote that Kant takes us to the limit of the very notion of critique and ultimately raises, but does not fully address, the question of ‘who’ is this ﬁnite being that must think through the transcendental imaginationfﬂ In a remarkably potent yet tragic stroke, Kant wrote the death of the omnipotent God and the types of docile subjects it produced who were rendered immobile due to its vengeance and fury, while putting in its place a fallen subject that was fated to be forever incomplete because of the burdens of its own actions. While Kant's thinking paved the way for new eschatological forms of power to emerge that took leave of traditional sovereign moorings, the fallen subject was compelled to become resentful of its biological existence. Bios were to remain forever imperfect by design and fated to be judged accordingly. With life fated to live a biologically endowed existence, it is stripped of its capacity to have a meaningful existence beyond the limits of its bodily formations, while political strategies operate by governing through the problem of ﬁnitude, even though the ﬁnite inevitably became a philosophical problem too difﬁcult to comprehend. As a result, forced to endure a growing resentment of its unfolding drama, liberalism slowly became morally equipped to continually intervene upon the souls of the living simply by offering to prolong the subject's existence better than any other political rationality. Such was the realization of our ﬁnite entrapment in the bodily form that the ability to philosophically transgress the injunction between life and death became increasingly impossible. Indeed, as we shall point out later, while liberal societies have a particular relationship to the question of dying as our existence is continually put into question, such that with each passing second we learn to survive until we become truly meaningless in the end, the idea of death remains incommensurable to the liberal subject. No longer does the resilient subject solely project its resentfulness onto the souls of ‘Others’. It resents the living world, for it too is radically endangering. It is here that catastrophic imaginaries begin to truly thrive. The resilient subject is shaped and anxiously mobilized by the prospect of the coming catastrophe. It fears the transformation of the subject, just as it fears the transformation of the ecosystem that gives sustenance to life. Our rage as such, to borrow from Sloterdijk, has become truly limitless. As everything becomes the source of our endangerment, we internalize the ressentiment and proliferate our impotence with unrivalled intensity and absolute necessity. Hence this produces a form of nihilism which is ‘unbounded: For no longer do we simply resent the teleological unfolding of history as we phase shift from masters to slaves to masters; there is no mastery to speak of and as a result all our lament ﬁlters into a politics of ressentiment as we are left to simply govern through our continually unfolding state of unending emergency. (111-17)

#### Threat imagery impoverishes scholarship and policy making- their claims can't be evaluated outside of the project of security that created them. Self Fulfilling prophecy outweighs aff predictions offense

Gregory D Foster, J. Carolton Ward Distinguished Prof. National Defense University, West Point Grad 69, PhD from GWU, Interrogating the Future: The Question of Long-Term Threats, Alternatives 19 1995

Where, then, does this leave us—in an elevated state of awakening or in a depressed state of confusion and resentment? It is, admittedly, burdensome and intimidating to face a deluge of questions without being afforded the intellectual crutch of an authoritative answer or two. That is the price we pay, though, for having allowed our minds to be crippled by Cold War dogma. Possessed of truth, we ignored, we denied, we disdained anyone or anything that contradicted our certainty. We did not question, we did not seek answers other than the ones we already had. To do so would have been superfluous, and clearly suspect. Now we must undergo corrective surgery. Whatever answers might emerge from the questions posed here, three fundamental issues deserve our attention. The first concerns the very language—the terminology—we use in public discourse. In his rather well-known 1946 essay, "Politics and the English Language," George Orwell drew the link between the debasement of language and the decline of civilization. He was convinced that both conditions were taking place in tandem at the time he wrote. By the same token, he believed the problem could be reversed. By ridding oneself of the many bad habits of English usage we have adopted, one can think more clearly, he said, and thereby take the first step toward political regeneration.74 The use of the word "threat" certainly seems to fit here. Although it is not a new word, the Cold War gave it heightened visibility, broadened and obscured its meaning, and made it part of the lingua franca of contemporary international politics. What should be all too obvious is the adversarial image the term conveys and the Manichean world view it engenders. Threattalk becomes threatthink. The resultant paranoia and intolerance invariably blind us to emerging developments and conditions that truly threaten our well-being but fall outside the bounds of our distorted perception. This brings us to a second fundamental issue: the effect our image of threat has on reality. The late Kenneth Boulding made the astute observation that there is a reciprocal, escalatory dynamic associated with threat imagery. For example, Country A, feeling itself threatened (however and for whatever reasons) by Country B, increases its armaments to reduce its insecurity. This makes B feel threatened, and so B increases its armaments to bolster its security. This makes A feel even more threatened, so A again increases its armaments. This growing threat "forces" B to further increase its armaments. And so on until either war breaks out or some other change (such as internal economic collapse) reverses the process.75 This is how threatthink becomes threat. If there is a single, documentable truth to be derived from an assessment of threat-based thinking, it is that the perception of threat— at least where that threat has a human component—almost invariably becomes a self-fulfilling prophecy. For this reason alone—the fact that we have shown ourselves perversely capable of creating unwanted inevitability—we must face up to a third fundamental issue: the more general failure of our overall approach to envisioning the future. Most of us justifiably consider ourselves unqualified to divine the future. We therefore typically defer to experts and authorities—futurists and assorted government technocrats presumably possessed of special powers or information the rest of us do not have—who end up thereby dictating not only our future but our present as well. These are the individuals who tell us not only that there are threats, but what they are and how we must deal with them. What we refuse to recognize is that the future these purported visionaries are able to see is invariably nothing more imaginative than a simple projection of what already is happening. It also is an assured way for them to solidify and perpetuate their own power over us. The future they see, because the rest of us accept it on authority as all but inevitable, closes out any perceived need to pursue other potentially fruitful possibilities; it provides an excuse for ignoring present needs that, if fulfilled, might well produce a markedly different future; it ensures nothing more enlightened or progressive than creeping incrementalism and evolutionary drift; it creates false expectations about what can and will be; and when it fails to materialize—as it so often does because of the unexpected-it produces feelings of helplessness, not among the purveyors of the deception, but among those of us who have so carelessly relinquished our fate to them.76 Threats are in the future. Threat assessment is about the future. Vision is of the future. The Cold War clouded our vision and crippled our ability to determine, objectively, whether there are threats that should concern us, what they are, why they are important, and how we should deal with them. Our future will depend in large measure on our willingness to overcome our Cold War myopia and to demonstrate a newfound degree of individual and collective vision. Whether vision is a gift or an acquired skill, we will have to seek out the visionaries in our midst who can either lead the rest of us less gifted out of our self-imposed darkness or at least stand as models on which we can pattern ourselves. And how will we know vision when we see it? We need not doubt that its presence will be so unlike anything we are used to, we will know. But if we are searching for a standard against which to judge, we could do no better than to recall the surpassing insight Abraham Lincoln demonstrated on at least one occasion at the height of the US Civil War. At an official reception, the president referred to Southerners rather as erring human beings than as foes to be exterminated. An elderly lady, a fiery patriot, rebuked him for speaking kindly of his enemies when he ought to be thinking of destroying them. "Why, madam," said Lincoln, "do I not destroy my enemies when I make them my friends?',77 (86-88)

#### Representations must precede policy discussion. Thus, the role of the ballot should be to assume the position of a critical intellectual- debate is primarily an academic activity. The signal sent intellectually outweighs any specific policy proposal

Neta Crawford ,PhD MA MIT, BA Brown, Prof. of poli sci at boston univ. Argument and Change in World Politics, 2002 p. 19-21

Coherent arguments are unlikely to take place unless and until actors, at least on some level, agree on what they are arguing about. The at least temporary resolution of meta-arguments- regarding the nature of the good (the content of prescriptive norms); what is out there, the way we know the world, how we decide between competing beliefs (ontology and epistemology); and the nature of the situation at hand( the proper frame or representation)- must occur before specific arguments that could lead to decision and action may take place. Meta-arguments over epistemology and ontology, relatively rare, occur in instances where there is a fundamental clash between belief systems and not simply a debate within a belief system. Such arguments over the nature of the world and how we come to know it are particularly rare in politics though they are more frequent in religion and science. Meta-arguments over the “good” are contests over what it is good and right to do, and even how we know the good and the right. They are about the nature of the good, specifically, defining the qualities of “good” so that we know good when we see it and do it. Ethical arguments are about how to do good in a particular situation. More common are meta-arguments over representations or frames- about how we out to understand a particular situation. Sometimes actors agree on how they see a situation. More often there are different possible interpretations. Thomas Homer-Dixon and Roger karapin suggest, “Argument and debate occur when people try to gain acceptance for their interpretation of the world”. For example, “is the war defensive or aggressive?”. Defining and controlling representations and images, or the frame, affects whether one thinks there is an issue at stake and whether a particular argument applies to the case. An actor fighting a defensive war is within international law; an aggressor may legitimately be subject to sanctions. Framing and reframing involve mimesis or putting forward representations of what is going on. In mimetic meta-arguments, actors who are struggling to characterize or frame the situation accomplish their ends by drawing vivid pictures of the “reality” through exaggeration, analogy, or differentiation. Representations of a situation do not re-produce accurately so much as they creatively re-present situations in a way that makes sense. “mimesis is a metaphoric or ‘iconic argumentation of the real.’ Imitating not the effectivity of events but their logical structure and meaning.” Certain features are emphasized and others de-emphasized or completely ignored as their situation is recharacterized or reframed. Representation thus becomes a “constraint on reasoning in that it limits understanding to a specific organization of conceptual knowledge.” The dominant representation delimits which arguments will be considered legitimate, framing how actors see possibities. As Roxanne Doty argues, “the possibility of practices presupposes the ability of an agent to imagine certain courses of action. Certain background meanings, kinds of social actors and relationships, must already be in place.” If, as Donald Sylvan and Stuart Thorson argue, “politics involves the selective privileging of representations, “it may not matter whether one representation or another is true or not. Emphasizing whether frames articulate accurate or inaccurate perceptions misses the rhetorical import of representation- how frames affect what is seen or not seen, and subsequent choices. Meta-arguments over representation are thus crucial elements of political argument because an actor’s arguments about what to do will be more persuasive if their characterization or framing of the situation holds sway. But, as Rodger Payne suggests, “No frame is an omnipotent persuasive tool that can be decisively wielded by norm entrepreneurs without serious political wrangling.” Hence framing is a meta-argument.

#### The alternative is to reject the AFF’s security representations as a critical intellectual labor that makes imagination of a more peaceful future possible. Neocleous 08

(Neocleous 8 — Prof of Government @ Brunel University; London (Mark, Critique of Security, pg. 184-5)

Anyone well versed in history or with experience of university life will know about the shameful ways in which large numbers of academics have elevated venality into the cardinal academic virtue, complying with the demands of those in power and the wishes of those with money: witness the political scientists, historians, anthropologists, geographers, cartographers, sociologists, linguists and many others who reworked their disciplines according to the principles and myths, and the principle myths, of fascism.' 'Academic life under fascism', notes Christopher Hutton, 'is a dismal ... episode in an unedifying story of relations between the modem academic and the state, and between academics and power both within and outside the university. But this part of the history of fascism is merely the worst moment in the wider and equally unedifying story of relations between academics and the state more generally, merely one way m which intellectuals have kowtowed to the principles and myths, and the principle myths, concerning security and the state. Spouting the jargon of security and enthralled by the trappings of power, their intellectual labour consists of nothing less than attempts to write hand-books for the princes of the new security state. The death of countless numbers in a more 'efficient' bombing of a city, the stationing of troops halfway around the World in order to bring to an end any attempt at collective self-determination, the use of military machines against civilians, the training of police forces in counter-insurgency practices, but more than anything the key concepts and categories used to explain and justify these things - all defended, supported and even ‘improved” by security intellectuals for whom, ultimately, intelIecua1 labour boils down to little more than the question of the most efficient manner. In which to achieve the security demanded by the state and bourgeois order. In rationalizing the political and corporate logic of security, the security intellectual conceals the utter irrationality of the system as a whole. The security intellectual then is nothing less than the security ideologue, peddling the fetish of our time. The only way out of such a dilemma, to escape the fetish, is perhaps to eschew the logic of security altogether - to reject it as so ideologically loaded in favour of the state that any real political thought other than the authoritarian and reactionary should be pressed to give it up, That is clearly something that can not be achieved within the limits of bourgeois thought and thus could never even begin to be imagined by the security intellectual. It is also something that the constant iteration of the refrain ‘this is an insecure world’ and reiteration of one fear, anxiety and insecurity after another will also make it hard to do, but it is something that the critique of security suggests we may have to consider if we want a political way out of the impasse of security. This impasse exists because security has now become so all-encompassing that it marginalizes all else, most notably the constructive conflicts, debates and discussions that animate political life. The constant prioritizing of a mythical security as a political end - as the political end - constitutes a rejection of politics in any meaningful sense of the term. That is, as a mode of action in which differences can be articulated, in which the conflicts and struggles that arise from such differences can be fought for and negotiated, in which people might come to believe that another world is possible - that they might transform the world and in turn be transformed. Security politics simply removes this; worse, it removes it while purportedly addressing it. In so doing it suppresses all issues of power and turns political questions into debates about the most efficient way to achieve ‘security’, despite the fact that we are never quite told - never could be told – what might count as having achieved it. Security politics is, in this sense, an anti-politics,” dominating political discourse in much the same manner as the security state tries to dominate human beings, reinforcing security fetishism and the monopolistic character of security on the political imagination. We therefore need to get beyond security politics, not add yet more ‘sectors to it in a way that simply expands the scope of the state, and legitimizes state intervention in yet more and more areas of our lives. Simon Dalby reports a personal communication with Michael Williams, co-editor of the important text Critical Security Studies, in which the latter asks: if you take away security, what do you put in the hole that’s left behind? But I’m inclined to agree with Dalby: maybe there is no hole. The mistake has been to think that there is a hole and that this hole needs to be filled with a new vision or revision of security in which it is re-mapped or civilised or gendered or humanised or expanded or whatever. All of these ultimately remain within the statist political imaginary, and consequently end up re-affirming the state as the terrain of modem politics, the grounds of security. The real task is not to fill the supposed hole with yet another vision of security, but to fight for an alternative political language which takes us beyond the narrow horizon of bourgeois security and which therefore does not constantly throw us into the arms of the state. That’s the point of critical politics: to develop a new political language more adequate to the kind of society we want. Thus while much of what I have said here has been of a negative order, part of the tradition of critical theory is that the negative may be as significant as the positive in setting thought on new paths. For if security really is the supreme concept of bourgeois society and the fundamental thematic of liberalism, then to keep harping on about insecurity and to keep demanding ‘more security’ (while meekly hoping that this increased security doesn’t damage our liberty) is to blind ourselves to the possibility of building real alternatives to the authoritarian tendencies in contemporary politics. To situate ourselves against security politics would allow us to circumvent the debilitating effect achieved through the constant securitizing of social and political issues, debilitating in the sense that ‘security’ helps consolidate the power of the existing forms of social domination and justifies the short-circuiting of even the most democratic forms. It would also allow us to forge another kind of politics centered on a different conception of the good. We need a new way of thinking and talking about social being and politics that moves us beyond security. This would perhaps be emancipatory in the true sense of the word. What this might mean, precisely, must be open to debate. But it certainly requires recognizing that security is an illusion that has forgotten it is an illusion; it requires recognising that security is not the same as solidarity; it requires accepting that insecurity is part of the human condition, and thus giving up the search for the certainty of security and instead learning to tolerate the uncertainties, ambiguities and ‘insecurities’ that come with being human; it requires accepting that securitizing an issue does not mean dealing with it politically, but bracketing it out and handing it to the state; it requires us to be brave enough to return the gift.

**Interpretation: The 1AC is an object of research. The role of the neg should be to disprove the various meanings of that object.**

**1] Plan focus restricts the debate to a ten second statement and leaves the rest of the aff unquestioned. They should be responsible for the way their knowledge is constructed and used because that produces the best model for activism and ethics in the context of the topic which is a unique education net benefit to our interpretation**

**2] Debate doesn't pass policies but it does alter the way we think about the world and about systems of power – turns their policy research standards because it's a question of how their research is oriented and whether it's for an ethical purpose – only our model of engagement accesses that education**

**3] Begs the question – if we win their justifications are repugnant that necessarily implicates the conclusion which means defense of their research model is a prior question to weighing the material consequences of the aff – also solves plan focus because the links necessarily implicate aff solvency**

### Space Militarization – Private Space is the only way to solve

#### Non-state actors in space are conflict dampeners – they avoid geopolitical tension and have financial incentives to keep conflict low

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In the terms of privatization and space security, space remains relatively untapped, but commercial and military benefits from space exploration/exploitation could even lead to ‘privatization of space’. Such privatization will result from growing pressure on spacefaring countries to defect from cooperation, since is less viable with good number of multiple actors who entered the space.36 However, space policy and space research are characterized by very high costs, which are rather impossible to bear by private companies, limited by economic calculation. As pointed out earlier, under-investment in technological development by private companies it is related to the fact that these actors are not focused on profits of a social nature, such as improving the quality of life of the recipient of the product.37 This makes some technology, potentially beneficial to society, not developed or introduced into use, because the profit margin is too small to make this viable for commercial players. To conclude, privatization of space security can develop in unexpected ways, but in today’s space environment private actors would rather play the role of security regulators than security providers. When investment in space technologies is less profitable than other areas of economy, private actors would focus on soft law and conflict prevention in space, and new private initiatives will appear. For example, apart from important space companies, as SpaceX or Blue Origin active in outer space, other private actors as Secure World Foundation (SWF), who focus on space sustainability, will play more important role in crafting international guidelines for space activities.38 This path the way for future solutions and projects, as cleaning the space debris, extracting resources from asteroids and planetoids, refuelling satellites, providing payload capabilities for governmental entities on market-based logic, will be based on activity non-state actors, providing soft law and regulatory solutions, where space faring states are unable to find any compromise. Therefore private companies will be in fact global (or space) regulators, as part of UNCOPUS, being involved in space activities.39 The last argument for private involvement in space security comes from an approach based on common good and resilience of space assets, emphasized by the Project Ploughshares, as an important part of space security. As of 2017 there are more than 700,000 man-made objects on the Earth’s orbit bigger than 1 cm, while 17,000 of them are bigger than 10 cm.40 Some of them are traced by SSA systems, both American and European, but these systems are public-military owned, and private operators are not granted any access to this data. Any collision of space object with space debris, even with small particles, might result in a chain reaction, called Kessler’s syndrome, and not only private but public, and military assets will be destroyed or impaired. In such conditions, a reluctant cooperation between the public and private sector, and unwillingness to share vulnerable data by public actors seem to confirm that private space activity is more than necessary. This is an apparent case when logic of mistrust between state powers must be overcome by private actors, perhaps by suggesting common preferences for debris mitigation, and space situational awareness. In the case of space debris, Space Data Association, an initiative supported by private sector, with its main aim to enhance data sharing between commercial satellite operators, could be an example of nascent public good provided by private actors for the sake of global security.

#### Space weaponization and arms racing ensure space war goes nuclear – only strong private competition can check conflict

Hitchens ’17 (Theresa Hitchens, Theresa Hitchens is Senior Research Scholar at the Center for International and Security Studies at Maryland, Prior to joining CISSM, Hitchens was the director of the United Nations Institute for Disarmament Research (UNIDIR) in Geneva from 2009 through 2014. Among her activities and accomplishments at UNIDIR, Hitchens served as a consultant to the U.N. Group of Governmental Experts on Transparency and Confidence Building Measures in Outer Space Activities, provided expert advice to the Conference on Disarmament regarding the prevention of an arms race in outer space (PAROS), and launched UNIDIR's annual conference on cyber security, From 2001 to 2008, Hitchens worked at the Center for Defense Information, where she served as Director, and headed the center’s Space Security Project, setting the strategic direction of the center and conducting research on space policy and other international security issues, “Space weapon technology and policy”, School of Public Policy University of Maryland, <https://aip.scitation.org/doi/pdf/10.1063/1.5009221?class=pdf>, November 2017)

Abstract. The military use of space, including in support of nuclear weapons infrastructure, has greatly increased over the past 30 years. In the current era, **rising geopolitical tensions between** the United States and Russia and China **have led to assumptions** in all three major space powers **that warfighting in space now is inevitable, and possible because of rapid technological advancements**. New capabilities for disrupting and destroying satellites include radio-frequency jamming, the use of lasers, maneuverable space objects and more capable direct-ascent anti-satellite weapons. **This situation, however, threatens international security and stability among nuclear powers. There is a continuing and necessary role for diplomacy, especially the establishment of normative rules of behavior, to reduce risks of misperceptions and crisis escalation, including** up to the **use of nuclear weapons**. U**.S. policy and strategy should seek a balance between traditional military approaches to protecting its space assets and diplomatic tools to create a more secure space environment.** I. INTRODUCTION Outer space is recognized by all nations as “the province of mankind” not subject to national boundaries or appropriation via both treaty – especially the 1967 Outer Space Treaty1 – and by the practice of nation states. Since the dawn of the space age, the use of satellites has become integral to the global economy, including providing communications, weather services, mapping, precision timing and navigation services for shipping, secure crossborder banking, and Internet connectivity. Every state has both an interest in making use of space, and reason to deal with its use by other states, because **the activities in space by one actor have the potential to impact all others**, for good or for bad. In addressing international and national security, and nuclear security in particular, the space environment has played a role of great importance from almost the beginning of the nuclear age. The first satellites launched by the Soviet Union and the United States were oriented toward seeking information on what was transpiring in areas controlled by the other, and to verify bilateral arms control agreements. While in short order space systems also were integrated to the offensive uses of long-range delivery systems by providing photographic information about potential targets, strategic space systems were during the Cold War widely viewed as stabilizing the Superpower nuclear competition. The use of space for military purposes has continued into the present era, with increasing capabilities to take advantage of large segments of the electromagnetic spectrum for acquiring intelligence, communicating globally, and generally supporting ways of using nuclear weapons both for deterrence, and, should deterrence fail, use of those weapons against an adversary. Most of the nuclear weapon possessing states operate satellites for these purposes. Perhaps as importantly, space systems over the last two decades have become integral to the tactical warfighting ability of many modern states – a situation that has complicated the status of space systems as strategically stabilizing. Indeed, the growing use of space by many countries to achieve victory on the battlefield has increased both the vulnerability of militaries to attacks on their space systems and has, at the same time, increased their value as potential targets in a war. Over the past 50 years, the Soviet Union, the United States, and China have carried out experiments in or aimed at the outer space environment – mostly the area close to the atmosphere in Low Earth Orbit (LEO) – that show the capability to destroy a satellite, or to disrupt its functions. The specter of space warfare for many years has, among other negative consequences, raised concerns that a state’s nuclear retaliatory capability could be compromised. This concern also applies more generally, of course, to an ability to disrupt communications functions for other military, or civilian, purposes. In the 1980s, there was a period when the United States, and perhaps others, explored whether systems based in space could be used to destroy an adversary’s intercontinental ballistic missiles, or their payloads. The so-called Star Wars program under the Reagan Administration envisioned the deployment of a system of satellites that would seek to destroy the missiles/warheads launched at the United States. One technology explored envisioned detonating a nuclear explosive to generate a beam of x-rays that would put out of commission the adversary’s warhead. Thus far, such technologies have not succeeded in playing a role in the nuclear-weapon situation globally. However, the U.S. descendant of the Star Wars program – currently limited to conventionally equipped, ground- and sea-based missile defense interceptors with limited capability against a full-blown nuclear attack – continues to stress nuclear deterrence and stability between the United States and Russia, as well as China, which maintains a much smaller nuclear arsenal than the Cold War adversaries. However, recent missile experiments by China have demonstrated the vulnerability of the geosynchronous equatorial orbit (GEO), where many hundreds of satellites are “parked” carrying out communications and other functions, including nuclear weapons support systems and spy satellites. II. INCREASED THREATS INVOLVING OUTER SPACE Since the first satellites were launched in the 1950s by the Soviet Union and then the United States, the Russian Federation, the United States, China, India, Japan, and other states have, without much coordination, launched so many satellites into space into various orbits and at various altitudes that there is currently a strong risk of both congestion and competition. There is no global regime for regulating outer space activities. The Outer Space Treaty of 1967, to which all the launching states, and most others, are party2 mandates that outer space be used solely for peaceful purposes, and prohibits the stationing of nuclear or other weapons of mass destruction in that environment. (The Treaty does not prohibit the transit of nuclear weapons, e.g. as a payload on a submarine-launched ballistic missile, through outer space; furthermore under common law practice, defensive military activities are tolerated as compliant with “peaceful purposes.”) The Outer Space Treaty, however, makes it clear that states are responsible for their own space activities, and compliance with international law. And while there are a number of other spacerelated treaties, UN principles and voluntary agreements managed by various UN and multilateral bodies, a nation’s activities in space are largely regulated by that nation alone. There is no international legal requirement for any one state to coordinate its satellite launches or maneuvers with others. Environmental Threats: Crowding and Debris Some 1,500 operational satellites are now in orbit, owned by more than 80 states or other entities. These states and entities have varying levels both of proficiency and of knowledge of the established laws and rules affecting space. In the radio frequency band of the electromagnetic spectrum, interference is rising, especially in the GEO regime. Some of this interference is deliberate, undertaken for political purposes, despite the fact that deliberate interference is one of the few legally binding restraints in the international space arena3 . The evolution in satellite technology has led to the wider use of smaller satellites, including so-called “Cubesats,” that can be deployed in constellations, especially in LEO. The number of operational satellites is expected to rise to many thousands within the decade. LEO, in particular, is becoming incredibly crowded with satellites, making tracking of on-orbit objects extremely difficult. Furthermore, many small satellites have no ability to maneuver to avoid collisions with other satellites and space debris. The half-century of using space has resulted, from the breakup of satellites and other activities, in a considerable amount of on-orbit debris – including satellites no longer in use, parts of satellites that have broken up, launcher stages, nuts and bolts, and debris from the deliberate destruction of satellites. The United States and others track some 23,000 orbiting pieces with a diameter of greater than 10 cm. This debris is especially dangerous if a satellite or transiting vehicle collides with a piece, since the closing velocity of such a collision on-orbit is very high – some 7.5 kilometers per second (faster than a bullet) in LEO. Worse yet, even very small debris, most of which cannot be detected much less tracked, can destroy an operational satellite; it is estimated that some 500,000 to one million pieces of debris smaller than 10 centimeters exist on orbit. **It is widely agreed that new international measures to better coordinate space activities are required to ensure that the space environment is sustained**. In 2007, the United Nations Committee for the Peaceful Uses of Outer Space (COPUOS) in Vienna, Austria, agreed on a set of guidelines for the mitigation of space debris, which are slowly being implemented by many space-faring states. It may be that such measures will eventually require removal of debris from orbit, as the decay of debris from space into the atmosphere where it burns up (or falls on Earth) is a very long-term prospect, taking as much as 25 years in LEO. Sadly, the lifetime of debris in GEO, like diamonds, is practically forever. COPUOS currently is working on a set of recommended best practices to ensure the “long-term sustainability of space.” COPUOS has a 2018 deadline to finish this work; however, there is already discussion of follow-on effort that may include international guidelines for debris removal. Increasing Military Tensions in Space In the geopolitical sphere, compared with the period following the breakup of the Soviet Union, the current decade is witnessing increased tensions between the United States and Russia, and between the United States and China. The geopolitical situation in space has been further eroded by the proliferation of experimentation with and/or deployment of dual-use technologies with “counterspace,” i.e. satellite attack, capabilities. As noted above, China, Russia and the United States all have tested (or in some cases deployed) such technologies in both LEO and GEO. The United States continues to have an advantage in military space capabilities, but its edge is eroding as China and Russia dedicate more resources. Most technologies involved in sustaining systems in orbit are dual-use, but certain specific activities are raising suspicions about potential intended weapons use. The capability to maneuver satellites is particularly relevant. Russia placed a satellite called Luch/Olymp in GEO that maneuvered or drifted over a considerable range, and at several points in 2015 came extremely close to commercial satellites owned by Intelsat.4 Intelsat called the move “irresponsible,” but their request for information from Russia went unanswered. The maneuvers further prompted concern at the U.S. Defense Department about the satellite’s mission, which has not been revealed by Moscow. The United States also has carried out programs in GEO that could have potential weapons capabilities. For example, the PAN, an acronym for Palladium at Night, is a classified program apparently dealing with communications platforms, and perhaps providing other capabilities.5 The Geosynchronous Space Situational Awareness Program (GSSAP) is a U.S. military satellite constellation that also maneuvers in orbit, designed, according to the Pentagon, with the objective of inspecting other satellites orbiting in GEO. Such activities are known as Rendezvous and Proximity Operations (RPO), and have a number of benign applications such as satellite refueling, inspection and repair. Russia is carrying out other such experiments in LEO, as are China, the United States, Japan and Sweden. The commercial applications of maneuvering satellites are also increasing. Among the number of more directly identifiable counterspace technologies now available, the most widespread are ground-based radio-frequency jammers, which can be used to disrupt satellite communications and operations. In addition, there are efforts to develop lasers for disrupting or degrading systems based in space. Russia, China and the United States have also carried out projects involving terrestrially based missiles carrying anti-satellite payloads. The United States as early as the 1980s launched missiles from an F-15 fighter jet with this objective. A 2007 Chinese test, involving the destruction of a non-functional Chinese weather satellite in LEO, released a considerable quantity of debris. The United States subsequently launched a missile from an Aegis cruiser that was advertised to have the objective of destroying a satellite in a decaying orbit, but this did not prevent speculation that the mission also had the objective of demonstrating a similar capability to that of China. Over decades, the U.S. missile defense program has also heavily relied on the space environment, for early warning, for communications, and as a place for engaging and destroying hostile systems. Noted above is the Reagan Administration’s “Star Wars” program, pursued with the idea of creating a “shield” against intercontinental ballistic missiles. **The harder-line rhetoric that has been employed in recent years also has had an inevitable impact of raising tensions**. The United States has pivoted from an approach of “strategic restraint” to one emphasizing “warfighting.”6 In particular, the budgets for providing resiliency in space systems and counterspace capabilities have been increasing. At the same time, Russian accusations that U.S. activities have a hostile objective, and its responses to U.S. representations, have become shriller. Russia has called the anti-ballistic missile system SM-3 2A an anti-satellite weapon, while touting its own objectives for acquiring anti-satellite capabilities. In 2013, China tested a missile, the Dong Ning-2, which appears capable of reaching satellites in GEO. Chinese military space activities lack transparency, but it seems clear that such activities include the objective of being able to exercise counterspace actions. Most troubling, there has been a lack of serious dialogue among these Big Three states. Multilateral Efforts to Reduce Risks For many years, a direct approach to concerns about the potential for weaponizing space (space has been militarized since the dawn of the space age, but so far cannot be said to have been weaponized) has been debated within the United Nations, as well as at the Conference on Disarmament in Geneva. The Russian-Chinese cosponsored initiative, on the Prevention of an Arms Race in Outer Space, has been on the agenda of the Conference on Disarmament since 1985, and under that agenda item Moscow and Beijing have proposed a treaty to ban weapons in space.7 However, the Conference has been all but immobilized by wider disagreements since that time; and the United States remains firmly opposed to the proposed treaty. There have been a number of efforts to set norms of behavior in space in order to guard against misunderstanding and conflict in space. Most recently, the 2013 UN Group of Governmental Experts (GGE) on Transparency and Confidence-Building Measures in Outer Space Activities released a set of recommended initiatives for states to implement, including improved communications about objects in orbit.8 Unfortunately, little work has been done since to implement the recommendations, either at the multilateral level or by individual states. However, the United States, Russia and China have recommended that the UN Disarmament Commission, based in New York, and the deliberative body on arms control issues, take up the question of implementation of the GGE recommendations. While the initial proposal has been received favorably, a decision regarding whether to put the issue on the Commission’s formal agenda will not be made until Fall. III. POLICY QUESTIONS FOR THE UNITED STATES In view of the increased uncertainties affecting the use of outer space, particularly in the area of international security, the United States needs to address several issues with some urgency. First, what is the appropriate mix of resiliency measures to apply in the coming years? A subsidiary question in this regard is what is an appropriate role for commercial providers? And should the U.S. military switch to constellations of small satellites for some national security missions? The budgetary implications of achieving objectives, and establishing appropriate requirements, are important components of pursuing this mix. And there is the inevitable bureaucratic overlap between the Department of Defense and the Intelligence Community. Such “turf” issues require constant attention lest they adversely impact on the fulfillment of national, vice institutional, objectives. Lengthy acquisition programs put systems at risk of becoming obsolescent earlier than they would otherwise become outdated. As part of this latter issue, the United States will need to consider what reforms are needed in the acquisition process, and related organizational arrangements. The integration of Department of Defense and Intelligence Community programs and activities is inevitably a delicate matter; it will require especial focus from the White House, in particular as resiliency is now being embedded into the requirements for acquisition of new systems. A more far reaching issue is how best to strike a balance between the defensive aspects of counterspace and the offensive aspects. And integral to addressing this balance is the impact of U.S. options to respond to hostile space activities on the stability of the strategic/nuclear relationships: U.S.-Russia, U.S.-China, and a large number of other such relationships involving the nuclear-weapon-possessing states. If “arms racing” resumes, or, in the case of India and Pakistan, continues, how will the use of space, specifically for counterspace activities, impact on these races, and vice-versa? Will there be a deterioration in nuclear deterrence? Will an offensive strategy involving the targeting of an adversary’s nuclear-related satellites emerge? These are questions that beg answers in the near-term, as budgetary and policy decisions are being made. **It is also important to consider the role of diplomacy in dealing with international security for outer space.** Diplomacy, in the form of both self-restraint and in reassurance of potential adversaries regarding intentions, has been a part of the tool kit for managing competition in space from the beginning of the space age. Can effective “rules of the road” be further developed? The limited success, but slow pace, of multilateral efforts should not be seen as failure, however. Diplomacy is a difficult business, often characterized by a “one step forward, one step back” dynamic. There is some optimism to be found in the ongoing COPUOS effort, which while a slightly sideways approach, will have positive impacts on international security if successful. While the Disarmament Commission has little power, the advent of discussions there would provide a much needed multilateral forum for addressing the security issues for space given the decades-long impasse at the Conference on Disarmament. Finally, **one should not overlook the value of bilateral diplomacy, particularly among the Big Three space powers. Further work will also be needed to regulate the proliferation of technologies in the commercial sector**. This will likely involve export control, and measures for the management of “traffic” in space (STM). However, care must be given to weigh national security concerns against the needs of commercial industry to thrive in the international marketplace. There is a tendency in the national security community to try to “close the barn door after the horses have escaped” that must not be indulged in the space domain, given the reliance of the national security sector on commercial capabilities and technological innovation. IV. THE NEED FOR A “TIME OUT” To date, no state is deploying dedicated anti-satellite weapons. Testing of capabilities does not a program make. That said, the trend lines are currently negative and require both time and analysis to mitigate. It would be irresponsible for the United States, or any other country, to leap to conclusions about the “inevitability” of all-out war in space. A balanced strategy, which combines resiliency, deterrence, and diplomacy **will be required to** protect national security and **ensure international security**. While development of some anti-satellite capabilities for potential future use may be wise, a run-away space arms race is not desirable for any party. It may be that a viable modus vivendi could be a situation of “implied deterrence:” i.e., the development of dual-use technologies with inherent weapons capabilities in a transparent manner so as to provide the knowledge to others that, if pushed, antisatellite weapons could be deployed. And despite the difficulties to date, **the prospect of the multilateral establishment of norms shows some possibility of promise.** This involves the implementation of recommendations by the Group of Governmental Experts discussed above; of the COPUOS LTS (long-term sustainability) best practices work making progress by 2018; the successful efforts to codify the legal regime that are underway (e.g., those at McGill University in Montreal), and perhaps the UN Disarmament Commission addressing TCBMs in 2018. These efforts must be given a chance to ripen, however much frustration is involved in the processes. It can perhaps be helpful to think of the world as being surrounded on all sides by a large fishbowl, of indefinite dimensions in the outward direction, with the atmosphere at the intersection between “outer” space and the land and waters below. Looked at in this way, human activities in outer space have little room to be confined to a single state: the world as a whole is impacted by those activities. Accordingly, when dealing with outer space, traditional concepts of absolute roles for state sovereignty must inevitably be modified to serve the objectives of global peace, security and stability. Whether this reality will at some point lead to an appreciation that reliance on force, nuclear weapons in particular, cannot play the role in space that it does on the Earth, remains to be seen.

### 1NC – AT: Debris Advantage

#### Probability – 0.1% chance of a collision.

Alexander William Salter, Economics Professor at Texas Tech, ’16, “SPACE DEBRIS: A LAW AND ECONOMICS ANALYSIS OF THE ORBITAL COMMONS” 19 STAN. TECH. L. REV. 221 \*numbers replaced with English words

The probability of a collision is currently low. Bradley and Wein estimate that the maximum probability in LEO of a collision over the lifetime of a spacecraft remains below one in one thousand, conditional on continued compliance with NASA’s deorbiting guidelines.3 However, the possibility of a future “snowballing” effect, whereby debris collides with other objects, further congesting orbit space, remains a significant concern.4 Levin and Carroll estimate the average immediate destruction of wealth created by a collision to be approximately $30 million, with an additional $200 million in damages to all currently existing space assets from the debris created by the initial collision.5 The expected value of destroyed wealth because of collisions, currently small because of the low probability of a collision, can quickly become significant if future collisions result in runaway debris growth.

#### Time frame – Kessler effect 200 years away.

Peter Stubbe, PhD in law @ Johann Wolfgang Goethe University Frankfurt, ’17, State Accountability for Space Debris: A Legal Study of Responsibility for Polluting the Space Environment and Liability for Damage Caused by Space Debris, Koninklijke Brill Publishing, ISBN 978-90-04-31407-8, p. 27-31

The prediction of possible scenarios of the future evolution of the debris p o p ulation involves many uncertainties. Long-term forecasting means the prediction of the evolution of the future debris environment in time periods of decades or even centuries. Predictions are based on models84 that work with certain assumptions, and altering these parameters significantly influences the outcomes of the predictions. Assumptions on the future space traffic and on the initial object environment are particularly critical to the results of modeling efforts.85 A well-known pattern for the evolution of the debris population is the so-called Kessler effect’, which assumes that there is a certain collision probability among space objects because many satellites operate in similar orbital regions. These collisions create fragments, and thus additional objects in the respective orbits, which in turn enhances the risk of further collisions. Consequently, the num ber of objects and collisions increases exponentially and eventually results in the formation of a self-sustaining debris belt aroundthe Earth. While it has long been assumed that such a process of collisional cascading is likely to occur only in a very long-term perspective (meaning a time 1 n of several hundred years),87 a consensus has evolved in recent years that an uncontrolled growth of the debris population in certain altitudes could become reality much sooner.88 In fact, a recent cooperative study undertaken by various space agencies in the scope of i a d c shows that the current l e o debris population is unstable, even if current mitigation measures are applied. The study concludes:

Even with a 90% implementation of the commonly-adopted mitigation measures [...] the l e o debris population is expected to increase by an average of 30% in the next 200 years. The population growth is primarily driven by catastrophic collisions between 700 and 1000 km altitudes and such collisions are likely to occur every 5 to 9 years.89

#### Status quo solves – mitigation and remediation compliance growing.

Colombo et. al 18—Camilla Colombo, PhD, visiting academic in Spacecraft Engineering within Engineering and Physical Sciences at the University of Southampton; Francesca Letizia, PhD, Space Debris Engineer at ESA Space Debris Office; Mirko Trisolini, PhD, Postdoctoral researcher at the Politecnico di Milano Department of Aerospace Engineering; Hugh Lewis, PhD, Professor within Engineering and Physical Sciences at the University of Southampton (“Space Debris: Risk Mitigation,” from Frontiers of Space Risk: Natural Cosmic Hazards & Societal Challenges, Chapter 5, p 128-136)

5.4 MITIGATION MEASURES The space debris problem is nowadays internationally recognized, therefore mitigation measures are being taken and guidelines discussed. These can be divided into two classes: The avoidance or protection measures and the active and passive debris removal measures. The avoidance or protection measures include the design of satellites to withstand impacts by small debris, or the selection of safe procedures for operational spacecraft such as orbits with less debris, specific attitude configurations, or implementing active avoidance maneuvers to avoid collisions. On the other hand, measures for debris removal currently consist in limiting the creation of new debris (by prevention of in-orbit explosions and ensuring spacecraft subsystems reliability), to free some orbital implementing end-of-life disposal maneuvers protected regions, or to reenter in the atmosphere. Active debris removal is also being considered as a mean to stabilize the growth of space debris by removing from orbit some selected noncompliant objects. The e.Deorbit mission will target an ESA-owned derelict satellite in low orbit, capture it with a net or robotic arm technology, and reenter with a controlled atmospheric reentry (Biesbroek et al. 2014). Acknowledging the fact that the projected growth in the number of satellites orbiting the Earth will increase in the future, space agencies and international organizations have been discussing and building a set of guidelines to ensure the sustainability of future space activities. The InterAgency Debris Coordination Committee (IADC) was founded in 1993 by ESA (Europe), NASA (the United States), the Japan Aerospace Exploration Agency (JAXA, Japan), and the Roscosmos Russian Federation. As of January 2017, the IADC also includes the Italian Space Agency (ASI, Italy), the Centre National d'Études Spatiales (CNES, France), the China National Space Administration (CNSA, China), the Canadian Space Agency (CSA, Canada), the German Aerospace Centre (DLR, Germany), the Korea Aerospace Research Institute (KARI, South Korea), the Indian Space Research Organisation (ISRO, India), the National Space Agency of Ukraine (NSAU, Ukraine), and the UK Space Agency (UKSA, United Kingdom). This international cooperation decided a set of space debris mitigation measures (Inter-Agency Space Debris Coordination Commitee, 2002), which includes: 1. Limitation of debris released during normal operations. 2. Minimization of the potential for on-orbit breakups (resulting from stored energy after the completion of mission operations, or during the operational phases of the mission and by avoiding intentional destruction and other harmful activities). 3. Post Mission Disposal in particular in geosynchronous regions and for objects passing through the LEO region. 4. Prevention of on-orbit collisions. The IADC guidelines were presented to the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) and contributed to the creation of the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space to be considered for the mission planning, design, manufacture and operational phases of spacecraft and launch vehicle orbital stages” (United Nations Office for Outer Space Affairs 2010): 1. Limit debris released during normal operations. 2. Minimize the potential for breakups during operational phases. 3. Limit the probability of accidental collision in orbit. 4. Avoid intentional destruction and other harmful activities. 5. Minimize potential for post-mission breakups resulting from stored energy 6. Limit the long-term presence of spacecraft and launch vehicle orbital stages in the low Earth orbit region after the end of their mission. 7. Limit the long-term interference of spacecraft and launch vehicle orbital stages with the geosynchronous region after the end of their mission. 5.4.1 Mitigation Guidelines for Post Mission Disposal In this section we focus on the third of the measures dictated by the IADC, namely Post Mission Disposal. A “25-year rule” was defined to limit the presence of satellites in the LEO region to no more than 25 years after their decommissioning. The 25-year limit was selected to ensure that a reasonable reduction in lifetime could be achieved without greatly affecting satellite resources. After 25 years a satellite has to be removed from the LEO protected region by placing it in a graveyard orbit or by disposing of it through atmospheric reentry. According to the IADC Space Debris Mitigation Guidelines (Inter-Agency Space Debris Coordination Commitee 2002) if "a spacecraft or orbital stage is to be disposed of by re-entry into the atmosphere, debris that survives to reach the surface of the Earth should not pose an undue risk to people or property.” The low Earth orbit protected region (LEO region) is the spherical shell region that extends from the Earth's surface up to an altitude of 2000 km. The geosynchronous protected region (GEO region) is a segment of a spherical shell with a lower and upper altitude boundary of 200 km below and above the geostationary altitude of 35,786 km, and which is constrained by a latitude sector extending between plus and minus 15 degrees from south to north (Inter-Agency Space Debris Coordination Committee 2002; United Nations Office for Outer Space Affairs 2010). At altitudes below 600 kilometers, spacecraft with a conventional area-to-mass ratio (i.e., conventional satellites have a value of area-tomass ratio around 0.012 m?/kg) will reenter within a few years due to atmospheric drag. Intervention to remove and prevent further creation of debris above that altitude should therefore be the primary focus of passive mitigation measures. As described in the document on the “Requirements on Space Debris Mitigation for ESA Projects” (ESA 2008) and the "ESA Space Debris Mitigation Compliance Verification Guidelines” (ESA 2015), end-of-life measures can be distinguished in: (1) Disposal, (2) passivation, and (3) reentry. Required measures for disposal currently cover spacecraft in LEO and GEO through a series of Operational Requirements (OR) (ESA 2008): "OR-01. Space systems operating in the LEO protected region shall be disposed of by reentry into the Earth's atmosphere within 25 years after the end of the operational phase." "OR-02. Space systems operating in the GEO protected region shall be disposed of by permanently removing them from the GEO protected region.” The GEO disposal orbit should be almost circular (i.e., eccentricity less of equal to 0.005) and with a minimum perigee altitude above the geostationary altitude, which is given as a function of the solar radiation pressure coefficient of the space system at the beginning of its life and its cross-sectional area. This is done to take into account the eccentricity oscillation due to the effects of solar radiation pressure and to ensure that such oscillation would not make the orbit interfere with the GEO protected regions. "OR-03. Where practicable and economically feasible, space systems outside the LEO and GEO protected regions shall implement means of end-of-life orbit disposal to avoid long-term interference with operational orbit regions, such as the Galileo orbit." OR-04. Launcher stages shall also perform end-of-life disposal maneuvers by targeting "direct reentry as part of the launcher sequence.” Alternatively, they should be injected into a LEO orbit with a maximum reentry time of 25 years. As other space systems, they should be removed from LEO and GEO protecting region and orbit that interfere with other operational orbits such as the one of the Galileo orbit. OR-05. Passivation of the system (spacecraft or launcher stage) has to be completed within 2 months of the end of mission. End-of-life measures for reentry include: OR-06. "For space systems that are disposed of by reentry," an "analysis has to be performed to determine the characteristics of fragments surviving to ground impact, and assess the total casualty risk to the population on ground assuming an uncontrolled reentry.” OR-07. Such a casualty risk has to be lower than 10-4 if an uncontrolled reentry is targeted; otherwise if the casualty risk is higher than the threshold of 10-4, "a controlled reentry must be performed such that the impact footprint can be ensured over an ocean area, with sufficient clearance of landmasses and traffic routes." The rate of compliance of missions to the end-of-life mitigation guidelines was analyzed by the ESA Space Debris Office in 2017). Between 2006 and 2015, the rate of compliance of LEO missions (including naturally compliant missions and satellites performing end-of-life maneuvers) was 53.3% for the payloads (corresponding to 60.3% of the payload mass), reaching end of life in the LEO protected region (Frey and Lemmens 2017). The compliant objects, with a lifetime after decommissioning of less than 25 years, include naturally compliant objects due to their initial altitude well inside the Earth's atmosphere (this constitutes the biggest part of the compliant share), compliant objects after a deorbit maneuver, or spacecraft having performed a maneuver leading to a direct reentry. In terms of mass, this share is constantly sloping downward. Between 2007 and 2016, 71.6% of the rocket bodies reaching end of life in the LEO protected region was compliant, and this fraction has remained virtually unchanged for 8 years in a row despite an increase in end-of-life maneuver activity. 5.4.2 Passive End-of-Life Disposal In order to meet the mitigation guidelines LEO satellites at the end of their life would use the remaining propellant to perform either a perigeelowering maneuver (to decrease the orbit perigee well inside the Earth's atmosphere to guarantee a reentry within 25 years) or a direct reentry. Spacecraft in GEO are instead currently re-orbited to quasi circular orbits outside the GEO protected ring, with a perigee line aligned with the SunEarth direction (where possible) in order to bind the long-term oscillations in the eccentricity caused by solar radiation pressure. Recently, ESA funded projects on the design of disposal trajectories for medium Earth orbits (MEO) (Alessi et al. 2014; Rossi et al. 2015), highly elliptical orbits (HEO), and libration Earth orbits (LPO) (Armellin et al. 2014; Colombo et al. 2014; Colombo et al. 2015). These have demonstrated the possibility of exploiting natural orbit perturbations for designing passive mitigation strategies for debris disposal. Disposal strategies enhancing the effects of orbit perturbations have been further analyzed in LEO (Alessi et al. 2017), in MEO (Rosengren et al. 2015; Alessi et al. 2016; Armellin and San-Juan; Daquin et al. 2016; Gkolias et al. 2016), in GEO (Colombo and Gkolias 2017), and in HEO (Colombo et al. 2014; Armellin et al. 2015). Indeed, it was shown that, rather than performing an expensive maneuver to lower the perigee, the optimal maneuver should be given in a way to change the disposal orbit to another neighborhood orbit where the effect of orbit perturbations causes the orbit perigee to enter into the atmosphere. Indeed, the effects of luni-solar perturbation causes long-term oscillation on the eccentricity, which can be exploited so that the spacecraft's trajectory over a long period (from 5 to 70 years, depending on the initial orbit) could lead to natural reentry. This effect can be enhanced by solar radiation pressure, especially if considering a spacecraft equipped with large solar panels or a deployable reflective surface (Lücking et al. 2012, 2013). Moreover, resonances with the Earth's nonuniform potential can enhance the eccentricity growth effects. 5.4.2.1 An Example of End-of-Life Deorbiting Exploiting Luni-Solar Perturbations One of the most beautiful demonstrations of how natural dynamics can be enhanced is given by the INTEGRAL mission designed by ESA, the United States, Russia, the Czech Republic, and Poland. The INTErnational Gamma-Ray Astrophysics Laboratory, launched in 2002, gathered some of the most energetic radiation from space (Eismont et al. 2003). A reentry of this spacecraft with a pure impulsive maneuver would have not been possible due to the limited amount of propellant left onboard. In an ESA-funded study, the end-of-life disposal of INTEGRAL mission--expected to end in 2016-was designed with a time window for disposal between January 1, 2013 and January 1, 2029. Reentry solutions with a delta-velocity requirement below 40-50 m/s were found (Colombo et al. 2014). The main perturbations acting on the dynamics of the reentry were luni-solar perturbations, which affect the evolution of eccentricity, inclination, and anomaly of the perigee measured with respect to the Earth-Moon plane. It was shown that depending on the set of initial elements, which depends on the date the reentry maneuver is performed, the proposed maneuver would then aim at further increasing or decreasing the eccentricity. In particular, if we focus on the natural evolution of the eccentricity under luni-solar perturbation and Earth's oblateness, when the nominal eccentricity is low, the optimal reentry maneuver further decrease the eccentricity value; as a consequence, the following long-term propagation will reach a higher eccentricity, corresponding to a reentry. In this case, the maneuver is more efficient (i.e., lower delta velocity is required) (Colombo et al. 2014). Once the initial disposal maneuver is performed, the spacecraft evolves under natural perturbations and the reentry can then be semicontrolled. The high inclination of HEOs represents an advantage as the final reentry phase can target regions at higher latitudes on the Earth's surface thereby reducing the ground hazard. In the case of HEOs, reentry is caused by luni-solar perturbation (not air drag), therefore the orbit reenter with quite a high eccentricity (high apogee and low perigee) and does not circularize. Due to the oscillations in eccentricity, the next optimal window for injecting the spacecraft into a reentry trajectory is between 2013 and the first half of 2018 for a final reentry in 2028. After that, the required maneuver would increase until reaching a next window for performing the maneuver between the second half of 2021 and the first half of 2026, for a reentry in 2028. These analytical studies were used for high fidelity parametric analyses performed by the ESA (Merz et al. 2015) to investigate the effect of a maneuver at apogee to change the perigee altitude. The final maneuver sequence was given at the beginning of 2015 and split into three major burns plus a touch-up for final fine-tuning. The spacecraft is now on its course to reentry in 2028 (see Figure 5.11).

#### The probability of collisions are relatively low, leaving us with a large window of opportunity to intercept these events Colin Stuart 7/9/21

{Colin Stuart, astronomy author & speaker, journalist for The Guardian, New Scientist, Wall Street Journal & European Space Agency, “Space Junk: Is it a disaster waiting to happen?”, <https://www.sciencefocus.com/news/space-junk-is-it-a-disaster-waiting-to-happen/>}

A UN report from 2013 projected that catastrophic **collisions** may **occur once every five to nine years** over the next two centuries. It’s already happening. In 2009 an Iridium communications satellite collided with the derelict Russian Kosmos 2251 satellite destroying both spacecraft. That event happened at about the same altitude as one of the biggest dangers: the eight-tonne Earth observation satellite Envisat. **It will remain in orbit for the next 150 years and there’s a 15 to 30 per cent chance that it will collide with another piece of space junk in that time. Kessler syndrome doesn’**t necessarily have to **play out quickly**. These **impacts** could be the first domino, with crashes **ramp**ing **up** significantly **over time.**

#### Even a worst-case Kessler syndrome would have little effect—the math checks out.

Fange 17

Daniel Von Fange, senior enginneer @ Origin Protocol, 5-21-2017, "Kessler Syndrome is Over Hyped," Braino.org, <http://braino.org/essays/kessler_syndrome_is_over_hyped/> //MLT

Let’s imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000. So even in the worst case, we don’t lose access to space. Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely. Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner. Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler. Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect. I’m removing Kessler Syndrome from my list of things to worry about.

#### No space war – MAD and Economics Wordsworth 15

Wordsworth, Rich. "Why We'll Never Fight a Real-Life Star Wars Space Conflict." Gizmodo UK. December 18, 2015. Accessed October 09, 2016. <http://www.gizmodo.co.uk/2015/12/why-well-never-fight-a-real-life-star-wars-space-conflict/>. JD\

So Why Won’t It Happen? Well, never say never. You might not make to the end of this paragraph before the sky lights up and the world goes dark. But there are some good reasons to be optimistic that won’t happen. One reassuring factor is that the more other countries develop their militaries, the more dependent on networks they become as well. China is developing its own drone programme, and so is Russia, which will both presumably be dependent on satellites to operate. And the more their (and our) economies and business interests develop, the more everyone will rely on satellites to further their economic ambitions. In the event that countries were to start knocking out each other’s satellites on a large scale, the consequences across the board – for everyone – would be disastrous. It would also be expensive in the short term. Getting things into orbit – peaceful or otherwise – still isn’t cheap, which is why only a handful of countries regularly do so. And if you want to blow up a network of many satellites today (as you would have to in a first strike, to ensure other satellites couldn’t pick up the slack), launching small satellites or missiles into orbit is the only practical way to do that – arming satellites with their own weaponry just isn’t financially or technologically feasible on a grand scale. We are, happily, a long way from a Death Star.

#### Their internal link is about anti-satellite warfare, that’ll never happen – it’s too expensive, satellite MADS deters, hacking is easier, and no country is considering it. – look at steer 20

#### Wordsworth 15

Rich Wordsworth, Why We'll Never Fight a Real-Life Star Wars Space Conflict, 18 Dec 2015, Gizmodo.com EE

Well, never say never. You might not make to the end of this paragraph before the sky lights up and the world goes dark. But there are some good reasons to be optimistic that won’t happen. One reassuring factor is that the more other countries develop their militaries, the more dependent on networks they become as well. China is developing its own drone programme, and so is Russia, which will both presumably be dependent on satellites to operate. And the more their (and our) economies and business interests develop, the more everyone will rely on satellites to further their economic ambitions. In the event that countries were to start knocking out each other’s satellites on a large scale, the consequences across the board – for everyone – would be disastrous. It would also be expensive in the short term. Getting things into orbit – peaceful or otherwise – still isn’t cheap, which is why only a handful of countries regularly do so. And if you want to blow up a network of many satellites today (as you would have to in a first strike, to ensure other satellites couldn’t pick up the slack), launching small satellites or missiles into orbit is the only practical way to do that – arming satellites with their own weaponry just isn’t financially or technologically feasible on a grand scale. We are, happily, a long way from a Death Star. “I don’t think [a large first strike] would be financially too costly [if you’re] thinking about kinetic energy weapons and the air-based or ground-based lasers,” says Jasani. “It’s viable. But if you say, ‘I’m going to put an [ASAT] weapon [permanently] in orbit’, we are then getting into very expensive and very complicated technology. So my guess is that in the foreseeable future, what we are going to focus on are the kinetic energy weapons and possibly lasers that could blind satellites or affect, for example, the solar panels. That kind of technology will be delivered in the foreseeable future, rather than having lasers in orbit [like] the Star Wars kind of thing.” But there’s another, possibly even more persuasive reason that a kinetic war in space may not happen: it’s just so much easier – and less damaging – to mess with satellites without getting close to them. “Jamming from the ground is not difficult,” says Quintana. “If you look at the Middle East, pick a country where there’s a crisis and the chances are that the military in that country has tried to jam a commercial satellite to try and avoid satellite TV channels broadcasting anti-government messages.” “My guess is that by the time we are ready for space warfare, I think you may not be banking on your hit-to-kill ASATs, but more on [non-destructive] high-energy laser-based systems,” Jasani agrees. “[Space debris] affects all sides, not just the attacked side. The attacking side will have its own satellites in orbit, which might be affected by the debris [of its own attack].” And if you really need to remove an enemy’s satellite coverage, you can always try to flatten or hack the control stations on the ground, leaving the satellites talking with no-one to listen. “I don’t think physically blowing things up from the ground is something that people are looking at again,” says Quintana. “Countries and governments try to find means other than physical conflict to achieve their strategic ends. So as space becomes more commercial and more civilian and as more scientific satellites go up, then you’ll find that states will not seek to directly attack each other, but will seek other means. “It may just be that they will try to cyber-attack the satellites and take them over, which has been done in the past. It’s much easier to physically or cyber-attack the ground control station than it is to attack the satellite itself - so why would you not look to do that as a first port of call and achieve the same ends?” Ultimately, then, what might keep us safe from a war in space isn't the horror of explosives in orbit, but a question of cost and convenience.