POSTURING AMERICAN SPACE DETERRENCE FOR THE SECOND NUCLEAR AGE

BY

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APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, the Air National Guard, or Air University.

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This study began accidentally when I stumbled across a Congressional testimony by Dr. Peter V. Pry of the EMP Commission in 2017. It was the first time I had ever heard of North Korea potentially having the intention or the capability to use a fractional orbital bombardment system (FOBS) to deliver an electromagnetic pulse (EMP) weapon from space. Given my previous research into space deterrence at low threshold kinetic threat levels, this seemed to be an interesting test case to see how the tailored deterrence model I developed in 2015 might relate in the higher thresholds of nuclear use in space. This led to deeper research beyond deterrence theory into the concept of space superiority, our nation's current views on it, and the relation to space deterrence and homeland defense.

As my research began, I wanted to be certain my references were accurate and the scenario plausible. To that end, I would like to thank David Meteyer, and Dr. M. V. "Coyote" Smith and Dr. Brent Ziarnick of the Air Command and Staff College, Schriever Scholars Program for their insights and guidance through this project. With respect to the basics of the technology and threat of electromagnetic pulse, I would like to thank Dr. Peter V. Pry, William Graham and Jack Liu for their perspectives and expertise in this field. Special thanks to Dr. Marc Dinerstein, for their editorial suggestions throughout the writing and editing process. Also, I would like to thank Paul Nantulya for his expertise and suggestions with respect to analyzing North Korean strategic culture and its impacts upon nuclear and space strategy. Also, I would like to thank Col Stephen Renner (PhD), and Dr. James Kiras, for their aid in navigating the development and editing of this thesis.

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ABSTRACT

Since the end of the Cold War, thinking about space deterrence at the nuclear threshold has been virtually ignored as unrealistic and unthinkable. However, with the advent of a second nuclear age, where multiple players are now finding renewed utility in thermonuclear weapons coupled with proliferated missile technology and space access, the former concepts of escalation control, and recent concepts like space mission assurance and resilience, may not be sufficient to deter nuclear threshold space deterrence scenarios propagated by rogue states. Using comparative analysis and theory testing methodology, this research will explore the history of United States' posture and thoughts regarding space and nuclear deterrence with an alternative framework for space deterrence: a tiered, tailored framework. A more tailored approach, based upon strategic cultural and behavioral analysis behind force postures of offensive space superiority and damage limitation capability enable a more flexible and survivable posture for Tier 1 space deterrence in the second nuclear age.

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Introduction

Recently, the Council on Foreign Relations published a contingency planning memorandum entitled *Dangerous Space Incidents*. This memorandum stated that "based on capabilities, intent, and history of malicious or destabilizing behavior, the states most likely to understand [and plan for] destabilizing actions [in space are] China…North Korea, and Iran."[1] These states have increasingly used "jamming, hacking, spoofing, and lazing of space and terrestrial based sensor, transmitters, and data links."[2] In addition to these reversible means of attack against United States critical space infrastructures, China and Russia are fielding capabilities such as "direct ascent or 'co-orbital' anti-satellite (ASAT)" weaponry to achieve strategic objectives such as counter-intervention or anti-access campaigns.[3] While all of these assessments are correct, it is interesting to note that the Council on Foreign Relations acknowledges another threshold of dangerous attack options, but chose not to assess it: "an electromagnetic pulse event in space."[4] Why? The members of the Council assessed this scenario to be an "outlier" that many "U.S. officials consider unrealistic."[5] Is space-borne electromagnetic pulse really an outlier that should be ignored simply because of its high threshold use of nuclear weapons in space?

Since the end of the Cold War, there has been little emphasis on protecting the United States and its critical space infrastructure from an

1. Micah Zenko, *Dangerous Space Incidents: Contingency Planning Memorandum #21* (New York: Council on Foreign Relations, April 2014), 1.
2. Ibid.
3. Sam J. Tangredi, *Anti-Access Warfare: Countering A2/AD Strategies* (Annapolis, MD: Naval Institute Press, 2013), 88.
4. Zenko, *Dangerous Space*, 1.
5. Ibid., 2.

electromagnetic pulse attack from space; that means it is hard to find any recent thinking about it. Perusing the literature on the subject, one finds no current scholarship on the credibility or readiness for such a threat. In recent years, scholars of nuclear age decision making and strategy, such as Kerry Kartchner and Michael S. Gerson, have begun to question the assertion that nuclear use is unrealistic.[6] They argue that the utility of the nuclear weapon is on the rise in military and foreign policies across the world due to a shift in the strategic order they refer to as the "second nuclear age."[7] Due to this re-emergence of the importance of the nuclear weapon by scholars like Kartchner and Gerson, should space strategists and scholars reconsider scenarios and potential threats such as electromagnetic pulse from space?

Paul Bracken addresses this lack of literature on the subject when he states, "The problem facing the world in the second nuclear age is that few people have thought about how atomic weapons reshape strategic rivalries in the world's most contested regions."[8] His observation is a timely one as space has been recognized as a contested region of international activity since at least 2011. This author argues that with great power politics returning to prominence in strategic decision making, strategists should look at this topic from a standpoint of deterrence and warfighting.

Since the 2007 Chinese destructive ASAT test, some in the United States Department of Defense (DoD) have called for a new strategy, shifting from one based on a view of space as a sanctuary to one of posturing American national security space for contested, degraded, and

6. Kerry M. Kartchner, Michael S. Gerson, "Escalation to Limited Nuclear War in the 21st Century," in *On Limited Nuclear War in the 21st Century,* ed. Jeffrey Larsen, Kerry M. Kartchner (Stanford, CA: Stanford Security Studies, 2014), 145.
7. Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New Power Politics* (New York: Times Books, 2012), 10.
8. Ibid.

operationally limited capabilities that support terrestrial warfighting.[9] However, these analyses and posture recommendations are based upon a view of space capabilities as force enhancers and assume that norms of behavior and treaty obligations such as the Outer Space Treaty will prevent the need to think about the unthinkable involving nuclear weapons in and from space. The author argues this is a huge gap for analysis of the strategic environment, potential adversaries and strategy.

This thesis examines one such scenario brought before Congress in 2017: North Korea's development and potential deployment of electromagnetic pulse weapons employed from satellites or fractional orbital bombardment systems (FOBS).[10] The advent of a "second nuclear age," wherein the synergy of nuclear weapons and space power capabilities are converging into regional and great powers' arsenals, provides a different context for strategic planners. Due to this different geopolitical context, it is imperative for strategists and policymakers to review old thinking regarding deterrence, war readiness, and space superiority that until recently may have been considered relics of the Cold War.

To provide an alternative view of this issue, this thesis uses a previously developed framework concerning space deterrence at the kinetic ASAT threshold. This framework for credible deterrence, also known as the tiered, tailored framework, is tested through analysis of North Korean strategic culture to gain insight into its strategic decision calculus and understand the rationale for why North Korea is pursuing

9. Air Force Space Command, *Space Mission Force: Developing Space Warfighters for Tomorrow.* white paper (Peterson AFB, CO: Headquarters, Air Force Space Command, 29 June 2016), 2.
10. Peter Vincent Pry, *Empty Threat or Serious Danger: Assessing North Korea's Risk to the Homeland*, Statement for the Record to Committee on Homeland Security, Subcommittee on Oversight and Management Efficiency Hearing, 115th Cong, 2d sess, 12 October 2017, 4.

space-based electromagnetic pulse weapons and postures of pre-emptive strike.[11]

It must be noted that while this research study is important to fill the gap in second nuclear age thinking with regards to the space environment, there are some limitations to the scope and breadth of this study.

First, it is very difficult to get primary sources from the North Korean military and political elite. As a result, the conclusions regarding its strategic culture rely on secondary reports from credible institutions, commissions and congressional committees. In addition, many of the current declared experts are less than credible in the field of Korean culture and government, and effects upon spacecraft of electromagnetic pulse (EMP).[12] As a result, this author found the EMP Commission's members and reports more credible than assessments from groups such as the Center for the Study of Weapons of Mass Destruction at National Defense University, or the U.S.-Korea Institute at Johns Hopkins University.[13] Finally, it must be noted that only the vertical dynamic of escalation, and not the horizontal, is being explored. The horizontal escalation dynamic is an important area of study also lacking in the field of space deterrence and war readiness strategy that adds potential great amounts of complexity to such a scenario, but it is out of the scope of this project.

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11. Christopher Stone, *Reversing the Tao: A Framework for Credible Space Deterrence*, (CreateSpace Publishing, 2016): xix.
12. During the interview process with Jack Liu and Patrick Terrell, it appeared that their expertise lay in fields other than nuclear engineering or Korean strategic thought. This made their claims appear less credible.
13. Most members of the EMP Commission have academic and professional credentials in EMP, nuclear weapons testing and spacecraft design. Some worked for the Nuclear Weapons Complex during the Cold War, while others led projects such as the Strategic Defense Initiative at higher levels of government service. While some may argue with their concerns and views, one cannot argue with their experience and professional credentials.

Chapter 1 provides a historical review of the United States national security space posture since 1991 and the end of the Cold War. It highlights how, despite shifts in the strategic environment regarding space power and deterrence, leaders and strategists continued to pursue an ineffective policy of strategic restraint and resilience. This policy enabled potential adversaries to pursue all ranges of counterspace capabilities, from reversible interference to kinetic and nuclear space weapons, whose purposes are to disrupt, degrade, or destroy American military and political influence in key regions of the world.

Chapter 2 provides an overview of the second nuclear age and deterrence theories adapted for the new age by the "third wave" school of deterrence theorists. In addition, this chapter extends a background on the development and components of the tiered, tailored framework for credible space deterrence. This framework presents a means for a strategic analysis overview, a framework for assessing a potential adversary, and a methodology for reviewing potential escalatory environments at various levels of space deterrent scenarios.

Chapter 3 uses this framework of strategic analysis for tailoring deterrence on specific adversaries, like North Korea. It assesses the North Korean regime's strategic culture and how it affects its decisions for the pursuit of nuclear, missile, and space power capabilities. In addition, it highlights how these views of the world and the weapons themselves influence its posture and doctrines of pre-emptive strike in a crisis.

Finally, Chapter 4 reviews the strategic profile assembled through the tiered, tailored framework process on North Korea to conclude the type of posture needed to be ready for a scenario involving a Tier 1 Deterrence scenario like an EMP from space. In addition to posture, the author explores implications of why this type of thinking regarding deterrence in space in second nuclear age dynamics is important for any

future national security space strategy. The objective of this study is to impart a willingness to think about the unthinkable in space, and to recognize that the age of strategic atrophy is over.[14] The United States cannot have a force capable of lethality and war readiness in space if we do not consider contingencies at high thresholds, including nuclear use.

14. Department of Defense, *Summary of the 2018 National Defense Strategy of the United States: Sharpening the American Military's Competitive Edge* (Washington, D.C.: Government Printing Office, 2018), 1.

Chapter 1

Development of Post-Cold War National Security Space Posture

Since 1991, space power primarily has been an enabler and force multiplier for terrestrial operations. Despite the shift in the strategic environment from a post-Cold War environment perceived as benign to one now called by some scholars the "second nuclear age," senior space leaders and policymakers are still holding fast to this outdated view of space power, space deterrence, and the international system. This chapter reviews the history of the present view of space power, space deterrence, and space superiority, and will demonstrate that this conception is not only flawed, but dangerous for the future of America's critical space infrastructure and the homeland itself.

Acceptance of a Contested, Degraded, Operationally Limited Posture: Historical Review

Following the fall of the Soviet Union, space leaders and policymakers concluded that no credible threat existed to the U.S. space enterprise.[1] Throughout the Cold War, the prime threat to U.S. satellite constellations had been Soviet ASAT weapons, lasers, and other nuclear threshold weapons systems such as EMP deployed onboard the FOBS.[2] The FOBS was a hybrid weapon that combined the technology of an intercontinental ballistic missile (ICBM), with longer range and sub-orbital (or fractional orbital) flight profiles that provided a means of attacking the United States' early warning network from the south.[3]

1. Joan Johnson-Freese, *Heavenly Ambitions: America's Quest to Dominate Space*, (Philadelphia, PA: University of Pennsylvania Press, 2009), 51.
2. House, Office of Technology Assessment, *Anti-Satellite Weapons, Countermeasures and Arms Control*, (Washington D.C., Government Printing Office, September 1985), 2-8.
3. Stefan T. Possony and J.E. Pournelle, *The Strategy of Technology: Winning the Decisive War*. (Cambridge, UK: Cambridge University Press, 1970), 125-127.

This process meant it would have been possible for the Soviets to detonate an EMP weapon over the United States to burn out its electrically based industrial and command and control infrastructures prior to launching a full nuclear strike.[4] Other more conventional, non-terrestrial counterspace weapons, such as co-orbital ASATs, also threatened strategic early warning, command and control communications of worldwide deployed forces, and global positioning satellites needed for timing signals and precision bombardment.[5] These Soviet-era weapons were being dismantled as the new Russian Federation struggled to rebuild its economic and political systems, while Western nations hoped for its integration into the new, globalizing system.[6] As a result, the hope for space becoming a sanctuary from conflict and a global common appeared likely.[7]

Assuming the removal of any credible threat in the foreseeable future, space leaders decided that as part of the force drawdown, it would be advantageous to promote a policy position assuming sanctuary in space.[8] Treaties like the Nuclear Non-Proliferation Treaty (NPT), Chemical Weapons Convention, and Missile Technology Control Regime, as well as Cold War era treaties such as the Outer Space Treaty of 1967, which banned the basing of weapons of mass destruction in space, were postured to be the foundation of a new world order.[9] This new order would enable all nations to participate in the development of space, lead to rules and norms of responsible behavior, and ensure the use of space

4. William R. Graham, "North Korea Nuclear EMP Attack: An Existential Threat," *38 North Online*, https://www.38north.org/2017/06/wgraham060217/ (Accessed on December 29, 2017).
5. House, Office of Technology Assessment, *Anti-Satellite Weapons, Countermeasures and Arms Control*, Washington, D.C.: Government Printing Office, September 1985, 6.
6. G. John Ikenberry, *Liberal Leviathan* (Princeton, NJ: Princeton University Press, 2011), 116-117.
7. Johnson-Freese, *Heavenly Ambitions*, 133.
8. Bruce DeBlois, "Space Sanctuary: A Viable National Strategy," *Air and Space Power Journal* (Winter 1998): 52-53.
9. DeBlois, "Space Sanctuary: A Viable National Strategy," 41-45.

for civil, military, or commercial purposes. Moreover, the ultimate goal would be the prevention of the "weaponization" of space into perpetuity.[10] Those supporting this move in the national security arena asserted that this posture of norms and sanctuary-based policy would be sufficient to sustain America's space power advantage. Eventually, this concept of strategic thought was labeled "strategic restraint."[11]

Strategic restraint is a concept that proponents argue will enable a stable, secure environment in space.[12] Such stability would be accomplished by the United States serving as the example, and not pursuing any means of self-defense in space, much less any offensive space power capable of seizing control of the "high ground" for the benefit of the United States alone.[13] Proponents argue that if the U.S. were to pursue offensive counterspace capability, the international system in space could be destabilized and the U.S. would be considered an aggressive hegemon.[14] However, this idea would only work in an international system in which every state accepts the rules, and bases governance and norms of behavior on a U.S.-led international order.[15] Strategic restraint does not address the potential rise of emergent or revisionist powers nor the revival of great power politics.

Due to the political and economic currents of the day, the strategic restraint view of space strategy prevailed and terms such as space superiority, pre-eminence, and dominance either fell out of favor, or were widely criticized when proposed as counter-strategies for the future. One example of this view is the Atlantic Council's report from 2016 which argues that strategic restraint has begun to unravel and that strategic

10. Ibid., 51.
11. Theresa Hitchens and Joan Johnson-Freese, *Towards a New National Security Space Strategy: Time for a Strategic Rebalancing* (Atlantic Council, 2016), iii
12. Ibid., 1.
13. Ibid., 53.
14. Johnson-Freese, *Heavenly Ambitions*, 145.
15. Ikenberry, *Liberal Leviathan,* 102-109.

restraint is still required to "re-balance" the space environment away from U.S. advantage.[16] In its place, a term that seems interchangeable with space superiority, but is in fact quite different, came into use: space security.

Despite its martial sound, space security is not about national security or achieving national strategic interests.[17] "Space security" is defined by the Space Security Index as "the secure and sustainable access to, and use of, space and freedom from space-based threats."[18] Its adherents argue that this focus is not based on "the interests of particular national or commercial entities, but the security and sustainability of outer space as an environment."[19] Space security is a concept that combines environmental concerns pertaining to debris generation with arms control advocacy. Its objectives are to ensure that conventional space weapons, those not yet banned by international treaty, are never deployed by the United States or its allies.

Throughout the 1990s and early 2000s, America's use of U.S. space systems such as Global Positioning System (GPS) and commercial satellite communications (SATCOM) grew exponentially until American society, as well as the armed forces, became dependent upon them for day-to-day life.[20] In addition, national sectors such as banking, finance, agriculture, and energy became interdependent upon critical space infrastructures.[21] Due to the perceived low threat future, and the transition from deterrence via nuclear weapons to conventional deterrence and coercion, the United States decided to not invest in

16. Hitchens, Johnson-Freese, *Time for a Strategic Rebalancing*, iv.
17. Space Security Index 2017, 1.
18. Ibid.
19. Ibid.
20. Stone, *Reversing the Tao*, 52.
21. Matthew Jude Egan, "Anticipating Future Vulnerability: Defining Characteristics of Increasingly Critical Infrastructure-like Systems," *Journal of Contingencies and Crisis Management*, (Vol 15, No 1, March 2007), 8.

hardening the nation's terrestrial infrastructure, or its space-based enablers from the dangers of EMP or lower threshold space attacks.[22]

Rising revisionist powers such as China noticed the successful use of formerly strategic space support capabilities in the 1991 Persian Gulf War and its greater integration into American and Western society.[23] These states found space power to have become the United States' "soft ribs," vulnerable enough for a rising power to target for its counter-intervention or future expansionist strategies.[24]

By 2000, it appeared to Congress and the Defense Department that inter-state espionage and technological information theft by China and others gave Congress great concerns that the new, more globalized order was not being as effectively implemented for space power and national security strategy as expected. As a result, Congress convened a commission to investigate the future posture needed to protect the advantages that space provided the United States and its allies. The Rumsfeld Commission concluded that the period of harmony between states in space was over and a "new era of space" had begun.[25] China began to engage in the first stages of its lawfare program against the potential revival of space superiority programs in the United States.[26] These efforts were "attempts to restrict U.S. space activities through international regulations" and treaties.[27] In addition, new Chinese anti-satellite weapons programs were being pursued in tandem with lawfare activities. Despite these warning signs, the Rumsfeld Commission's final

22. Johnson Freese, *Heavenly Ambition*, 51
23. Stone, *Reversing the Tao*, 48.
24. Ashley Tellis, "China's Military Space Strategy," *Survival: Global Politics and Strategy* 49, no. 3 (2012): 49.
25. House, *Report of the Commission to Assess United States National Security Space Management and Organization*, (Washington, D.C., Government Printing Office, January 11, 2001), 11.
26. Orde F. Kittrie, *Lawfare: Law as a Weapon of War*, (Oxford, UK: Oxford University Press, 2016), 165.
27. House, *National Security Space Management*, xii.

report underscored that "evaluation of the threat to U.S. space capabilities currently lacks priority in the competition for collection and analytic resources."[28]

This lack of attention toward the critical space infrastructure of the United States "could leave the U.S. vulnerable to surprises in space and could result in deferred decisions on developing space-based capabilities due to the lack of a validated, well-understood threat."[29] The Space Commission report was one of the first to notice that the concept of "mutual vulnerability" was not mutual and instead was "offering an inviting target" that very well could lead to the U.S. facing what the Chinese term a "grave aftermath."[30] The Commission recommended that the Department of Defense acquire and develop space forces that could "be employed in independent operations or in support of air, land, and sea forces to deter and defend" against attacks.[31] This recommendation for space forces meant the development of a "Space Corps" and possibly an independent military department for space, but in the near term, the Rumsfeld Commission viewed the development of space forces to achieve space superiority and active defenses as required. Most of the recommendations by this commission and others later in the decade were never implemented, and those that were, such as the creation of a DoD/Intelligence Community National Security Space Office, were eventually reversed and discontinued by Air Force and Intelligence Community (IC) leaders.[32]

28. House, *National Security Space Management*, xiii.
29. Ibid., xiii.
30. Christopher Stone, "Defending Critical Space Infrastructure," *Space News Magazine*, 5 December 2016, http://www.spacenewsmag.com/commentary/defending-critical-space-infrastructure/.
31. House, *National Security Space Management*, xxxiii.
32. Secretary of the Air Force Michael B. Donley, Memorandum Regarding Headquarters Air Force Space Management and Organization, 25 August 2010, 3.

The Advent of the National Security Space Strategy

Following the 2007 kinetic ASAT test by the Chinese, it became clear to many in government that the time had come to acknowledge that space was quickly moving away from a sanctuary to a more contested environment.[33] Due to this awareness, the George W. Bush administration's 2006 National Space Policy recognized that "those who effectively utilize space will enjoy added prosperity and security and will hold a substantial advantage over those who do not."[34] The Bush administration decided that "freedom of action in space is as important to the United States as air power and sea power."[35] Therefore, the United States "must have robust, effective, and efficient space capabilities [to] deter others from impeding those rights or developing capabilities intended to do so, take those actions necessary to protect its space capabilities, respond to interference, and deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests."[36] Authors and commentators invested in globalization and space security ideology began to assert that the Chinese and Russian governments' rationale for development of counterspace weapons systems was the 2006 policy's imperialist rhetoric about space, which to them was seen as a global common, the inheritance of all mankind.[37] These comments failed, however, to acknowledge that Chinese and Russian counterspace programs had been ongoing since the early 1990s despite the adherence of strategic restraint and the U.S. no longer pursuing active counterspace programs.[38] The Obama administration, starting in 2009, halted the

33. Stone, *Reversing the Tao,* 1.
34. National Security Presidential Directive 49, National Space Policy of the United States, 31 August 2001, https://faz.org/irp/offdocs/nspd/space.html.
35. Ibid.
36. NSPD 49, cited in Johnson Freese, *Heavenly Ambitions*, 104.
37. Theresa Hitchens, "The Perfect Storm: International Reaction to the Bush National Space Policy," *High Frontier: The Journal for Space and Missile Professionals*, (March 2007), 21.
38. Stone, *Reversing the Tao,* 49.

policy of the Bush administration and space policy reverted to the international approach of rules-based norms of behavior. Strategic restraint was resuscitated as national policy.

The 2011 National Security Space Strategy (NSSS) was based upon a concept of deterrence and diplomatic soft power known as "layered deterrence."[39] Layered deterrence consisted of a "top down diplomatic initiative" that would demonstrate to the world the U.S. government's intention to walk back the language of the 2006 Bush policy and link directly into the international system, rather than national interests, for its foundations.[40] The layered deterrence model is based on a report published by the Eisenhower Center for Space and Defense Studies at the U.S. Air Force Academy in 2010. The concept was to "dissuade and deter the development, testing and employment of counterspace systems and prevent and deter aggression against space systems and supporting infrastructure that support U.S. national security."[41] But what are those layers?

The NSSS consists of elements based primarily in the diplomatic instrument of power, not the military instrument of power. It includes: deterrence through norms; deterrence through entanglement; deterrence through resilience; and deterrence through response.[42] Below is a synopsis of each of these elements.

Deterrence through norms refers to the DoD's role in promoting the "responsible use of space" and condemning "activities that threaten the safety, stability and security of space domain."[43] The NSSS also states that the DoD would "preserve our advantage" as well as deter

39. Department of Defense, *National Security Space Strategy* (Washington, D.C.: Government Printing Office, 2011),10.
40. Ibid., 2.
41. Ibid., 10.
42. Stone, *Reversing the Tao,* 3.
43. *National Security Space Strategy*, 2.

potential aggressors from interfering with or attacking the United States' or allied space systems. According to Ambassador Gregory Schulte, the Deputy Assistant Secretary of Defense for Space Policy at the time, the operative effect of this element of space policy comes through the process of defining what is and is not responsible behavior.[44] As part of this effort, the Departments of Defense and State, pursued promotion of an International Code of Conduct as well as the advancement of what became known as transparency and confidence building measures (TCBM).[45] Enforcement of these norms would occur through the diplomatic and economic isolation of irresponsible actors. International pressure based on non-legally binding agreements are a deterrent against physical and legal attacks against the United States, according to the authors of the NSSS.[46]

Second is deterrence through entanglement. The execution of this layer of deterrence consists of the creation of "alliances with other space faring nations…and international organizations."[47] In the minds of the authors of the NSSS, the deterrent effect would come from a perception of solidarity between allied states should satellite constellations come under attack or purposeful interference. The fact that those spacecraft have the support and utilization of multiple nation states would make it less likely that the adversary would strike these assets.[48] These alliances, it should be noted, do not provide any active space defenses or retaliatory terrestrial options for enforcement of such a deterrent mechanism.[49] These alliances are only agreements between the U.S. and allied states for interdependency upon U.S. and allied systems. One example of this

44. Gregory Schulte, "Protecting Global Security in Space," (presentation, S. Rajaratnam School of International Studies, Nayang Technological University, Singapore, 9 May 2012), 5.
45. Ibid., 11.
46. Ibid., 5.
47. *National Security Space Strategy*, 3.
48. Schulte, *Protecting Global Security in Space*, 5.
49. Stone, *Reversing the Tao*, 4.

interdependency is the U.S.–Australia agreement to share Wideband Global SATCOM satellite bandwidth.[50] Despite the lack of counterspace enforcement or defensive mechanisms, the NSSS authors concluded that this layer of "deterrence" would "alter the enemy's targeting calculus."[51]

Third is the "deterrence through resilience." Resilience would be more a "cost effective protection" measure against critical space infrastructure defense than an effort to create a space force capable of space superiority.[52] These perceived cost-effective efforts would protect space systems that supported conventional deterrence and nuclear command and control through measures such as the improvement of the U.S. "intelligence posture" via space situational awareness capabilities (SSA) and disaggregation.[53] SSA-based intelligence would enable the U.S. to "better monitor and attribute activities in the space domain [and] maintain awareness of…the capabilities, activities and intentions of others."[54] Resilience through "disaggregation" states that rather than building large, exquisite spacecraft for force-enhancement functions of terrestrial operations, changing the architectures to include smaller, dispersed satellites or hosting payloads on commercial satellites would create a means to maintain some operations capability following an attack.[55] Disaggregated architectures would serve as a denial of the benefit of any attack upon U.S. critical space infrastructure. Air Force Space Command, in a 2013 white paper, supported this view by stating that "resilience [and disaggregation as part of resilience] serves as a

50. Christopher Stone, "Security through vulnerability? The false deterrence of the National Security Space Strategy," *Space Review*, 13 April 2015, http://www.thespacereview.com/article/2731/1.
51. Stone, *Reversing the Tao*, 4.
52. Air Force Space Command, *Resiliency and Disaggregated Space Architectures,* white paper, (Peterson AFB, CO: Headquarters Air Force Space Command, 13 April 2013), 10.
53. Ibid., 12.
54. *National Security Space Strategy*, 17.
55. *Resiliency and Disaggregated Space Architectures*, 8.

deterrent, which may be the best way to preserve our capability by avoiding an attack."[56]

The fourth element of deterrence is labeled "deterrence through response."[57] The NSSS states that this deterrent was to follow after an attack was already complete or in action and showed that the United States "retains the right and capabilities to respond in self-defense, should deterrence fail."[58] These responses would "not necessarily come from space," given that the U.S. has no capability to respond in kind from space in the kinetic realm and a very limited capability on the reversible side of the counterspace spectrum.[59] The NSSS does not detail what type of capabilities, active defenses, or offensive strike options terrestrially would be required to assure either the U.S. or allies of the credibility of this deterrent layer.[60]

Recent research shows that while the intentions undergirding the NSSS were probably good, its effectiveness at deterring the "development, testing and employment of counterspace" weapons has proved wanting.[61] China continues to test kinetic ASAT weapons, co-orbital robots, and lasers, while Russia has re-engaged in space weapons programs, joined China in its lawfare activities, and has even announced the redeployment of hypersonic weapons carried upon FOBS-capable missiles.[62] This counter-strategy is based upon the exploitation of the ideological framework of the immediate post-Cold War world, where the new world order of norms and rules-based governance would preserve the peace and security of the world, and by extension, U.S. interests as a status

56. Ibid.
57. Stone, *Reversing the Tao,* 5.
58. *National Security Space Strategy,* 10.
59. Stone, *Reversing the Tao*, 5.
60. *National Security Space Strategy*, 13.
61. Ibid., 10.
62. Daniel R. Coats, *Worldwide Threat Assessment of the U.S. Intelligence Community* (Washington, D.C.: Office of Director, National Intelligence, 13 February 2018), 7.

quo power.[63] The NSSS, however, did not base its concept of deterrence upon the credibility of deterrence theories of the first or indeed the second nuclear age.[64] A review of these waves of deterrence theories is offered below.

Foundations of Deterrence vs. the Foundations of the NSSS

Since the end of the Cold War, the idea of space warfare, especially kinetic engagements in orbital space, is viewed by some as "unthinkable."[65] This view toward space war is due in part to the fear of debris generation's negative impact upon the environmental condition of space. In reality, space is not what should be the object of defense, but the infrastructure itself. The reality of the strategic space environment requires more than TCBM, good will and a nebulous, un-credible threat to use terrestrial means to respond to an attack in space, especially in an era in which nuclear weapons have re-emerged in the foreign policies and strategy-making of many of the rising regional powers around the world, some of which are now space-faring.[66]

When the United States, or any country for that matter, declares a deterrent threat to an adversary state, that threat must be seen as credible.[67] A lack of deterrent threat leads to failure when the threat is not taken seriously either by the one giving the threat, or by the receiver of the threat. One point to make here is that rhetoric alone is not a threat.[68] Some commentators in foreign policy and diplomacy argue that rhetoric and verbal comments that appear to be threatening are

63. Ikenberry, *Liberal Leviathan,* 232-234.
64. Stone, *Reversing the Tao*, 14.
65. Michael Krepon, *Anti-Satellite Weapons, Deterrence and Sino-American Relations* (Washington, D.C.: Stimson Center, September 2013), 29.
66. Bracken, *Second Nuclear Age,* 106-07.
67. Herman Kahn, *On Thermonuclear War* (Princeton, NJ: Princeton University Press, 1960), 146–47.
68. James L. Payne, *The American Threat: National Security and Foreign Policy*, (Sandpoint, ID: Lytton Publishing, 1982), 54.

"dangerous" and destabilizing to an already tense situation.[69] However, a true threat is not mere words, but is the capability, will, and determination of the one giving the threat that in the mind of the adversary is requisite for a credible threat.[70] Deterrence requires a credible threat, so what makes a credible threat?

Credibility is based upon several things. One is the will of a state: a nation's willingness to oppose its adversaries is inferred from its past behavior.[71] If a state is willing to retaliate or actively deter an adversary's action regardless of escalation level, then most likely the status quo can be maintained through deterrence. If, however, a state is unwilling to follow through on its threats and continues not to follow through over time, then the credibility of the threat will degrade to ineffectiveness.[72] Appearing to do nothing in response to an act of aggression by an enemy demonstrates a lack of will. Standing fast and being willing to assume the costs and risks associated with that threat displays determination.[73] The United States must be ready when that testing comes, otherwise, if it fails to respond proportionally or with enough escalatory power, a change to the status quo or threshold of acceptance, could result.

Capability and will are the requisites for any deterrent threat. A capability refers to an armed force that is able to alter the behavior of a state or non-state actor either by deterrence by its very existence, or through warfighting.[74] Capabilities serve to provide an idea to others; that is "what a nation with a similar level of willpower will do" in a certain situation.[75] If the power that is leveling a deterrent threat on

69. Scott Sagan, "The Korean Missile Crisis," *Foreign Affairs* (November/December 2017): 76.
70. Payne, *National Security and Foreign Policy*, 54.
71. Ibid., 55.
72. Therese Delpech, *Nuclear Deterrence in the 21st Century* (Santa Monica, CA: RAND Corporation, 2012), 106.
73. Payne, *National Security and Foreign Policy,* 197.
74. Lawrence Freedman, *Deterrence* (Cambridge: Polity Press, 2004), 28.
75. Payne, *National Security and Foreign Policy,* 54.

another has a "high capability," sometimes termed as superiority, then that enables the deterrent force to have a credible means of escalation dominance should deterrence fail.[76] High capability will enable an adversary to perceive that the capability and will of the United States is high, even if the determination to go to war over a crisis is low. All of these components create the baseline for a credible declaratory policy, or communications method, toward the adversary.

Declaratory policy, sometimes called strategic communications, serves as the mechanism to assure understanding of the United States' determination, capability, and will toward deterring aggression by a certain adversary in a specific geography or political interest.[77] Depending on the type of deterrence theory, the audience of declaratory policy may be different. For second wave deterrence theorist Thomas Schelling the audience is the enemy power targeted for deterrence and the allies are the actors for which assurance of deterrence was promised.[78] For Herman Kahn, another second wave theorist, credible deterrence was communicated to the American and allied public, as they were the ones the state was duty bound to protect from attack.[79]

During the Cold War, capability meant a strong, survivable deterrent force that was ready and willing to retaliate and destroy the aggressor in a punishing or denial-based campaign.[80] To prevent the Soviet perception that defenses would encourage a U.S. first strike, the creation of active defenses or counterforce capabilities would be prohibited under Thomas Schelling's "stable balance of terror" view of

76. Ibid., 55.
77. William J. Perry and James R. Schlesinger, *America's Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Washington, D.C.: U.S. Institute of Peace Press, 2009), 35.
78. Keith Payne, *The Great American Gamble: Deterrence Theory and Practice from the Cold War to the Twenty-First Century* (Fairfax, VA: National Institute Press, 2008), 52.
79. Ibid., 52.
80. Stone, *Reversing the Tao,* 8.

deterrence.[81] Adherents of this theory argue that a stable deterrent order between two superpowers with nuclear weapons depended upon the mutual vulnerability of the civil populations.[82] As a result, damage limitation strategies such as active or passive defenses would be considered "destabilizing" and could potentially provoke a first strike by the Soviet Union.[83]

Herman Kahn disputed Schelling's view that mutual vulnerability was the way to stability, holding instead that giving the president the most options possible and the citizens the best chances of survival offered the most credible baseline for any deterrent to an aggressor.[84] Having nuclear superiority in offensive forces was only one area of need in his view; having the ability to limit the damage through defenses meant that if deterrence were extended to allies (and it was), it would be more credible for the U.S. to risk escalating to nuclear use if the nation could survive with limited damages to its infrastructure.[85] As a result of these combined measures, the United States could keep its treaty commitments and national defense priorities without committing national suicide.[86]

When reviewing the NSSS's development of its view on deterrence in space, it is evident that the document is not based on the foundations laid by prior deterrence theorists. As Peter Marquez, former Director of Space Policy for the National Security Council, states "they do not grasp the intent of deterrence, the full range of other security constructs and, most importantly, what should be done when, not if, deterrence fails."[87]

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81. Ibid., 9.
82. Payne, *Great American Gamble*, 68.
83. Ibid., 53.
84. Ibid., 37.
85. Kahn, *On Thermonuclear War*, 557.
86. Payne, *Great American Gamble*, 29.
87. Peter Marquez, "Space Deterrence: A Pret-a-Porter Suit for the Naked Emperor" (Washington, D.C.: Marshall Institute, 2011), 11.

In the arena of declaratory policy, the NSSS speaks more about what the United States will not do, rather than what it will do in the case of attack. As an example, the NSSS states that by not developing ASAT weapons for active defense or offensive space superiority, and by its continued push for acceptance of norms of behavior through TCBM, the U.S. is ensuring security and protection from attack.[88]

The posture review that led to the NSSS suffered from a lack of analysis of historical trends in international treaty law.[89] Regarding the deterrence through norms element of the strategy, there have been numerous occasions where treaties, conventions, and covenants between nations have been breached.[90] In fact, a look at the historical track record for political treaties shows that the real norm of international relations is that of treaty non-compliance.[91] While it is a laudable goal to push for norms of non-interference in space, the reality of the space strategic environment heralded in the open press is that of purposeful interference coupled with testing of kinetic ASATs.[92] As the proliferation of nuclear and missile technologies has also increased rapidly in the last two decades, the potential use of FOBS and EMP might also be possible in the near future, despite treaties banning nuclear use in space. This reality of increasing kinetic threats to space systems began to set in as China extended its range of kinetic ASATs into geosynchronous Earth orbit (GEO), making all U.S. satellites vulnerable to kinetic strikes. Congress called for another review in 2014, along with a strategy for

88. *National Security Space Strategy*, 13.
89. Stone, "Security Through Vulnerability."
90. Laurence Beilenson, *The Treaty Trap: A History of the Performance of Political Treaties by the United States and European Nations* (New York: Public Affairs Press, 1969), 191. This work is a comprehensive look at historical development and trends in Western political treaties, including treaties addressing arms control in nuclear and space issues. Most of those treaties addressed in his book are still in effect today, and the same players he addresses as routinely breaching those treaties are still engaging in similar behavior today.
91. Ibid.
92. Stone, *Reversing the Tao*, 12.

space protection and offensive capabilities needed to address the fact that space was now acknowledged as a "warfighting" domain.[93] To respond to this, the DoD created what it asserted was the answer: deterrence through "warfighting mission assurance."[94]

Resilience and the Warfighting Mission Assurance Model of Protection

Following the space portfolio review in 2014, the space policy office within the Office of the Secretary of Defense published what it termed a taxonomy for achieving the NSSS's deterrent goal of resilience under the framework of "Space Domain Mission Assurance."[95] This taxonomy was divided into three sub-sections capable of achieving protection of critical space infrastructure: Defensive Operations; Reconstitution; and Resilience.[96]

First under the sub-sets of space warfighting mission assurance-based protection is defensive operations. Defensive operations are defined in the taxonomy as "activities or operations undertaken to interrupt an adversary kill chain, or provide warning or insight to the targeted mission system in support of defensive actions."[97] The DoD taxonomy defines defensive operations as those that would "reduce the likelihood that an adversary will be able to mount a successful attack on our space architectures by disrupting an adversary's ability to target space systems or directly intercepting an attacking system."[98] Such operations can include "synchronized and systematic maneuvers of on-orbit assets" that would "confuse and overwhelm an adversary's targeting

93. Air Force Space Command, *Space Mission Force: Developing Space Warfighters for Tomorrow*, white paper (Peterson AFB, CO: Headquarters Air Force Space Command, 29 June 2016), 6.
94. Department of Defense, *Space Domain Mission Assurance: A Resilience Taxonomy* (Washington, D.C.: Homeland Defense and Global Security, 2015), 2.
95. Ibid., 3
96. Ibid.
97. Ibid., 4.
98. Ibid.

system" or also include "active measures to deceive, degrade or destroy targeting systems."[99] These activities are intended to provide better command and control to execute defense when combined with friendly force space object surveillance and identification capabilities needed to enable warning and characterization of the attack underway.[100] This would be supported and facilitated by the next layer: reconstitution.

Reconstitution is not a new concept. It was seen by its proponents as means of maintaining access to space-based capabilities since the height of the Cold War.[101] Essentially, reconstitution means that if an adversary attacked U.S. spacecraft, the nation could replace them at a rate capable of sustaining the advantages of space force enhancement to terrestrial operations.[102] Reconstitution as an option, however, seemed to be a bit out of reach due to the high cost of launch vehicles and the slow pace of designing, producing, and deploying spacecraft using current acquisition methodologies. The Operationally Responsive Space (ORS) office was founded to become the champion of reconstitution as a method of getting space capabilities on-orbit cheaper and faster.[103] After falling out of favor for many years for being too expensive, the ORS office rehabilitated reconstitution.

The taxonomy describes reconstitution as "plans or operations to bring new assets on line (e.g. launching replacement satellites or activating new ground stations) in order to replenish lost or diminished functions to an acceptable level for a particular mission, operation, or

99. Ibid.
100. Douglas Loverro, "Statement for the Record" (address, Strategic Forces Subcommittee, Washington, D.C., 25 March 2015), 3.
101. Center for Strategy and Technology, *Rapid Space Force Reconstitution* (Maxwell AFB, AL: Air University Press), J-1.
102. *Space Domain Mission Assurance,* 4.
103. Marcus Weisgerber, "As the U.S. Air Force Turns its Focus to Space, This Small Team Could Lead the Way," *Defense One*, 19 November 2017, https://www.defenseone.com/business/2017/11/us-air-force-turns-its-focus-space-small-team-could-lead-way/142656/.

contingency after an attack or catastrophic event."[104] This second layer is not the same as mission recovery, which is defined as "bringing back to a normal position or condition; to save from loss and restore [present constellations] to usefulness."[105] Reconstitution is replacement, not repair.

The DoD document asserts that reliance upon reconstitution reduces the need for resilience. In a conflict, "the more quickly you can reconstitute your space capabilities, the less resilient those capabilities need to be on their own. The reverse is also true: the less quickly you can reconstitute a given space capability, the greater your need for those capabilities to be inherently resilient."[106] The proponents of this view assert that resilience and reconstitution are inherently complementary means for defense and protection of space capabilities. What is resilience in greater detail?

Resilience is the ability to take a hit and bounce back, or more specifically, the "ability of an architecture to support the functions necessary for mission success with higher probability, shorter periods of reduced capability."[107] While this term is central to the NSSS view of deterrence as well as defense, it is interesting to note how the taxonomy describes its implementation:

> It becomes extremely difficult to characterize that resilience in a closed form analysis, and it becomes nearly impossible to develop a quantitative method for measuring and comparing resilience across alternative future system architectures. In short, more expansive formulations of resilience lead to the results we

104. *Space Domain Mission Assurance,* 3.
105. Ibid., 4.
106. Ibid., 5.
107. Ibid., 3.

discussed at the outset: decisions that devolve into the cost-capability trade-offs that are so familiar.[108]

In other words, it is hard to know how resilient a specific constellation is within its own system design or how to make an already deployed constellation more resilient due to updates in adversary space weaponry.

Addressing the 2016 Air Force Association convention, then Deputy Assistant Secretary of Defense for Space Policy Douglas Loverro said that to deter an adversary from attacking the critical space infrastructure of the United States, it was vital to deny the benefits of attack by making it "politically difficult" to attack.[109] This "defensive" form of national security space postures is, Loverro said, the best way forward for space protection and defense.[110] Is resilience the same thing as space superiority?

Space superiority is not well understood in the context of the threat environment of the second nuclear age. For example, in the Department of Defense's *Dictionary of Military and Associated Terms*, space superiority is defined as "the degree of dominance in space of one force over any others that permits the conduct of its operations at a given time and place without prohibitive interference from space-based threats."[111] This definition leaves out the fact that many of the current space weapons threats today are based terrestrially, not in space.[112] Developments in counterspace threats based on Earth are changing as potential adversaries such as China and Russia look to enhance their "multi-layered attack infrastructure" by adding deployed capabilities into

108. Ibid., 5.
109. Phillip Swarts, "Loverro: Defense is the Best Deterrent Against a War in Space," *Space News,* 14 October 2016, http://spacenews.com/loverro-defense-is-the-best-deterrent-against-a-war-in-space/.
110. Ibid.
111. Joint Publication 1-02, *Dictionary of Military and Associated Terms,* 2016, 230.
112. Stone, *Reversing the Tao,* 49.

key orbital regimes.[113] These types of forces, while already demonstrated, are expected by the Intelligence Community to be deployed in the near future.[114] The United States, on the other hand, does not have this same type of capability for denying access or defending critical space infrastructure, despite senior leaders stating otherwise.

In September 2017, Secretary of the Air Force Heather Wilson stated that, "Air and space superiority are not America's birthright…[we have] earned it the hard way, and we are not going to give it up without a fight."[115] Yet it appears that the United States does not have a force postured to gain or maintain space superiority, today or anytime soon. A white paper published in 2016 by General John Hyten, then Commander of Air Force Space Command, stated that the members of the "space mission enterprise [will] focus on creating a force capable of achieving space superiority…"[116] Space Command's lack of capabilities highlights that a contested, degraded, and operationally limited environment exists today and shows that the Air Force understands that it currently lacks space superiority capability. As a result of this situation, and the context of the second nuclear age, how can it be said that the United States is prepared for all thresholds of counterspace activity? American strategic thinking regarding space power has not caught up with the developments of the new strategic environment.

By 2016, the DoD had altered its position slightly, believing that because of the continued development, test, and deployment of

113. Ibid., 30.
114. Daniel R. Coats, *Worldwide Threat Assessment of the U.S. Intelligence Community* (Washington, D.C.: Office of Director, National Intelligence, 13 February 2018), 13.
115. Brian Everstine, "SecAF Wilson: New Strategies, Stable Funding Needed to Maintain Air Superiority," *Air Force Magazine,* 28 September 2017, http://www.airforcemag.com/Features/Pages/2017/September%202017/SECAF-Wilson-New-Strategies-Stable-Funding-Needed-to-Keep-Air-Superiority.aspx.
116. Air Force Space Command, *Space Mission Force: Developing Space Warfighters for Tomorrow*, white paper (Peterson AFB, CO: Headquarters, Air Force Space Command, 29 June 2016), 2.

counterspace capabilities and strategies by our potential adversaries China and Russia, space was no longer a sanctuary. As a result, the DoD would have to be able to "cope with loss or degradation of space assets" by an adversary.[117] These concerns led Air Force Space Command to pursue several initiatives to address this issue of "space as a warfighting domain."[118]

According to the 2017 Office of Management and Budget's (OMB) report on *Leadership, Management, and Organization of Department of Defense Space Activities*, "despite repeated warnings from the Intelligence Community on seminal events like the 2007 successful destructive Chinese [ASAT] test, the Government Accountability Office (GAO) argues that little has changed in the past 20 years to improve the Department of Defense space posture. It has only taken modest steps in addressing how it organizes its space forces [to respond] to these threats."[119] Due to the report's findings and the acknowledgement of Air Force Space Command's white paper in 2016, it appears that the United States does not have space forces capable of achieving space superiority, much less warfighting. Rather, the U.S. only maintains organizations capable of space force enhancement functions within uncontested environments.[120]

While such a posture might have been enough during the early days of the second nuclear age when space superiority could be assumed and cooperation considered the norm, today's strategic environment is

117. Jan Van Tol, *Air Sea Battle: A Point of Departure Operational Concept* (Washington, D.C.: Center for Strategic and Budgetary Assessments, 2010), 87.
118. Gen Jay Raymond, Statement for the Record to Strategic Forces Subcommittee, House Armed Services Committee Hearing, 115th Cong, 2d sess, 12 May 2017, 2.
119. Executive Office of the President, *Report on Leadership, Management and Organization of Department of Defense Space Activities* (Washington, D.C.: Office of Management and Budget, December 2017), 2.
120. Mike Gruss, "Hyten tells Senate DoD Needs to Focus on Space Control and Battle Management System," *Space News*, 20 September 2016, http://spacenews.com/hyten-tells-senate-dod-needs-to-focus-on-space-control-battle-management-system/. s

becoming more dangerous than any time since the Cold War.[121] Continuing with a posture of self-deterrence and security through vulnerability disguised as space superiority might not be enough for future space power crises.

Chapter Conclusions

Since the 1990s, the United States has maintained a posture of strategic restraint in space, purposefully leaving critical space infrastructure vulnerable to attacks, and has assumed an environment of unchallenged space superiority. Since 2007, this short, benign period of strategic history has been fast drawing to a close, making it even more imperative that the United States adjusts its posture to one capable of deterring attacks from major powers and non-peer adversaries. As the OMB report from 2017 shows, and despite all the evidence pointing toward the exploitation of American vulnerability in space, the DoD has made few substantive changes to create a space force capable of achieving credible deterrence postures, much less space superiority. With the advent of second nuclear age dynamics in the international environment, it behooves the United States to acknowledge that our strategic restraint has not led to a peaceful space medium, but rather has provided an opportunity for revisionist powers and non-peer adversaries to destabilize the international system and jeopardize American security.

121. Todd Harrison et al., *Escalation and Deterrence in the Second Space Age* (Washington, D.C.: Center for Security and International Studies, October 2017), 8

Chapter 2

Testing the Framework:

Tailoring Space Deterrence for Nuclear Threshold Threats

> *Most governments when asked to choose between war and peace are likely to choose peace because it looks safer. These same governments if asked to choose between getting the first or second strike will very likely choose the first strike…once they feel war is inevitable, or even very probable.*
>
> - Herman Kahn
>
> On Thermonuclear War (1960)

> *Space fighting is not far off. National security has already exceeded territory and territorial waters and airspace and territorial space should also be added. The modes of defense will no longer be to fight on our own territory and fight for marine rights and interests. We must also engage in space defense as well as air defense.*
>
> - Teng Jinqun
>
> People's Liberation Army Analyst (2001)

Since the Cold War, the idea that nuclear weapons would have any impact upon space power theory, space deterrence, or space defense postures was considered unlikely. After all, the nuclear weapon's influence upon foreign policy and strategy had taken a back seat to non-proliferation regimes and sanctuary theory, therefore making any need for deterrence of space attacks, especially at higher nuclear thresholds, unnecessary. However, recent scholarship has pointed to the fact that the world is now in the midst of a second nuclear age, one in which great power competition has returned, but with non-peer adversaries also acquiring capabilities for nuclear use and space access.[1] What does this

1. Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New Power Politics* (New York: Times Books, 2012), 10–11.

environment mean for space deterrence given the proliferation of ASAT weaponry, missiles, and EMP weapons? This chapter provides background on these new dynamics of the strategic situation and reviews an alternate strategic analysis framework for credible space deterrence that is tailorable to a particular crisis's context.

The Second Nuclear Age and Changes in Deterrence Theory

In the past few decades, nuclear weapons non-proliferation efforts have proven ineffective. As a result, the spread of nuclear weapons has emerged from "natural causes" of state interest.[2] This means that despite norms and globalization efforts meant to limit the spread of such weapons, "normal dynamics of fear and insecurity that have long characterized international affairs" have led to nuclear weapons returning for a second act.[3]

Thomas Schelling stated that "there is a tendency in our planning to confuse the unfamiliar with the improbable. The contingency we have not considered looks strange; what looks strange is thought improbable; what is improbable need not be considered seriously."[4] Now with the shift to a strategic environment in which nuclear weapons technologies and the means to deliver them effectively are actively pursued by rogue states like North Korea, the possibility of limited nuclear use may be on the rise.[5] As Herman Kahn states in his book, *Thinking about the Unthinkable in the 1980s*, "Some of the ideas [regarding nuclear use by states] are not on anyone's minds, but probably should be."[6] Put another way, "nuclear weapons exist. They are spreading. As a result, the United

2. Bracken, *Second Nuclear Age*, 1.
3. Ibid., 2.
4. Roberta Wohlstetter, *Pearl Harbor: Warning and Decision* (Palo Alto, CA: Stanford University Press, 1962), vii.
5. Kerry M. Kartchner and Michael S. Gerson, "Escalation to Limited Nuclear War in the 21st Century," in *On Limited Nuclear War in the 21st Century,* ed. Jeffrey Larsen and Kerry M. Kartchner (Stanford, CA: Stanford Security Studies, 2014), 145.
6. Herman Kahn, *Thinking about the Unthinkable in the 1980s* (New York: Simon and Schuster, 1983), 19.

States may face a situation where other countries may use them."[7] Due to the "second mover advantage" that North Korea gains through learning from Russia and China, what does that mean for deterrence and escalation thought?

Deterrence theorists have modified their theories somewhat because of the different strategic contexts of the second nuclear age. The "third wave" theorists such as Keith B. Payne or Therese Delpech argue that not all adversaries can be viewed as rational, reasonable, and predictive and therefore a unified deterrence theory is ineffective in the modern world.[8] In addition, the personal beliefs, intentions, and worldviews that exist in the multiplayer, multicultural environment of today's international system imply that more understanding of a state's strategic culture and decision-making calculus is required to effectively posture for credible deterrence.[9] In addition to strategic culture, two scholars argue that not just any posture, but one capable of escalation dominance adds credibility to deterrence frameworks in this new nuclear age.[10]

Kerry Kartchner and Michael Gerson argue that strategies of escalation dominance claim to be more relevant to today's strategic environment than in the past.[11] This is because escalation dominance "does not depend on shared commitment to a particular set of understandings or rules" and therefore might be more helpful in dealing with revisionist powers and states of concern that are either not invested in the international order's rules and norms of behavior or are trying to

7. Bracken, *The Second Nuclear Age*, 81.
8. Freedman, *Deterrence*, 22.
9. Kerry M. Kartchner, "Strategic Culture and WMD Decision Making," in *Strategic Culture and Weapons of Mass Destruction: Culturally Based Insights into Comparative National Security Policymaking,* ed. Jeannie L. Johnson et al. (New York: Palgrave Macmillan, 2009), 55.
10. Kartchner and Gerson, "Escalation to Limited Nuclear War," 165
11. Ibid.

rewrite them through action.[12] Escalation dominance, if done correctly, relies "purely upon superior brute force and war-winning strategies, coupled with the credible threat to employ those forces and strategies if necessary."[13]

This credibility of threat is key. If a government or actor lacks the forces necessary to escalate or engage in a war-winning strategy, then escalation dominance will be lacking. An example of escalation dominance being successfully employed against the U.S. is the Russian use of nuclear posturing to deter NATO and U.S. intervention in the invasion of Ukraine in 2014. Russia postured its nuclear forces per its doctrine of escalate-to-de-escalate and the open threat to use those nuclear forces if any conventional force entered Russian territory.[14] Escalation dominance was viewed as a credible possibility by NATO, and Russia seized Crimea and added it to the territory of the Russian state.[15]

With this context in mind, and with the possibility of having to include higher threshold events or crises within the national security space strategy of the U.S., one possible option based on third wave thinking on deterrence and escalation dominance is the tiered, tailored approach to space deterrence.[16]

A Review of the Framework for Credible Space Deterrence

The framework suggested in *Reversing the Tao* began with a look at the strategic level viewpoint necessary to understand the threat and

12. Ibid.
13. Ibid., 166.
14. Joshua Stowell, "The Problem with Russia's Nuclear Weapons Doctrine," *Global Security Review Online*, 13 February 2018, https://globalsecurityreview.com/nuclear-de-escalation-russias-deterrence-strategy/.).
15. Loren Thompson, "Ukraine Dilemma: U.S. Can't Prevent Russian Annexation Without Better Missile Defenses," *Forbes Online*, https://www.forbes.com/sites/lorenthompson/2014/05/12/ukraine-dilemma-u-s-cant-prevent-russian-expansion-without-better-missile-defenses/#3ee3e4e43ed5,.
16. High threshold deals with the higher nuclear threshold levels of the Space Power Escalation Ladder.

operational environment within which all scenarios would play regarding DoD postures for deterrence in space. National leaders therefore are required to acknowledge four items of importance to frame the situation.

First, American strategists should recognize that deterrence requires getting into an adversary's decision-making process through observation and analysis of its strategic culture, doctrine, and behavior.[17]

Second, strategists and policymakers must acknowledge that space is an offensive, dominant medium.[18] As a result, in order to provide effective deterrence in a standard space power environment, much less at the higher nuclear thresholds of the second nuclear age, the U.S. must actively protect its space systems through a credible offensive-counterforce capability to reverse the first-strike instability, at least up to the kinetic weapons threshold.[19] A kinetic ASAT's use could not only be a threat or use of force for active deterrence in the conventional sense but could also be part of an adversary's nuclear strategy.[20]

Next, theorists of the third wave suggest that any future national security space posture should acknowledge that damage limitation measures such as active defense of U.S. critical space and terrestrial infrastructures are vital to ensure credible deterrence in environments of vertical escalation.[21] Deployment of active defenses supports the view expressed by second nuclear age scholars such as Keith B. Payne, who argue that to exercise force projection in regional contexts of the second nuclear age as means to deterrence requires management of risk to the U.S. homeland and deployed forces. To ensure an adequate management of risk requires damage limitation measures such as "offensive

17. Stone, *Reversing the Tao*, 56.
18. James Finch, "Bringing Space Crisis Stability Down to Earth," *Joint Force Quarterly* 76 (1st Quarter 2015): 18
19. Stone, *Reversing the Tao*, 56.
20. Bracken, *Second Nuclear Age*, 233.
21. Stone, *Reversing the Tao*, 57.

capabilities for counterforce strikes; active defenses such as air and ballistic missile defenses; and passive defenses such as physical protection" and hardening against space-borne EMP.[22]

Finally, policymakers and strategists must view space systems as a critical infrastructure of the United States and not just a support structure for force enhancement and terrestrial operations.[23] The view of space systems as critical infrastructure has been a view in national strategy and doctrine for years, but it has never been fully funded or executed broadly by senior leadership as a critical infrastructure normatively.[24]

Following the strategic framing necessary to tailor deterrence to potential adversaries, the posture suggested in the framework in *Reversing the Tao* includes a tiered structure: Tier 1 space deterrence scenarios deal with the merger of the nuclear and space power threats that could impact the homeland; Tier 2 space deterrence deals with most counterspace threats across the counterspace spectrum and up the vertical escalation ladder; Tier 3 deterrence deals with strictly reversible counterspace threats and means to escalate.[25] Having the physical means to achieve escalation dominance is vital to this framework for space deterrence. To help clarify the thresholds of escalation in a space power context, even those that combine with nuclear use, the author devised the following escalation ladder (See Figure 1).[26]

22. Payne, *Fallacies of Cold War Deterrence*, 187.
23. Ibid., 51.
24. DoDM 3020.45-V1, *Defense Critical Infrastructure Program, DoD Critical Asset Identification Process (CAIP)*, 24 October 2008 (Change 1, 23 May 2017), 23.
25. Stone, *Reversing the Tao*, 59–62.
26. Ibid., 62–63.

Non-Interference/Peaceful Use of Space

1. Freedom of Action in Space (civil, commercial, military use of space for benefit of nation and world)
2. Intelligence/SSA Collections (Passive/Active)

Reversible, Yet Purposeful Interference Threshold (Deny/Degrade)

3. Passive Jamming
4. Active Jamming/Cyber Attacks
5. Laser Tracking/Dazzling
6. Unauthorized, Rendezvous and Proximity Operations Near U.S. or allied spacecraft
7. Posturing/Mobilization of Destructive Space Attack Forces

Irreversible, Purposeful Interference Threshold (Damage)

8. High Energy Chemical Laser
9. High Power Microwave Weapons Use

Kinetic, Debris Generation Threshold (Destroy)

10. Kinetic Energy (KE) Anti-Satellite (ASAT) missiles (Terrestrial Based-LEO)
11. Kinetic Energy (KE) Anti-Satellite (ASAT) weapons (Co-Orbital)
12. Kinetic Energy (KE) Anti-Satellite (ASAT) missiles (Terrestrial Based-GEO)

Nuclear Use Threshold (Destroy)

13. Terrestrial Fractional Orbital Bombardment Systems (FOBS)
14. Orbital Electro-Magnetic Pulse (EMP)
15. Orbital Nuclear Strike against spacecraft (all orbital regimes affected)

Figure 1. Space Power Escalation Ladder. (Reproduced from Christopher Stone, *Reversing the Tao: A Framework for Credible Space Deterrence*, CreateSpace Publishing, 2016).

To explain the escalation ladder tool, the first threshold describes the ideal peacetime condition of non-interference and the international peaceful use of space. The first threshold also describes conditions supported by customary norms such as freedom of action in space for civil space exploration, commercial space development, and military uses of space for the national and multinational interest. In addition, it also includes military operations such as intelligence and space situational awareness operations to ensure the status quo is maintained by all spacefaring nations and the monitoring of arms control treaties.

The next threshold addresses the first level of purposeful attack along the reversible side of the counterspace spectrum. Examples can include passive or active jamming of radio-frequency communications,

tracking or illumination by lasers upon surveillance satellites, unauthorized rendezvous and proximity operations near U.S. or allied spacecraft, or even posturing and mobilization of destructive, space attack forces on Earth. This threshold has been current norm of behavior in space for the last decade or so.

The next threshold of the space power escalation ladder is the first set of damaging counterspace attacks. This threshold consists of two rungs of chemical laser use or high-power microwave weapons systems. High energy chemical lasers, in the current context, refer to terrestrial-based laser systems, although high energy lasers have been proposed and discussed for decades.[27] Deterrence theorists of the Cold War, such as Keith B. Payne, have argued that deploying laser systems into orbit, especially for defensive purposes, could aid nuclear deterrence stability.[28] High power microwaves are another form of directed energy weapons that can "produce effects that range from denying the use of electrical equipment to disrupting, damaging, or destroying that equipment" onboard spacecraft.[29] While these can deny and degrade spacecraft systems, these types of weapons systems, terrestrial-based or orbit-based, serve to bridge the destructive threshold of space power attack.

Once the kinetic threshold has been crossed, destruction of U.S. space assets is the adversary's clear objective within its destructive space warfare concept.[30] These rungs of escalation within this framework for space deterrence decision making includes kinetic energy anti-satellite (KE ASAT) missiles (terrestrial-based) with ranges of low Earth orbit (LEO) all the way up to GEO. In addition, co-orbital ASATs deployed in

27. Keith B. Payne, *Laser Weapons in Space: Policy and Doctrine* (Boulder, CO: Westview, 1983) is one example of a scholarly work that examines high energy lasers deployed in space. High energy lasers could also be deployed terrestrially.
28. Ibid., 1.
29. Eileen M. Walling, *High Power Microwaves: Strategic and Operational Implications for Warfare* (Maxwell AFB, AL: Air University Press, May 2000), 1.
30. Stone, *Reversing the Tao,* 64.

space are included within this threshold. Co-orbital ASATs are kinetic weapons that can be based in orbit and used to strike other satellite targets, interceptors, or other attacking satellites.[31] While current counterspace postures within this threshold are limited to terrestrial-based KE ASAT missiles and a few test co-orbital ASATs, future deployment modes could be multilayered and multiuse for both space-on-space and space-to-ground attacks. Writings from near-peer potential adversaries such as China indicate that this type of multilayer attack architecture is part of its future space strategy.[32]

As one continues to the top of escalation tool, the maximum damage that could be done is by crossing the threshold to nuclear use. These less familiar weapons systems could be used to affect critical space infrastructure in orbit, destroy terrestrial targets such as power grids and command and control centers, or both. This type of scenario constitutes a Tier 1 Deterrence event. One example of this is an electromagnetic pulse employed via FOBS or satellites.

An EMP is defined as the interaction of high energy nuclear radiation with the atoms of the atmosphere causing damaging surges of electric power.[33] When a nuclear explosion occurs at high altitude or in space, "the EMP signal it produces will cover the wide geographic region within the line of sight of the detonation."[34] This EMP capability can

31. Dana J. Johnson et al., *Space Weapons, Earth Wars* (Santa Monica, CA: RAND Corporation, 2002), 55.
32. Sun Zhaoli, *Science of Strategy*, (Beijing: Academy of Military Science, Military Science Press, 2013), 240. Note: This is the most current version of the Academy of Military Science's document from 2013, not to be confused with the Chinese National Defense University documents with a similar title.
33. Thomas C. Riddle, *Nuclear High Altitude Electromagnetic Pulse-Implications for Homeland Security and Homeland Defense* (Carlisle Barracks, PA: USAWC Strategy Research Project, 2004), 2.
34. Jack Liu, "A North Korean EMP Attack-Not Likely," *38 North Online*, 5 May 2017), http://www.38north.org/2017/05/jliu050517.

produce “widespread and long-lasting disruption and damage to the critical infrastructures that underpin the fabric of U.S. society.”[35]

An EMP attack has three phases. The E1 phase occurs when “gamma radiation during the first 10 nanoseconds from the nuclear detonation rips electrons out of the atoms in the atmosphere.”[36] This process induces very high voltages in electrical conducers, most of which are not designed to protect against such levels of surge. E2 is generated when the scattered gamma rays and emissions, produced by neutron collisions from the explosion for one nanosecond, pulse similar to a lightning bolt. Because of this similarity, this is one area that can be easier to protect against.[37] Finally, E3 is a slow pulse lasting hundreds of seconds and is a result of the impact of the EMP on the Earth’s magnetic field. E3 is similar to the geomagnetic storms that occur in nature and can negatively impact such things as power lines and spacecraft systems in orbit.

In testimony before a 2004 committee on EMP, Gary Smith of Johns Hopkins University stated that the effect of such an attack “can be continental in scope.”[38] Continent-wide damage is possible because a detonation at an altitude of 500 kilometers means the entire continental United States, as well as parts of Canada and Mexico, and vital parts of our critical space infrastructure would be impacted by such a strike.[39]

Lowell Wood also of Johns Hopkins University, previously described the potential impact of EMP before a hearing of the House Armed Services Committee in 1997:

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35. William R. Graham. *Report of the Commission to Assess the Threat to the United States from EMP Attack: Critical National Infrastructures* (Washington, D.C.: Government Printing Office, 10 July, 2008), vi.
36. Jack Liu, “A North Korean EMP Attack-Not Likely,” 5 May 2017, *38 North Online*, http://www.38north.org/2017/05/jliu050517.
37. Ibid.
38. Riddle, *Nuclear High Altitude Electromagnetic Pulse-Implications*, 3.
39. David Stuckenberg, *Novel High Altitude Delivery Platforms for Weapons of Mass Destruction/Mass Effect* (Washington, D.C.: American Leadership and Policy Foundation, March 2016), 2.

> We essentially…move [the United States] back in time by about one century and you live like our grandfathers and great-grandfathers did in the 1890s until you rebuild. You do without telephones. You do without television, and you do without electric power…and if it happens that there is not enough fuel to heat with in the winter time and there is not enough food to go around because agriculture has become so inefficient and so on, the population simply shrinks to meet the carrying capacity of the system.[40]

This assessment led the EMP Commission to assert that a high-altitude or space-borne EMP strike upon the homeland could lead to many deaths over a short period of time. Commission member Ambassador Henry Cooper testified, "We do not have experience with losing the infrastructure in a country with 300 million people, most of whom don't live in a way that provides for their own food and other needs."[41] As a result of this lack of data and given our technology-dependent society and the populations presently considered, it appears 10 percent, or 30 million people, "would probably be the range where we could survive as a basically rural economy."[42]

The threat of an EMP strike, from high altitudes or in orbital space, taking the United States back over a century to a rural society may seem far-fetched, but this is not just considered likely by security focused groups and think tanks, but also by studies conducted within the arms control community. This agreement by seemingly disparate agendas provides additional weight to the concerns regarding this threat.

In the early twenty-first century, most national economies are heavily dependent upon infrastructures, both terrestrial and space-

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40. House, *Electromagnetic Pulse (EMP): Should This be a Problem of National Concern to Private Enterprise, Businesses Small and Large, As Well As Government? Hearing before the Committee on Small Business, Subcommittee on Government Programs and Oversight*, 106th Cong. 1st Sess, 1999, http://www.house.gov/smbiz/hearings/106th/1999/990601/transcript.html.
41. Ibid.
42. House, *Threat Posed by Electromagnetic Pulse (EMP) Attack*, Committee on Armed Services, 110th Cong, 1st sess, 2008, 9.

based, that rely on electricity and electronics.[43] These infrastructures are interdependent and overlapping, creating a situation where even a localized impact in one or more urban areas could have tremendous negative consequences. An EMP explosion in or near an urban area or on a continental scale "has the capability to produce widespread and long-lasting disruption and damage to critical infrastructures, creating the possibility of long-term catastrophic consequences."[44] It could not only "seriously degrade or shut down a large part of the electric power grid in the geographic area of EMP exposure near instantaneously, it could also lead to functional collapse of grids beyond the exposed area, as electrical effects propagate from one region to another."[45]

When cut off from the communication, financial, and other society-supporting functions provided through critical infrastructures dependent upon electrical grids, "emergency response efforts are jeopardized, and fuel reserves for back-up systems and stocks of food and medicine will quickly be exhausted. The maintenance of a reasonable standard of health will not be possible without the rapid recovery of the economies critical industries. Prolonged disruption of these systems puts the survival of the population and the prospect of economic recover into question."[46]

In addition to the terrestrial impacts that an EMP strike from space or high altitude could convey upon the civilian population, its impact upon our critical space infrastructure, which is interdependent with our terrestrial infrastructure, is also worth considering.[47]

According to the Defense Threat Reduction Agency, "there is little question that unhardened satellites are vulnerable to high altitude

43. Article 36, *Economic Impacts of a Nuclear Weapon Detonation*, International Steering Group of the International Campaign to Abolish Nuclear Weapons (London: United Kingdom, March 2015), 1.
44. Ibid., 2.
45. Ibid.
46. Article 36, *Economic Impacts of a Nuclear Weapon Detonation*, 2–3.
47. Stone, *Reversing the Tao*, 47.

nuclear explosions."[48] It is also consensus that "any country or organization with sufficient technology, missile lift, and guidance capability can damage or destroy a satellite in orbit using a number of different weapons and kill mechanisms."[49] These can include everything from reversible attacks using radiofrequency jamming and lasers, to irreversible kinetic effects such as anti-satellite missiles and nuclear detonations.[50]

Experts say that the use of a FOBS to execute an EMP strike upon the United States' critical infrastructure by North Korea is more likely than a standard ICBM strike because such an attack "does not require an accurate guidance system because the area of effect, having a radius of hundreds or thousands of kilometers, is so large. No reentry vehicle is needed because the warhead is detonated above the atmosphere."[51] This accessibility to technology for EMP from space makes for a very serious situation should a nation not deterred by traditional methods of deterrence and coercion gain the capacity to employ such technology. One of these nations of concern is North Korea.

According to the House Committee on Homeland Security, the North Koreans achieved what many thought impossible: they detonated a thermonuclear weapon. Following this test, the North Koreans released a technical report entitled, "The EMP Might of Nuclear Weapons" describing a capability similar to what Russia and China have called "Super-EMP" weapons.[52] North Korea also made a public statement after its thermonuclear test: its new weapon of "great destructive power" can

48. Defense Threat Reduction Agency, *A Technical Report in Support of the EMP Commission* (Washington, D.C.: Department of Defense, August 2010), 2.
49. Ibid., 2.
50. Stone, *Reversing the Tao,* 47.
51. Pry, "Empty Threat or Serious Danger," 4.
52. Ibid., 1.

"be detonated at high altitudes for super-powerful EMP attack according to [North Korean] strategic goals."[53]

Chapter Conclusions

Due to the changes in the strategic environment of space from one of perceived sanctuary to one of purposeful interference, testing of kinetic weapons, and the deployment of FOBS systems in Russia and perhaps North Korea, it becomes apparent that "thinking about the unthinkable" in space power contexts is warranted again. Strategists should test the proposed framework for space deterrence analysis throughout the vertical escalation dynamics, and at all thresholds, to ensure the proper foundations to develop effective national security space strategy and posture. The next chapter tests the framework by analyzing a non-peer adversary to see if the methodology enables understanding for the creation of an effective strategy and posture for the space power crises of the second nuclear age.

53. Bill Gertz, "Korea Nuclear Test Furthers EMP Bomb," *Washington Free Beacon*, 6 September 2017, http://freebeacon.com/national-security/korea-nuclear-test-furthers-emp-bomb/.

Chapter 3

Testing the Framework: Assessing North Korean Nuclear Space Power

> *Strategic cultures are not like strategic plans. They are the result of political and cultural history and tend to be relatively stable over time. The study of these cultures would be inexpensive and could reduce our uncertainties about how these countries could use their new power.*
>
> - Stephen Rosen: *Winning the Next War*

> *[T]here have been fears expressed that North Korea might use a satellite to carry a small nuclear warhead into orbit and then detonate it over the United States for an EMP strike. These concerns seem extreme and require an astronomical scale of irrationality on the part of the regime. The most frightening aspect, I've come to relate, is that exactly such a scale of insanity is now evident in…their space program.*
>
> *- James Oberg, former NASA space engineer*

The tiered, tailored strategic framework is designed to provide a tool for the space strategist to assess potential adversaries' decision-making calculus to provide a greater, foundational understanding of why the adversary is pursuing its space power force projection capabilities through their view of themselves, space deterrence, and strategy. This chapter applies this framework to North Korea to assess its rationale for the creation of space power escalation capabilities at the nuclear threshold and what that means for its posture and strategy against the United States and its allies.

Limitations, Assumptions Regarding the Tiered, Tailored Framework

Before assessing the case of North Korea using the framework, the author must recognize a limitation and an assumption of the subsequent review. The limitations of access to primary source documentation

regarding North Korean strategy require an assumption about the country's intentions. The assumption is that strategic cultural analysis can be used as a tool to address the limitation and gain greater insight into a unique worldview.

The first limitation is that the framework analysis is limited by a lack of primary source documentation into the strategic decision cycles and thoughts of the Kim regime and its military. Part of deterrence is finding an answer behind the "why" question undergirding an adversary's decision calculus and resultant strategic actions.[1] Analysis with access to primary source government documents that detail the specific organizational, political, and strategic processes and thoughts in a leader's own words aids precision analysis of perceptions. Understanding the rationale behind a nation's cost/benefit worldview is important for effective deterrence.[2] Typically, Western deterrence analyses, especially of Asian nuclear or space powers, rely upon mirror imaging or the rational actor model to fill in the gap of understanding on why an adversary would or would not behave in a certain way.[3] The framework within this thesis is designed to address this very issue of lack of primary source materials by using strategic culture analysis as the foundation of getting to the "why?"

Strategic cultural analysis is intended to aid in assessment of adversary perceptions and intent which are vital to crafting an effective strategy for deterrence.[4] The purpose of the framework is to get strategists to think within the potentially unique worldviews of non-Western adversaries. These worldviews could have an impact on how an adversary leadership views deterrence, weaponry, and even the United

1. Stone, *Reversing the Tao*, 17.
2. Ibid.
3. Payne, *Fallacies of Cold War Deterrence*, 39.
4. Lawrence A. Kuznar et. al., *From the Mind to the Feet: Assessing the Perception-to-Intent-to-Action Dynamic* (Maxwell AFB, AL: Air University Press, 2011), 1.

States. This unique worldview can directly counter the assumptions of the Western rational actor model or mirror imaging.[5] The framework's strategic cultural analysis is not intended to be predictive, but to determine how "culture influences strategy."[6] This analysis then must be compared with "past and future behavior" within both force posture and action to logically "provide plausibility, but not proof" of future behavior.[7] If the evidence of strategic behavior appears to match with the strategic cultural sources and functions, then it can be understood to be a manifestation of strategic culture and worth a strategist's consideration for posture and strategy shifts to achieve advantage or victory. The framework provides a tool to space strategists to analyze potential adversaries' strategic behaviors, postures, and intentions via the sources and functions within the cultural dynamic.

The second limitation is the use of strategic culture. It is assumed as a means of explanation and influence upon strategy. According to Kerry Kartchner, strategic culture as context "explicates [strategy] in terms [of] how states are thought by its own and other peoples as being likely to act based on the 'way they are' (i.e., its identity, or character, is said to predispose them toward certain policies)."[8] In other words, "culture influences strategy because mind moves muscle, and muscle moves material."[9] While it is important to avoid mirror imaging when assessing the perceptions and intentions of potential adversaries, "culture is…a conditioning influence upon behavior and as such it cannot be operationalized as a reliable predictive analytical tool" alone.[10]

5. Payne, *Fallacies of Cold War Deterrence*, 39.
6. Colin S. Gray, *Perspectives on Strategy* (Oxford, UK: Oxford University Press, 2013), 102.
7. Allen S. Whiting, *The Chinese Calculus of Deterrence*, (Ann Arbor, MI: University of Michigan, 1975), 224.
8. David G. Haglund, "What Good is Strategic Culture?" in *Strategic Culture and Weapons of Mass Destruction: Culturally Based Insights into Comparative National Security Policymaking,* ed. Johnson et al., 23.
9. Gray, *Perspectives on Strategy*, 97.
10. Ibid.

Nevertheless, the framework as developed enables strategists to tailor their analysis to a specific adversary, with limited information, and not assume that each nuclear power thinks exactly the same and is capable of deterrence through traditional means.

Employing the Framework: Strategic Analysis of North Korea

The first step in the framework of analyzing a Tier 1 Deterrence adversary such as North Korea is through a strategic cultural analysis. Strategic culture can be viewed as a shared system of meaning, including language and terms that are both understood and agreed upon within a specific cultural context.[11] Strategic culture provides the foundations and presuppositions from which North Korean leaders "perceive their external environment" and frame their worldview regarding the use of force and perceived external threats.[12] Three foundations that drive North Korean thinking are geography, self-reliance, and the perceived existential threat from the United States.

From a geographic standpoint, the land mass is mostly mountainous and not good for agriculture. This geographic drawback for farming makes the entire peninsula dependent on imports to meet their food requirements.[13] While the mountains make for difficult subsistence, leaders initially thought, mistakenly, they would provide a natural barrier against invasion. Korea's early governments found that its natural barriers did not protect them well enough; the country was invaded 900 times over a 5,000-year period. As a result, for centuries early monarchic governments managed its "strategic vulnerability through cultural and diplomatic stratagems, such as intermarriages and

11. Jeannie L. Johnson, Kerry M. Kartchner, and Jeffrey A. Larsen, "Introduction," in *Strategic Culture and Weapons of Mass Destruction: Culturally Based Insights into Comparative National Security Policymaking*, ed. Johnson et al, 9.
12. Paul Nantulya*, Is North Korea a Rational Actor?* (Washington, D.C.: National Defense University, 2017), 5.
13. Ibid.

alliances, limited shows of force, and the acceptance of tributary status" to aggressive neighbors like China.[14] By the end of the first half of the twentieth century, Korea had been forced to surrender its sovereignty to the occupation of Japanese forces and found it split into two countries at the 38th parallel at the end of World War II.

Following the war, Korea was divided into two states at the 38th parallel. The Korean War, called the Fatherland Reunification War by the North, was launched by the North Koreans as the means to reunify the peninsula under the Kim regime and its communist ideology. Its defeat and acceptance of an armistice was viewed by the Kim regime as humiliating and required the development of an even more aggressive military posture, including the development of nuclear forces.[15] The United States, as the leader of the United Nations forces that preserved a divided Korea and defended the South Korean government, is seen as the sole reason for this failure and is perceived as an existential threat to North Korea.[16]

The second foundation of North Korean strategic culture that explains its nuclear behavior is *Juche*. Translated as self-reliance, *Juche* was adopted in 1972 as North Korea's official "guiding ideology."[17] It focuses the country toward "complete political and ideological independence, economic self-reliance and sufficiency; and a viable national defense."[18] This concept of independence invokes traditional Korean ideas of isolationism and self-sustainment.[19] In addition, it also now includes a hatred of the United States and a reliance upon extended

14. Ibid.
15. Russell D. Howard, *Strategic Culture* (Joint Special Operations University, JSOU Report 13-6, December 2013), 68.
16. Joseph S. Bermudez, Jr, "North Korea and the Political Uses of Strategic Culture," in *Strategic Culture and Weapons of Mass Destruction: Culturally Based Insights into Comparative National Security Policymaking*, ed. Johnson et al., 195.
17. Ibid., 6.
18. Ibid., 11.
19. Howard, *Strategic Culture*, 70

deterrence by other states.[20] Kim Il-sung, founding father of the state and grandfather of the regime's current leader, said, "North Koreans must absolutely repudiate the tendency to swallow things of others undigested or imitate them mechanically" in reference to reliance upon Soviet or Chinese nuclear aid.[21] To avoid relying upon extended deterrence, Kim pursued indigenous nuclear weapons capabilities while pursuing training and assistance from the Soviet bloc.

Juche's notion of national governance views the nation as a body, with the "respected leader" as the nation's overarching head, and the communist party as the "nervous system" that circulates all directives to the people. This body politic concept connects with the traditional Confucian cultural norm of hierarchy and authority, with a "proclivity for conformity and uniformity that is common in East Asian cultures."[22]

In addition, North Korea's government is also viewed as an analogue to the Confucian family unit with the survival of that family falling under the responsibility of the "collective father" who is the spiritual leader and center of the universe.[23] By extension, the idea of possessing nuclear weapons, missile systems, and access to American targets through space makes North Korea's posturing as a nuclear space power "nothing less than an ideological (even spiritual) commitment" to the Kim regime and its followers.[24] This commitment to hierarchical government, undergirded by strength initiated by Kim Il-sung was continued by his descendants. Never again would a North Korean leader neglect the military instrument to ensure a viable defense infrastructure capable of achieving dominance.[25] Kim Il-sung's own writings state that,

20. Bermudez, "North Korea and the Political Uses of Strategic Culture," 197.
21. Nantulya, *Is North Korea a Rational Actor?*, 8.
22. Ibid.
23. Bermudez, "North Korea and the Political Uses of Strategic Culture," 192.
24. Nantulya, *Is North Korea a Rational Actor?*, 8.
25. Bermudez, "North Korea and the Political Use of Strategic Culture," 196-197.

"Without *Chawi* (viable, strong defenses), Korea's complete unification, independence and prosperity will never be realized."[26]

This fixation toward superior military strength was reinforced at the end of the Cold War by the loss of the Soviet Union as North Korea's military support and ally. North Korea concluded that it alone would have to be prepared to face and defeat the United States as its principal enemy. The other element of this ideology is the doctrine of *Songun*, which means military first. *Songun* places the armed forces as the central institution of the North Korean society granting all resources and support from the population. Under Kim Il-sung, *Songun* was subordinate to *Juche* but his death in 1994 enabled his successor, Kim Jong il to change that. That year, Kim Jong-il placed the armed forces above the party and issued the new guidelines that "officially replaced *Juche* with *Songun* as the basis for state planning" and strategy.[27] According to James Strafford, this decision contributed to North Korea's economic woes, as most of its resources and imports went to the armed forces of the state, not the population.[28] How does this cultural and historical background affect the Kim regime's nuclear and space power behavior?

Due to North Korea's links to ancient Korean culture, its national security strategy is a derivative of Confucianism and its resultant commitment to hierarchy.[29] Confucian thinking tends to view the world as an "organic whole, difficult to separate into parts, just as the various schools of thought are often interrelated."[30] The Kim regime is primarily concerned with ensuring its survival. This push for regime stability is

26. Nantulya, *Is North Korea a Rational Actor?*, 7.
27. Ibid.
28. Ibid.
29. Ibid.
30. Julie Cheng. "Confucianism and WMD." *Ethics and Weapons of Mass Destruction*, ed. Sohail H. Hashmi (Cambridge, UK: Cambridge University Press, 2004), 249.

"synonymous with the desire to maintain personal power and perpetuate the cult of personality of three generations of the Kim family."[31]

The third foundation that drives North Korean strategic culture and its nuclear and space power pursuits is the perceived existential threat posed by the United States.[32] What is the basis for this perception? First, North Korea considers the United States to be the main reason it was prevented from overrunning the South and unifying Korea.[33] Second, United States forces are stationed in South Korea as a result of the U.S.–South Korean mutual defense treaty. Through this treaty, the U.S. provides extended nuclear deterrence and ballistic missile defense assets for the protection of Seoul. North Korea views these forces as a threat to its survival and national security.[34] Finally, the North concludes that if given the right opportunity, the United States would overthrow the Kim regime and destroy all of North Korea. Fear of an American invasion has been a core theme in North Korean propaganda as well as its threats to destroy America, since the Korean War.[35]

These strategic cultural foundations serve as the baseline for the North Korean military strategy that relies on large, offensively postured armed forces, with emphasis on deep strike capabilities, including nuclear weapons and space access.[36] Its doctrine of deterrence for both its conventional and nuclear forces is one of pre-emptive strike given its smaller size and capabilities relative to the United States. Its nuclear forces are seen as a "guarantee that North Korea will be treated as an equal and with the respect due to it by its neighbors."[37] What type of

31. Nantulya, *Is North Korea a Rational Actor?* 7.
32. Ibid.,191.
33. Ibid.
34. Howard, *Strategic Culture*, 70.
35. Nantulya, *Is North Korea a Rational Actor*?, 8.
36. Ibid., 9.
37. Ibid.

capabilities have the North Koreans been developing to ensure self-reliance and security? In a 2015 study by Joseph Bermudez of the U.S.–Korea Institute, provides three possible future paths for North Korean nuclear strategy: low-end scenario, medium scenario, and high-end scenario.[38]

The low-end scenario shows North Korea "armed with 20 nuclear weapons" and "able to field only minor improvements to its current force of 1000 ballistic missiles."[39] They would be "able to reach most targets in Northeast Asia, including limited deployments of rudimentary sea-launched systems and possibly the fielding of the road-mobile Musudan IRBM in an emergency operational status."[40] In addition, it was projected that in this scenario, North Korea might be able to deploy a small number of ICBMs in an "emergency status," meaning only a few might be ready for use in time. As a result of this limited capability, North Korea in this scenario would only use these weapons in a posture similar to asymmetric deterrence and only if attacked by the United States.[41]

The medium scenario entails a deterrent force of 50 weapons with a "growing variety of yields," but with a few that can reach as high as 50 kilotons.[42] In this scenario, North Korea would field a road-mobile Musudan IRBM and the KN-08 road-mobile ICBM that could be used operationally. With these developments and a projected development of a sea-launch ballistic missile capability, North Korea would have a more robust and "assured retaliatory capability able to more credibly threaten targets in Northeast Asia and the United States."[43] Under this posture,

38. Joseph Bermudez, "North Korea's Development of a Nuclear Weapons Strategy," *North Korea's Nuclear Futures* (Washington, D.C.: U.S.-Korea Institute, 2015), 16.
39. Bermudez, "North Korea's Development," 16.
40. Ibid.
41. Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, NJ: Princeton University Press, 2014), xx.
42. Bermudez, "North Korea's Development," 16.
43. Ibid.

nuclear weapons would only be used for deterrence and, if that fails, to be used in response to an attack by the United States, South Korea, or Japan.

Finally, within the proposed high-end scenario, "North Korea would successfully accelerate its development and deployment of nuclear weapons and delivery systems."[44] As part of this acceleration in numbers of warheads and delivery capabilities, "significant advances in weapons design such as miniaturization and a wider variety of yields" would become possible.[45] These weapons would be capable of being delivered at intercontinental ranges towards the United States, not just in the Asia-Pacific region, and include a more rapidly deployed solid-fuel missile able to conduct broader arrays of strike options. In this situation, the limited use of nuclear weapons on the peninsula would be provided for the "threshold for use against Japan" and the United States would "be lowered."[46] More recent developments indicate that the Kim regime is pursuing the most threatening, high-end scenario and any hope of Pyongyang using its nuclear, missile, and space programs as bargaining chips for negotiations is over.[47]

North Korean Nuclear Strategy of First Strike Deterrence

Since Bermudez assessed North Korean capabilities, Kim Jong-un has rapidly accelerated his nuclear, missile, and space program efforts. These efforts have reportedly yielded capabilities not assessed to have been achieved by the regime, such as miniaturization of warheads, the testing of thermonuclear-level yields, and the launch of a solid-fuel ICBM capable of ranging the United States mainland.[48] Kim Jong-un began

44. Ibid., 17
45. Ibid.
46. Ibid.
47. Mathieu Duchatel, Francois Godement, "Pre-Empting Defeat: In Search of North Korea's Nuclear Doctrine" *ECFR Policy Brief 237* (European Council on Foreign Relations, November 2017), 6.
48. Pry, "Empty Threat or Serious Danger," 2.

this rapid growth in capability in earnest in May 2016.[49] Since then, his regime's testing of IRBM and ICBM capability has increased in frequency and success, yielding some analysts to assert that the focus has shifted from one of "appearance" to one concerned with "efficacy of its missiles."[50] This pursuit of efficacy is shown by the fact that since January 2014 there have been 77 tests, whereas there were only 36 in the preceding 29 years.[51] In addition, this enhanced focus on developing a credible arsenal capable of hitting the United States and its allies includes the capability and testing for the employment of EMP-capable weapons.

According to testimony to Congress of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP Commission), all of these rapid advances highlight that the thermonuclear tests and several missile flight trajectories indicate that an EMP attack is part of North Korea's assessed capability goals.[52] Some analysts argue that despite the longer ranges and miniaturized thermonuclear capabilities, the lack of precise guidance and navigation controls for its weapons systems would focus its efforts strictly upon counter-value targets, and only individual cities.[53] While acknowledging these concerns, the EMP Commission asserts that given this limited capability, combined with the advances in its nuclear technologies and space access abilities, North Korea "may well prefer using a nuclear weapon for an EMP attack, instead of destroying a city."[54] The Commission argues that "state actors that possess relatively unsophisticated missiles armed with nuclear weapons…may obtain the greatest political-military utility from one or a few such weapons by using

49. Ibid.,1.
50. Ibid.
51. Ibid.
52. Pry, "Empty Threat or Serious Danger," 2.
53. Liu, "A North Korean EMP Attack-Not Likely."
54. Pry, "Empty Threat or Serious Danger", 3.

them—or threatening their use—in an EMP attack" on the United States."[55]

North Korea's Pursuit of Satellite-Based EMP Weapons Platforms

According to official statements and what few documents analysts in South Korea and the West have obtained, the North Korean armed forces were directed to perfect the "method and operation" of nuclear weapons as the "pivotal" means for "deterrence and war strategy" of the state.[56] Sources "make clear that North Korean thinking on nuclear weapons centers on the concept of a pre-emptive strike" as part of its defensive, deterrence posture.[57] First-strike deterrence is similar to the Chinese perspective of deterrence as "active deterrence" or a posture of "attack to deter."[58] This Chinese concept states that rather than waiting for the threat to fully materialize through a direct attack, it would be considered an act of self-defense to conduct the first strike.[59] This logic also appears in the American deterrence theory of Herman Kahn, who stated in 1960 that "Most governments when asked to choose between war and peace are likely to choose peace because it looks safer. These same governments if asked to choose between getting the first or second strike will very likely choose the first strike…once they feel war is inevitable, or even very probable."[60] If the North Korean regime concludes that an "imminent attack" is possible from the United States then "all the powerful strategic and tactical strike means of our revolutionary armed

55. William Graham et al, *Executive* Report (Washington, D.C, Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack: 2004), 2.
56. Bermudez, "North Korea's Development," 14.
57. Mathieu Duchatel, Francois Godement, "Pre-Empting Defeat: In Search of North Korea's Nuclear Doctrine," *ECFR Policy Brief 237* (European Council on Foreign Relations, November 2017), 3.
58. Christopher Stone, "Rethinking the National Security Space Strategy, Chinese vs. American Perceptions of Space Deterrence", *Space Review*, 4 November 2013, http://www.thespacereview.com/article/2395/1.
59. Henry Kissinger, *On China, (*Penguin Books, 2012), 133.
60. Kahn, *On Thermonuclear War*, 136.

forces will go into preemptive and [justice] operations against the enemy."[61]

Given its limited intelligence and reconnaissance capabilities, documents show that North Korean "strategic forces" will be ready "at any time to strike 'the U.S. mainland, their stronghold, its military bases in the operational theaters of the Pacific, including Hawaii and Guam, and those in South Korea.'"[62] There remains considerable uncertainty and ambiguity in public statements from the Kim regime regarding this strategic view, but "ultimately North Korea's quest for deterrence is determined…from North Korea's perspective, [that] striking first would be a rational act, because at the present time the regime would be unlikely to survive a first strike from the US; if it fears it is about to be struck, it might as well strike first."[63] Thus, because of this rapid progression in capability, its strategy for first strike as a deterrent posture, and its recent access to space, the EMP Commission asserts evidence suggests a space-borne EMP strike is being developed by North Korea, which may even have two pathfinder spacecraft in orbit currently.[64]

Some observers, such as the EMP Commission's William Graham, argue that the evidence suggests that North Korea's first-strike deterrence posture and current capabilities indicate that its two currently orbiting satellites, KMS-3 and KMS-4, are the right size and in the right orbital type and altitude to assert an existential threat to the United States homeland.[65] While some analysts like Jack Liu argue the North Koreans lack the size and numbers of weapons to achieve catastrophic damage upon the United States, Graham asserts

61. Duchatel, Godement, "Pre-Empting Defeat: In Search of North Korea's Nuclear Doctrine," 3.
62. Ibid., 4.
63. Ibid., 8.
64. Pry, "Empty Threat or Serious Danger," 2.
65. William Graham, "North Korea Nuclear EMP Attack: An Existential Threat," (Unedited draft obtained during interview process, January 2018), 2.

otherwise.[66] He cites a prior Commission report to Congress that states, "certain types of relatively low-yield nuclear weapons can be employed to generate potentially catastrophic EMP effects over wide geographic areas, and designs for variants of such weapons may have been illicitly trafficked for a quarter century."[67] Graham, in an editorial for the U.S.-Korea Institute's website *38North*, cites the 2004 interview of two Russian generals who stated that the "design for Russia's Super-EMP warhead, capable of generating high intensity EMP fields of 200,000 volts per meter, was 'accidently' transferred to North Korea."[68] In addition, Graham cites evidence presented to Congress that Russian scientists have been aiding North Korea with its nuclear weapons and missile programs to improve the effectiveness of the EMP weapons platforms.[69] In addition to Russian help, media reports indicate that the North Koreans may be receiving technical assistance and parts for its launch vehicles and ICBMs from China.[70] How does this indicate that North Korea is pursuing the capability of nuclear space power?

Graham, known for his background with early American upper atmospheric nuclear testing in space, assesses that the orbital flight paths of the KMS-3 and KMS-4 spacecrafts, their payload size and weight, and altitude indicate that they could be at best pathfinders for an EMP weapons platform, or at worst, currently capable of executing such an attack.[71] Another observer, Ambassador Henry Cooper, a former Director of the Strategic Defense Initiative, expressed similar concerns when he stated that current missile defense systems "are not arranged to

66. Jack Liu, "A North Korean EMP Attack-Not Likely," *38 North Online*, 5 May 2017, http://www.38north.org/2017/05/jliu050517.
67. Graham, "North Korea Nuclear EMP Attack," 2.
68. Ibid.
69. Ibid.
70. Anders Corr, "Chinese Involvement in North Korean Missile Program: From Trucks to Warheads," *Forbes Online*, 5 July 2017, https://www.forbes.com/sites/anderscorr/2017/07/05/chinese-involvement-in-north-koreas-nuclear-missile-program-from-warheads-to-trucks/#620111a56f2f..
71. Graham, "North Korea Nuclear EMP Attack," 3.

defend against even a single ICBM that approaches the United States from over the South Polar Region, which is the direction…North Korea launched its satellites."[72] Despite the doubts raised by some other observers like Jack Liu and Patrick Terrell that orbital EMP is not a realistic or credible threat, James Oberg, a former NASA engineer who is the only U.S. civilian space expert to visit the North Korean launch site, asserts these concerns are legitimate and the U.S. government should verify the payloads of these satellites and the intentions of North Korea's quest for space power:

> There have been fears expressed that North Korea might use a satellite to carry a small nuclear warhead into orbit and then detonate it over the United States for an EMP strike. These concerns seem extreme and require an astronomical scale of irrationality on the part of the regime. The most frightening aspect, I've come to realize, is that exactly such a scale of insanity is now evident in the rest of their "space program."[73]

James Oberg's conclusions were made, in part, due to the extreme lack of transparency of the tours of the launch facilities and spacecraft mating process. In addition, North Korea's assertions that they are observation satellites to be used for agriculture planning are not credible. He writes, "North Korea is a small country to start with, with limited agricultural space. Airborne sensors could easily cover all required regions with greater flexibility and far lower cost. And commercial Earth observation satellites already exist willing to sell supplementary imagery at all conceivable wavelengths."[74] After his tour and watching the advancement in nuclear, missile, and space power capacities, Oberg

72. Henry F. Cooper, "Whistling Past the Graveyard," *High Frontier (blog)* September 20, 2016, http://highfrontier.org/september-20-2016-whistling-past-the-graveyard.
73. Jim Oberg, "It's Vital to Verify the Harmlessness of North Korea's Next Satellite," *Space Review*, 6 February 2017, http://www.thespacereview.com/article/3164/1in.
74. Ibid.

concluded that this may be a pursuit of nuclear space power weapons capabilities: "Now that North Korea can build unshielded nuclear weapons that could fit into that same payload shroud and wind up in orbit an hour away from American airspace, the issue has become a lot more vital, and pressing."[75] In other words, North Korea has developed a Tier 1 Deterrence threat to the United States.

Strategic Profile of North Korea: Summary

The pursuit of weapons of mass destruction, missiles, and space technology all point back to the threat-based worldview that is designed to keep the Kim regime in power and its form of communism alive. Without the existential threat from the United States, there would be no rationale for "military first," or the maintenance of a large, offensive-postured conventional force or the development, testing, and deployment of nuclear and space weapons. Their geographic context, self-reliance for security, and even subsistence, make it a very challenging environment over which to rule. As a result of these existential fears, the United States should prepare for the use of these nuclear and space capabilities which North Korea may use to ensure the survival of the regime from external threats and the perception of strength within the state.

In addition, this background also highlights the concern behind its strategy and doctrine for employing these weapons. Due to its secondary goal, behind regime survival, of reunification of the Koreas, it is not difficult to see how and why the North Koreans maintain an offensive posture. States that are planning or "bent on conquest will prefer offensive military" strategies.[76] Of interest is that despite all the sanctions and negative impacts on the people of North Korea, the regime's "cognitive anti-access" hold on the people has continued the

75. Ibid.
76. Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars*, (Ithaca NY: Cornell University Press, 1986), 69.

existential threat narrative of the United States.[77] However, if the threat of war coming to North Korea is going to lead to its destruction and the loss of power for the regime, scholars indicate that such thinking will push the government to arrange that any future "war will be fought on the territory of the enemy, of neutrals, or even of allies."[78] Finally, states such as North Korea, who conclude they face multiple threats, internally and externally, may move toward an offensive posture to strike first and minimize the effect of the imbalance of military capabilities for the weaker force. This appears to be the path that Pyongyang is taking.

Chapter Conclusions

This chapter uses the strategic framework to assess the Tier 1 space deterrence threat tailored to North Korea. This framework highlights the importance of conducting a strategic culture analysis to gather the undercurrents of decision making in the Kim regime, the leader's thought processes, and the rationale behind his development of nuclear space power capabilities such as EMP satellites capable of striking the United States. To effectively posture U.S. space infrastructure for a credible deterrence, strategists and policymakers should understand the foundations of adversary thinking and why they are pursuing such weapons. Only then can strategists create a strategy that can influence the adversary and not just prepare for weapons use.

77. Tangredi, *Anti-Access Warfare*, 204-205.
78. Posen, *Sources of Military Doctrine*, 69.

Chapter 4

A Future National Security Space Strategy for the Second Nuclear Age

> *Deterrence theory favors status quo powers, not powers unhappy with the limitations put on them by the existing distribution of power and superior weapons in the hands of others.*
>
> - Therese Delpech: *Nuclear Deterrence in the 21st Century*
>
> *At one time, our nation may be robustly confident, at another, confused and uncertain. For this reason, the American reputation is always being tested, and we must make constant efforts to protect it. Our reputation ebbs and flows depending on the sacrifices we have recently made-or failed to make—in support of our threats.*
>
> - James L. Payne: *The American Threat* (1981)

Since 9/11, the joint doctrine of the Department of Defense states that the United States armed forces will execute homeland defense "by detecting, deterring, preventing and defeating threats from actors of concern as far forward from the homeland as possible."[1] As a result of the analysis of the threat posed by North Korean EMP weapons attacking the homeland from space, what conclusions can we draw from the framework regarding our deterrence effectiveness? What implications does that have for our future posture and its part in the defense of the homeland? This chapter explores conclusions and implications regarding such a high threshold space power crisis and how to adequately posture for it in the future.

Why Our Deterrence Posture Has Been Ineffective in North Korea

For several decades, the United States' posture for deterrence (nuclear, conventional, and space) has been to make deterrent threats,

1. Joint Publication 3-17, *Homeland Defense,* I-1.

but not to follow through on them.[2] Those few times in the 1970s that we did respond to aggression on the Korean Peninsula led to the deaths of Americans and South Koreans and was not even proportional, much less aimed at escalation dominance to sustain the status quo. The North Koreans have: engaged in provocative military operations on land, sea, and air since the 1960s; detonated atomic, thermonuclear weapons; tested intercontinental and intermediate range ballistic missiles; and achieved space access capability, despite our government's deterrent threats to use force if the Kim regime crossed any of those lines.[3] The United States did not want to provoke the North Koreans into a full-scale war on the peninsula, thereby altering the status quo. As a result, the credibility of the United States' deterrents diminished more and more and North Korea gradually escalated past the acceptable thresholds with no consequences beyond soft economic sanctions. How can we restore our credibility in a nuclear, space-enabled environment?

French analyst Therese Delpech argues that to restore credibility, the U.S. must be willing to follow through on its threats of military force. By restoring will and highlighting the determination of the United States to go to war over North Korea's provocations and attacks, the deterrent thresholds could be restored.[4] This situation, created by our government's lack of determination and will over many years, has created a condition where the risks are now much higher and the potential for nuclear use is increased. Due to this lack of action, the United States now must be willing to take more aggressive action to establish effective deterrence. As a result of this environment created by deterrence failure and the acceptance of the graduated shifts in the status quo, can the

2. Therese Delpech, *Nuclear Deterrence in the 21st Century* (Santa Monica, CA: RAND Corporation, 2012), 105.
3. Payne, *The American Threat*, 54.
4. Delpech, *Nuclear Deterrence in the 21st Century*, 106.

United States deter North Korea from using nuclear space power projection capability?

Can North Korea Be Deterred?

Scott D. Sagan asserts that North Korea can and will be deterred from using its nuclear weapons against the United States. He does acknowledge that the non-proliferation regimes and other efforts to prevent the Kim regime from achieving nuclear, missile, and space access capabilities have failed. He concludes that Korea has now become a "deterrence problem" that can be managed.[5] His concern lies more with the United States and South Korea "stumbling into nuclear war" and the use of rhetoric as a threat that could lead the North Koreans to attack.[6] This author disagrees with Sagan's assessment of a "slow moving Cuban Missile Crisis" or that rhetoric such as "all options remain on the table" is "dangerous," as Sagan bases his assessment on Kim Jong-un within a rational actor model.[7] He postulates a similarity between a U.S.-Soviet bi-polarity and the relationship between the U.S. and North Korea. He stated in an article in *Foreign Affairs* in 2017 that Kim Jong-un, as a rational actor, would respond better to diplomacy than overt threats."[8] In addition, Sagan asserts that if the United States takes the use of force off the table this would create stability.

James Payne provides context with regards to threats in a deterrence environment. Drawing on decades of study and development of deterrence theory, Payne states that rhetoric alone does not constitute a threat. A threat exists instead when an adversary concludes that the enemy, in this case the U.S., has the "capability and will" to go to war "in designated circumstances."[9] Payne asserts that as the strategic culture

5. Sagan, "The Korean Missile Crisis," 72.
6. Ibid.
7. Ibid., 76
8. Ibid., 78.
9. Payne, *The American Threat,* 54.

and context behind North Korea's strategic behavior attest, "it doesn't begin to adequately describe" the "psychological strategy" that he terms a willingness for "suicide in your neighbor's living room."[10]

Therese Delpech does not assess that North Korea has been or will be deterred by the threats of the United States. She argues the evidence shows that deterrence has already failed in the context of the North Korean nuclear program as well as the deterrence of violence of any kind: "How is it possible that a country unable to feed its people [has] threatened the lone superpower for decades?"[11] She asserts that the sinking of the South Korean Navy vessel ROKS *Cheonan* and the attack upon South Korean territory killing 46 people as evidence of "deterrence failure."[12] Responding to this "clear act of war" with nothing stronger than "soft economic sanctions" precipitated a failure that continues to this day.[13] North Korea, she assesses, has concluded that the United States does not follow through on threats of military action in designated circumstances, and as a result, concludes that "it can lash out again and again without facing serious consequences."[14] Delpech argues that to reverse this trend the United States must follow through with sufficient force to punish Pyongyang and "prevent any similar—or worse—action in the future."[15] Former South Korean president, Lee Myung-bak agrees: "If we once again tolerate North Korea's blatant act of violence, then I believe that will not promote, but endanger, the peace and stability in the Korean Peninsula."[16]

These disparate opinions demonstrate that there are no guarantees of deterrence 100 percent of the time. Analysis shows that any purely

10. Bracken, *Second Nuclear Age*, 2.
11. Delpech, *Nuclear Deterrence in the 21st Century*, 102.
12. Ibid., 105.
13. Ibid.
14. Ibid., 103.
15. Ibid., 106.
16. Delpech, *Nuclear Deterrence in the 21st Century,* 106.

deterrent posture at these thresholds would not be completely assured. This lack of assurance is due to North Korean strategic culture and posture for pre-emptive strike and its use of force in the conventional arena several times with no consequences. Because of this lack of consensus and the uncertainty that pervades the second nuclear age's multipolar environment, Payne concludes that the United States' best option is to hedge against the uncertainty through the understanding of strategic culture in decision making and prepare for deterrence failure. Not to do so and to accept that deterrence can be assured, could lead to "unprecedented catastrophe."[17]

Posturing for Space Deterrence in the Second Nuclear Age

At the strategic level, the United States now has the responsibly to acknowledge that North Korea's ability to launch EMP satellites via FOBS to the United States creates a situation where the risk is not just to the Korean Peninsula, but to the homeland and its critical space infrastructure.

The framework for credible space deterrence appears to link up well with the current theory and concepts of second nuclear age strategic thinkers such as Paul Bracken, Kerry Kartchner, and Keith Payne. Bracken argues for a posture that includes strategists who are willing to "think about the unthinkable," realize that "the doctrine of mutually assured destruction is completely out of fashion," and realize that the United States may be "forced into more hazardous approaches."[18] Kartchner argues that to understand such a diverse group of decision makers requires the use of strategic culture analysis to get into the head of the enemy, especially in circumstances where weapons of mass

17. Payne, *Fallacies of Cold War Deterrence,* 194.
18. Bracken, *The Second Nuclear Age,* 222.

destruction are involved.[19] Payne argues that as a result of such diverse strategic worldviews in various capitals of potential adversaries, damage limitation capabilities including offensive and defensive options must be part of any future posture.[20]

The United States should consider a posture similar to what is recommended in the tiered, tailored framework but with additional damage limitation measures. *Reversing the Tao* argues that following analysis of the adversary's strategic culture and view toward deterrence, an aggressive postured adversary should be counter-postured similarly to provide first-strike stability and vertical escalation dominance.[21] While potentially effective for such a scenario, within a Tier 1 Deterrence situation, such a posture is insufficient to effectively deter space crises at the nuclear thresholds tailored to North Korea's unique strategic culture. Instead, a posture of offensive space superiority supported by defensive damage limitation measures is the best posture for future deterrence. What could this look like?

First, the national security space strategy of the future must acknowledge the connection of space as a "forward region" of homeland defense similar to that of the emergent Asian nuclear-space powers in the second nuclear age environment. As seen in the former *Strategy for Homeland Defense and Civil Support Joint Operating Concept*, an active, layered defense strategy for the homeland conceptually includes three regions: forward regions, approaches, and the homeland itself.[22] The space medium is one such forward region of the U.S. homeland and at higher thresholds of escalation in space, such as nuclear use that can

19. Beatrice Heuser, "Foreward," in *Strategic Culture and Weapons of Mass Destruction: Culturally Based Insights into Comparative National Security Policymaking*, ed. Johnson et al., xi.
20. Payne, *Fallacies of Cold War Deterrence,* 187.
21. Stone, *Reversing the Tao*, 46.
22. Department of Defense, *Homeland Defense and Civil Support Joint Operating Concept*, Version 2.0, 1 October 2007, ES-3.

reach and directly impact the homeland, any national security space strategy that is linked to homeland defense should acknowledge space as a forward region. This view of space as a forward region is vital in "ensuring the freedom of action, full access and use of capabilities…in space" while having the means of denying that freedom to threatening powers.[23] These layers of defense of the space forward region include detection, deterrence, preventative actions, and defeating threats, "as far forward…as possible."[24]

Detection is more than the operational task of tracking an inbound weapon. Detection is about ascertaining and staying ahead of an adversary who is developing and testing missiles, FOBS, or EMP satellites capable of a strike on the homeland or critical space infrastructures. What is first required is the use of the tiered, tailored framework to assess the adversary's strategic calculus and the trends of its weapons programs that could potentially become a deployed or used threat. Once that is accomplished, the next step is to ensure that the detection of the threat is operationally possible. Assessing an adversary's space posture requires a robust space situational awareness (SSA) capability. As a mission area, the DoD articulates the importance of this capability and has invested in ground-based sensors such as the Space Surveillance Telescope, the C-Band radar, the Space Fence, and recently, the Deep Space Radar.[25] In addition, the Space Surveillance Network, originally designed to track space and missile threats to the United States from the Eisenhower years forward, is now used by the U.S. Strategic Command's Joint Force Space Component Command.[26] In

23. Joint Publication 3-27, *Homeland Defense* (Washington, D.C.: Department of Defense, 2013), III-14
24. DOD, *Joint Operating Concept*, ES-19.
25. Mr. Kenneth Rapuano, Statement for the Record to Strategic Forces Subcommittee, House Armed Services Committee Hearing, 115th Cong, 2d sess, 15 March 2018, 9.
26. David N. Spires, *Beyond Horizons: A Half Century of Air Force Space Leadership* (Air Force Space Command, 2002), 187.

2014, the U.S. Air Force launched the newest in-space surveillance system called GSSAP (Geosynchronous Space Situational Awareness Program) to monitor activities in the GEO belt. The assets in GEO are of vital national interest and must be defended.[27] The ability to attribute enemy activities and impending threats to our space infrastructure and homeland at all thresholds is vitally important to prevent surprises at the strategic and operational levels.

Updates to the National Defense Strategy highlight the importance of active and passive defenses to a credible posture for deterrence.[28] The National Defense Strategy does not specifically state that space infrastructures and nuclear, high-threshold threats by adversaries are included in space deterrence, but its approach does appear to be a good starting point. In the past, there has been no real deterrence capability or capacity in either the 2011 National Security Space Strategy, or follow-on guidance documents such as the Space Protection Strategy. As James Payne suggests, for a true deterrence capability to work, there must be a viable capability that adds to the risk calculus of an enemy. This capability requires a multilevel attack architecture that enables options for vertical escalation across the counterspace spectrum, even in high threshold nuclear environments. As mentioned before, a credible deterrent must include capability, will, determination, and a believable declaratory policy.

Second, offensive deterrent capability is an area where much progress has occurred since the days of the Cold War. Where before, a non-nuclear ASAT option did not exist due to technological limitations, there are numerous programs of record that could be modified in short

27. Mr. Kenneth Rapuano, Statement for the Record, 7.
28. Department of Defense, *Summary of the 2018 National Defense Strategy of the United States: Sharpening the American Military's Competitive Edge*, (Washington, D.C: Government Printing Office, 2018), 6.

order.[29] The Standard Missile-3 is a workable option for LEO intercepts, while the Ground-Based Interceptor has a potential range into low-medium Earth orbit for active deterrence roles and missions. However, depending on the adversary in question, and the need in the second nuclear age for escalation dominance at all thresholds, it might behoove the United States to consider deploying a mixed deterrent force, tailorable to specific adversaries and threats. For example, in the 1960s, the Soviet Union deployed nuclear-tipped FOBS and planned to include "spaceships, satellite fighters and other flying apparatus armed with rockets."[30] The United States, in response, decided to deploy two obsolete Thor missiles at Johnston Island in the Pacific to serve as nuclear ASAT weapons as a deterrent against the Soviets' use of these FOBS on the United States.[31] The deployment and reuse of old Thor missiles highlights the determination and will of the U.S. government at the time, as well as the analysis of the threshold level that the Soviets were perceived to require to prevent them from utilizing their FOBS on the homeland. These systems also show that there is precedence for taking a current program of record and modifying it for a new and vital mission set. Whatever the capability needed to deter the use of space attack weapons systems, kinetic or nuclear, must be covered in any space deterrent force for the second nuclear age, especially if these weapons are to be used for active deterrence roles, also called preventive action.

Third is preventive action. In the context of a second nuclear age environment, this can cover a multitude of activities. First, it requires taking the North Korean or Chinese concept of "attack to deter," otherwise called "active deterrence," and applying it to the U.S. concept of space deterrence and homeland defense. The reason for this, as

29. Joseph T. Page II, *Space Launch Complex 10: Vandenberg's Cold War National Landmark*, (Charleston, SC: History Press, 2016), 64-65.
30. Page, *Space Launch Complex 10*, 64.
31. Ibid., 65.

suggested in the analysis of North Korean strategic culture, is that part of the reason the United States has been exploited in space is due to our assumption of acceptance of international norms and rules. These assumptions of passive response have led to the exploitation of U.S. vulnerability. Shaping U.S. strategy and posture to be more aggressive, like that of China or North Korea, rather than traditional U.S. methods, could aid escalation dominance and second nuclear age deterrence. Given the offensive dominant nature of both the space environment and the regional non-peer and peer adversaries of the second nuclear age, preventative action may require a deterrent attack against "mobile warfare" assets such as terrestrial-based KE ASATs or EMP satellites that are deployed into LEO. Should indications and warnings from our overhead reconnaissance satellites, aircraft, or SSA sensors indicate that ground-based space attack assets are about to leave garrison, or a satellite is assessed to be an EMP weapon, preventive strikes may be the only sure means of defending the homeland and its critical space infrastructure from destruction.[32] Such preventive actions would be legitimate, and because the use of nuclear weapons from space is banned by international treaty, any such preventive action could be framed as enforcement of such international norms as well as the inherent right of self-defense by the United States.[33]

Fourth is defeating threats which requires "capabilities and the political will to engage and defeat the threat as far away as possible from the U.S. homeland. In some ways, this ties-in with the aforementioned deterrence concept of "attack to deter." Given a high threshold threat such as an EMP device in orbit, or the launching of a FOBS system

32. Stone, *Reversing the Tao,* 57.
33. The United Nations Charter, the U.S. Constitution and the Outer Space Treaty of 1967 all support the inherent right of self-defense and the international agreed ban on weapons of mass destruction in space.

toward the United States, there must be an option to intercept such threats prior to its overflight of the homeland or other U.S. territory.

Chapter Conclusions

For centuries, international law recognized that nations need not suffer an attack before they can lawfully take action to defend themselves from imminent danger.[34] As the author stated previously, "the United States must adapt the concept of imminent threat to the capabilities and objectives of today's potential adversaries who do not seek in the near term to attack us using conventional means. Instead, [adversary] strategic and military planners rely on asymmetric means to strike at the U.S. homeland's space enabled" instruments of national power.[35] The dynamic, complex nature of the second nuclear age, the increasing likelihood of nuclear use, even in space, makes having a credible deterrent force, capable of escalating up to all levels of the space power escalation ladder, a vital piece of any future posture for deterrence. To be capable of deterrence in a Tier 1 Deterrence environment requires the ability for warfighting, possibly even nuclear warfighting, within the medium of space. The implications of not preparing in this way could lead to catastrophe for the United States and its allies.

34. Stone, *Reversing the Tao*, 59.
35. Ibid.

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