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Editor's Note

This issue of *Space & Defense* enriches our collaboration with USSTRATCOM's Deterrence & Assurance Academic Alliance (https://www.stratcom.mil/Academic-Alliance/). DAAA cultivates a network of leading universities with faculty and students interested in contributing analysis and solutions to problems of deterrence in the 21st century. Given the USAFA Eisenhower Center's heritage exploring space politics and policy, we found extraordinarily productive overlap between the editorial ambition of this Eisenhower Center journal and DAAA's mission. To enable future joint efforts, prior to publication, we welcomed Dr. Michelle Black, former USSTRATCOM civilian, cofounder of the Academic Alliance, and current assistant professor of Political Science at the University of Nebraska, Omaha, to our editorial board.

Our lead article this issue, "China's Military Space Strategy," by Sam Rouleau, 2Lt, USAF, applies concepts from political-economy to glean insights on the roots and future direction of China space. The field of political-economy is routinely concerned with the role of ideas in shaping material incentives for state actors. Rouleau analyzes the Marxist dialectic from Chinese Communist Party ideology and traces how such an important belief system within the Chinese leadership ought to affect investment in space capabilities. Rouleau's article is straight from our customary mold at *Space & Defense.* It also touches upon academic interests at STRATCOM in cross-domain deterrence.

Subsequent articles in this issue address questions of interest to DAAA that travel beyond the technical confines of space policy to include cyber and nuclear decisions. Two of the articles, by Timothy Goines, Maj., USAF and myself, on cyber and cross-domain deterrence, respectively, were in fact presented at the Academic Alliance's annual tabletop exercise and workshop in March 2018. This issue's third feature article, by Saint-Clair Lima da Silva, Col, Brazil Air Force (AFB), presents comparative research, again in a political-economy context, investigating how state inculcated ideas of sovereign autonomy provide an unconventional yet superior explanation to that of regional power rivalry when analyzing drivers for Brazil's nuclear program during the 1970-1980s.

Finally, we are pleased to feature the return of our "Student Voice" section, also aligned with DAAA goals. Laura Olson, 2d Lt, USAF (USAFA '17) won the Political Science honor society Pi Sigma Alpha's Best Undergraduate Class Paper Award in June 2017. Her study, part of her capstone experience at the U.S. Air Force Academy, synthesized public opinion data and media content analysis to demonstrate significant gaps in correlation between media framing and American support for post-Cold War uses of force in Kosovo (1999) and Syria (2012-2016). In 2Lt Olson's case, as is true for all our authors, *contributions herein are academic and do not represent official policy or opinion of the U.S. Air Force.*

Consistent with President Eisenhower's legacy of critical thinking on space and national security, and lining up with deterrence and assurance research priorities of the STRATCOM Academic Alliance, we ask new faculty and student voices to speak up as they tackle thorny problems. Our type of defense challenge often affects multiple actors while weaving together political and economic as well as military dimensions of power at the frontiers of defense policy.

Damon Coletta
USAFA
February 2019

China's Military Space Strategy: A Dialectical Materialism Perspective

Sam Rouleau

China's military space strategy accommodates in significant ways the Chinese Communist Party's (CCP's) ideological commitment to dialectical materialism. This Marxian commitment persists and manifests in China's investment in space power despite the Party's widely acknowledged development of state capitalism to guide China's economy.

CHINA'S MILITARY SPACE STRATEGY

The trajectory of humankind changed on 4 October 1957 when the Soviet Union launched Sputnik, becoming the first nation to successfully enter the space domain.[1] Since 1957, space technology has developed rapidly, as we have continued to push the boundaries of space exploration. In the 21st century, space technology forms the foundation for modern communication, navigation, and warfighting capability. Without space, modern society would be denied GPS technology, and militaries would be unable to establish global communications, perform satellite reconnaissance, or execute precision strikes. In many ways, the space domain will be increasingly vital to the national interest and international politics moving forward.

China's recent economic success provides a strong bulwark on which to build their space capability. Throughout the 1990s, China's GDP grew at an outstanding rate of no less than seven percent annually.[2] Current projections have the Chinese economy surpassing the U.S. and holding forty percent of global GDP by 2040.[3] The economic success of the People's Republic of China (PRC) will allow for commitment and progress in the pursuit of advanced space technology.

China has identified space as integral to achieving national prosperity and security. More specifically, Liu Yanjun, Wan Shuixian, Li Daguang, and Guo Tong from the National Defense University write in their work, *On Space Dominance*, that space holds the key to political, economic, and military security.[4] Space capability can be a powerful diplomatic tool. For example, during the Berlin Crisis, the United States used the Samos 2 photoreconnaissance satellite to determine that the Soviet Union had no combat ready ballistic missiles, undermining Nikita Khrushchev's stated position that the missile gap between the Soviets and the Americans was insurmountable, forcing Khrushchev to soften his stance and compromise.[5] The Chinese view this early utilization of space technology as a foundational example of how space technology can strengthen China's diplomacy, placing them in a stronger negotiating position. In other words, space

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[1] Sam Rouleau is Second Lieutenant in the United States Air Force and Class of '17 at the U.S. Air Force Academy.
[2] Henry Kissinger, *On China* (New York: Penguin Books, 2011), 479.
[3] Joseph Nye Jr., *The Future of Power* (New York: Public Affairs, 2011), 184.
[4] Liu Yanjun, Wan Shuixian, Li Daguang, Guo Tong, *On Space Dominance* (Beijing: National Defense University, 2003), 1, 3, 8.
[5] Ibid., 3.

enables the national information system, which strengthens diplomatic capacity and propagates political proposals, opinions, and ideology.[6]

In the economic realm, China asserts that space holds promise for economic prosperity. Regarding resources, the People's Republic of China is cognizant of the potential implications of the unique treasures found beyond Earth's atmosphere, such as potential energy sources and the potential for new biotechnologies, believing that new technologies will become economically profitable.[7] Additionally, China intertwines the future of humanity with the future of the space domain: "the population that Earth can sustain has a limit, and sooner or later mankind will set forth the proposition to expand living space into outer space. Therefore, in the 21st Century, mankind's reliance on space aviation technology will be similar to mankind's reliance on electricity and petroleum."[8] If the potential of the space domain is harnessed properly, they conclude that consequent economic growth will raise the standard of living throughout China and strengthen China's international position by fortifying their economy.[9] The dynamism that space can bring to labor, capital, production, and markets is another example of why China believes that space power contributes to ensuring national survivability.[10]

Space's past and potential impact on military capability is also of significant interest to China. As China observed the Cold War competition between America and the Soviet Union, they concluded that space was the deciding factor and would be in the future: "mankind's demands on the realm of space have continually increased, and have led to a further strengthening of the trend toward the militarization of space."[11] In general, the Chinese military and Communist Party believe that space will be the domain that dictates victory in future wars, because "in the 21st century, possessing the vantage point of outer space will to a very large degree allow control of the progress and conclusion of war."[12] Space's considerable impact on warfare reinforces the political and economic justification for why a strong space capability is paramount to China's interest and development.

After prevailing in the Cold War against the Soviet Union, the United States now finds itself joined by the People's Republic of China as a preeminent player on the international stage. As outlined above, the governing Communist Party of China (CPC) is committed to developing their space capabilities to ensure China's place on the world stage and survival of the Party. The experience of the United States during the Cold War offers historical insight into how to better understand the foundation of China's military space strategy.

Specifically, Dr. Andrew Marshall's work on understanding Soviet strategy outlines a promising framework of how to enhance America's awareness of China's approach to the space domain. Before Andrew Marshall's arrival at the Pentagon, Department of Defense assessments of Soviet military power were strictly based on quantitative methods.[13] However, Marshall's approach to net assessment held that quantitative comparisons

[6] Ibid., 4.
[7] Ibid., 4, 7.
[8] Ibid., 4.
[9] Ibid., 8.
[10] Ibid., 8.
[11] Yanjun, Shuixian, Daguang, and Tong, *On Space Dominance*, 19.
[12] Ibid., 9.
[13] Andrew F. Krepinevich and Barry Watts, *The Last Warrior Andrew Marshall and the Shaping of Modern American Defense Strategy* (New York, NY: Basic Books, 2015), 171.

must "capture qualitative differences between the opposing men and equipment," and that it was necessary to "incorporate differences in training, tactics, military doctrine, campaign strategy, and theater objectives."[14] Marshall's approach directly contributed to the end of the Cold War and collapse of the Soviet Union. Although the Soviets had put themselves under economic stress, "Marshall's insights into the true burden enabled him to provide Weinberger, Iklé, and many others with a more accurate and nuanced assessment of how the long-term competition with the Soviets was going and whether deterrence was likely to hold."[15] Marshall understood that strategy and policy are influenced by more than a few factors. By understanding Soviet approaches to training, tactics, and military doctrine, he was able to better assess Soviet military strength and the Soviet-U.S. competition and conflict. In this same way, understanding Chinese thought and perspective is fundamental to forming sound long-term strategy for the United States.

The context in which the Chinese understand space has evolved along with the evolution of the space domain itself. However, dialectical materialism, the philosophical grounding of the CPC, influences their thinking, including military space theory and strategy. China has concluded that humankind has begun an inevitable transition to the Age of Information, where victory in conflict and the international realm will be determined by which nation can most adeptly obtain, protect, and exploit knowledge and information. Space will be the method by which information dominance can be gained and "will be the decisive factor for victory in warfare."[16] Dialectical materialism is not the only lens through which China's military space posturing can be understood; however, the dialectical materialist perspective provides essential insight into the foundations of China's military space doctrine that American policymakers and strategists must consider.

DIALECTICAL MATERIALISM

Dialectical materialism is the philosophy and world view that was established by Karl Marx and Friedrich Engels and served as the foundation for Marxism. Marx and Engels rejected idealism in favor of materialism. Marx describes his "materialist conception of history" as starting from "the proposition that production of the means to support human life and, next to production, the exchange of things produced, is the basis of all social structure…The final causes of all social changes and political revolutions are to be sought, not in men's brains, not in men's better insights into eternal truth and justice, but in changes in the modes of production and exchange."[17] In Marx and Engels' view, understanding must be grounded in real, or material, conditions.

The original term dialectics was coined by G.W.F. Hegel in a response to the abstractive view of metaphysics. Hegel specifically opposed metaphysical abstractive thought because it viewed objects as having set identities and characteristics.[18] In Hegel's mind, dialectical thought defines concepts based on interrelationship and interaction, so ideas are defined based on this constant evolving notion of relationship. Dialectical thought is especially important when two ideas seem to contradict one another, and this contradiction drives understanding of the

[14] Ibid., 184.
[15] Ibid., 190.
[16] Li Daguang, *On Space Warfare* (Beijing: Military Science Publishing House, 2001), 367.
[17] T. Borodulina, *On Historical Materialism: A Collection* (Moscow: Progress Publishers, 1976).
[18] Ibid.

world.[19] In essence, dialectical materialists look to the material world to discover the nature of contradictions that serve as the force of change in the world and seek to determine the laws that govern and describe this change.

Since Mao-Tse Tung, the CPC has relied on dialectical materialism as the foundation of its approach to domestic and international affairs. While each leader of the CPC since Mao has emphasized different policies for China, they all agree on the main contradiction that China is facing. Currently, "the main overall contradiction is the contradiction between the societal needs of the people and the ability of the CPC to provide for them."[20] The focus of the CPC is inherently pointed inward, as the main contradiction has the potential to destroy the Party's rule if it goes unaddressed. Essentially, resolving the main contradiction holds the key to the longevity of the Chinese populace, the CPC maintains that the Party can still save China, making the interests of the Party akin to those of the Chinese state: "Safeguarding the core and its authority is the highest interest of the entire party, and the entire country and nation."[21]

While the foundational contradiction in China's dialectical materialist perspective is grounded in the domestic realm, the CPC also applies this dialectical thinking to the international environment. Although Marx's initial thoughts on class conflict, which were derived from dialectical materialism, were centered on individuals and small collectives, he concluded that class conflict had already and would continue to evolve into national and global political forces.[22] Just as class conflict informs domestic policy in China, the competition between the CPC and the United States can be viewed as driven by class conflict as well. This is reflected by the asymmetry of technological capability in the space domain between China and America. The CPC has determined that the main contradiction "in the event of war is the contradiction between the high technological level of the U.S. forces and the relatively low technological level of Chinese forces."[23] As a result, China has focused on modernizing their military in an attempt to resolve this contradiction, which has been illustrated by China's strategy of Anti-Access/Area Denial (A2/AD).

The space domain promises to contribute to the resolution of both the main contradiction of the CPC and the contradiction between the United States and China. The promise of space is immense, and Ning Wangrong and Ling Chunhui even go as far as to argue that "one can even predict that the next industrial revolution will be conducted in space."[24] This transition from material means of production to advanced technology and a focus on concentrating knowledge will propel humanity into the Age of Information. Given the perspective of the CPC that the space domain offers an opportunity to revolutionize the economy, properly developing space capability would significantly contribute to the ability of the CPC to provide for the societal needs of the Chinese population.

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[19] GWF. Hegel, *Philosophy of Right*, trans. S.W. Dyde (Ontario: Batoche Books, 2001).
[20] John T. Banks, "Questions on China Space Strategy," e-mail message to author, April 15, 2017. (John Banks is a Senior Analyst at Leidos).
[21] Chris Buckley, "China's Communist Party Declares Xi Jingping 'Core' Leader," *The New York Times*, October 27, 2016, accessed May 1, 2017, https://www.nytimes.com/2016/10/28/world/asia/xi-jinping-china.html?_r=0.
[22] R.J. Rummel, *Understanding Conflict and War: Volume 3 Conflict in Perspective* (Beverly Hills California: Sage Publications, 1977), Chapter 5.
[23] Ibid.
[24] Ning Wangrong and Ling Chunhui, *Space Confrontation*, 2nd ed. (Beijing: Junshi Yiwen Press, 2010), ix.

Viewed from the context of Chinese and American military capability, the space domain will once again play a significant role in resolving this contradiction. The command of space offers the promise of "effectively control[ing] other nations" both militarily and politically.[25] Because space has the potential to alleviate the main contradiction within the People's Republic of China and elevate China's international standing, the CPC is committed to its development moving forward.

HISTORY OF THE SPACE DOMAIN

Although China was not directly involved in the early Space Race, their historical view of the development of the space environment, space technology, and its impact on military confrontation is foundational to their current view of space. Generally, Chinese space history analysts separate the development of the space domain into three periods: the initial period, the middle period, and modern day space operations.[26]

Jia Jun Ming, a colonel in the People's Liberation Army and professor at the National Defense University in Beijing, focuses on the historical evolution of space's role in military conflict. He defines the initial period of space operations as the 1960s and 1970s.[27] During this time, space operations generally consisted of "information assistance and support." [28] In addition to mentioning satellite technology's role in resolving the Berlin Crisis of 1961 on favorable terms for the United States, Jia Jun Ming also offers the Cuban Missile Crisis and the Fourth Middle East War as additional examples of space operations in the initial period. The Yom Kippur War is highlighted because it is the first time in which space information assistance was used to directly support combat operations. During this conflict, the United States and Soviet Union employed a total of thirty-four reconnaissance satellites.[29] Satellite capability facilitated the initial success of the Egyptian and Syrian militaries. Specifically, Soviet intelligence gave Egypt and Syria the knowledge of Israel's weaknesses in the Bar Lev defensive line and how to avoid American reconnaissance satellites.[30] Soon after, the United States Big Bird reconnaissance satellites noticed a ten kilometer gap between Egypt's second and third army groups, giving Israeli forces the knowledge to launch a counter attack that resulted in Israel regaining the initiative in the conflict.[31] Space operations in the initial period were an extension of other military capabilities, and space characteristics during this time period can be described as: "indirect confrontation, fairly small operational means and scale, rather low operational effectiveness, and single strategic operational goals."[32]

The middle period, which occurred during the 1980s and early 1990s, witnessed the maturation of "indirect confrontational" space operations.[33] From a technology development standpoint, the United States improved upon military communication capability through the MILSTAR Program, which also had the goals of establishing a strategic communication system that could resist jamming and could survive nuclear warfare.[34]Additionally, America focused on early warning capability and launched the

[25] Ibid., ix.
[26] Jia Jun Ming, *On Space Operations* (Beijing: National Defense University Press, 2002), 2.
[27] Ibid., 2.
[28] Jun Ming, *On Space Operations*, 2.
[29] Ibid., 3.
[30] Wangrong and Chunhui, *Space Confrontation*, 25.
[31] Ibid., 25.
[32] Jun Ming, *On Space Operations*, 4.
[33] Ibid., 4.
[34] Ibid., 5.

Defense Support Program (DSP) satellites. Unfortunately, the limitations of the DSP were exposed during the Gulf War, because it was not able to provide adequate warning time for theater tactical missile defense. Nonetheless, the DSP led to refinement of early warning systems.[35] Another trend was the simplification of space equipment with a focus on miniaturization. Lastly, President Reagan's Star Wars Program and America's commitment to both National and Theater Missile Defense Systems revolutionized space warfare, shifting the focus of space military technology from a tactical to strategic level.

The Malvinas Islands War, Kosovo Conflict, and the Gulf War all illustrate the maturation of space's role in warfare. At the outbreak of the Malvinas Islands War, the United States supported the United Kingdom with twenty-four reconnaissance satellites to provide the British with accurate, current military intelligence.[36] The Soviets provided similar support to Argentina by mobilizing thirty-seven satellites of their own. Both sides were effective, as the British were able to sink the Argentine cruiser, *General Belgrano*, and Argentina was able to sink the *Sheffield*, a British destroyer.[37] The Kosovo conflict was characterized by similar types of operations and also saw a large prevalence of precision guided munitions.

The Gulf War is commonly referred to as the "first outer space war."[38] The multinational effort to fight against Saddam Hussein was held together by American space operations which provided "fully systematic reconnaissance, early warning and detection, command and control, communications, navigation and positioning, and meteorological services."[39] It was such a success that America proclaimed the integral role of space assets. General Thomas S. Moorman Jr., commander of Air Force Space Command during the Gulf War, stated, "Operation Desert Storm was a watershed in the history of the military applications and development of outer space; it was the first time that outer space systems were comprehensively used in a military conflict, and it had a crucial impact on the outcome of the war."[40] China paid close attention to the role of space assets and how they were employed during the Gulf War and agreed with General Moorman's assessment, concluding that "indirectly confrontational space information warfare not only directly served strategic goals but also went deep into the campaign and combat spheres…it had begun to manifest certain characteristics of a campaign."[41]

After the hi-tech local wars of the 1990s, the descriptions tend to become more generalized. For example, the Chinese space analysts agree that the current phase of space development is the "completion of maturation."[42] In addition to the continued development of technology, the early stages of the 21st century witnessed a renewed focus on space operational theory and organizational layout.[43] The Schriever Space Exercises in 2001 directly demonstrated this point for the Chinese. What separated this particular space warfare exercise was that the space domain was treated as "an important means of deterrence in an informationized age" and that the hypothetical operations included elements of satellite warfare.[44] The Chinese consider the Schriever Space

[35] Ibid., 5.
[36] Wangrong and Chunhui, *Space Confrontation*, 25.
[37] Ibid., 26.
[38] Wangrong and Chunhui, *Space Confrontation*, 28.
[39] Ibid., 29.
[40] Ibid., 29.
[41] Jun Ming, *On Space Operations*, 7.
[42] Yanjun, Shuixian, Daguang, and Tong, *On Space Dominance*, 263.
[43] Ibid., 264.
[44] Daguang, *On Space Warfare*, 288.

Simulation as a watershed event that provides the evolution of U.S. space doctrine, demonstrating the maturation of space development. PLA space analysts noted characteristics of American space operations that had not been seen before. One novel concept was the utilization of space assets as a deterrent measure.[45] A second novel concept was the implementation of weapons that are "non-lethal and whose effects are reversible."[46] Since this initial space exercise, the United States has conducted seven more; the most recent was held in 2012 and focused on the organizational system of Air Force Space Command and integration of space operations with ground operations and NATO countries.[47] China is aware of the United States investigation of space operational theory and organization based studies, indicating that the space domain is in the final stages of maturation

DIALECTICAL MATERIALISM APPLIED TO THE SPACE DOMAIN

After reviewing the general concept of dialectical materialism and offering a macro view of space history from the Chinese perspective, the next important step to understanding the foundation of Chinese military space strategy is to synthesize dialectical materialism with the historical evolution of the space domain. Before continuing with this synthesis, the Chinese explicitly state that the goal of studying space is to "understand its innate laws and interrelationships."[48] Only through this understanding can the initiative in space be obtained.

One of the integral interrelationships is how the Information Age and the space domain relate and influence one another: "Progress in science and technology has forcefully pushed the development of mankind's history forward…transforming from the post-Industrial Age to the Information Age."[49] The new Age of Information has and will continue to redefine economic and cultural patterns. Instead of a world that values industrial strength and manufacturing capability, the Information Age will value comprehensive knowledge.

As with many contradictions, the current contradiction between the remnants of industrialization and future of informationization are a source of disruption. The Information Age has already begun to drastically affect "nations' economic growth, social development and national strength."[50] The new competition enabled by the Information Age is responsible for shifting the world towards multipolarity and "smashing the old proportion of strengths."[51] Therefore, the Chinese are committed to using the trend of informationization to strengthen their cultural, economic, and international standing and to shortcut the process of catching up to the United States.

The revolution from an industrial world to an informationized world touches upon every aspect of society, including warfare. China has concluded that warfare in the Age of Information will be significantly different. The goal of "warfare is no longer primarily to annihilate the enemy's effective strengths, but rather it is primarily to destroy and paralyze the enemy's battlefield knowledge and information systems, to effectively control his

[45] Ibid., 291.
[46] Ibid., 292.
[47] Jiang Lianju, ed., *Lectures on the Science of Space Operations* (Beijing: Military Science Press, 2013), 12.
[48] Lianju, ed., *Lectures on the Science of Space Operations*, 2.
[49] Daguang, *On Space Warfare*, 1.
[50] Ibid., 4.
[51] Ibid., 4.

information flow, energy flows, and material flows, thus achieving the goal of controlling the battlefield."[52] The objective in future warfare will center on information superiority. The driving force behind these new laws of information warfare is the same technological force that brought about the information revolution. While the move towards the Age of Information is relatively new, it is not surprising because technology has been moving civilization forward throughout human history. In this regard, the Age of Information and importance of the space domain are the logical follow-ons of the evolution of the land, sea, and air domains.

One of the main conclusions is that the space domain holds the key to controlling the land, sea, and air domains as well as dominance in informationized warfare. The history of space and how it was employed by the United States and Soviet Union during the Cold War has led the Chinese to reach this conclusion: "In the 21st century, possessing the vantage point of outer space will to a very large degree allow control of the progress and conclusion of war, and at the present time, this is rapidly developing in the direction of final guidance to victory in war."[53] The unique capabilities of the space domain are why space "is the strategic vantage point of informationized warfare" and will provide the information superiority that is necessary to capturing the digitized battlefield.[54] Space military strengths offer the solution to the contradiction between the Chinese and American militaries and will lead to "the overall elevation of a national military system's confrontational capabilities."[55]

After describing the law of space's role in information dominance, Chinese analysts derive another important insight from the history of the space domain, concluding that space warfare is inevitable. Perhaps due to the probabilistic nature of dialectic analysis, the CPC tends to view the history of warfare through a technological deterministic lens.

Although the CPC does not believe that private property will cease to exist and is by no means dedicated to ending private property within China, the Party attributes the accruement of wealth as the origin of war, stating that the emergence of private property led to warfare.[56] Furthermore, warfare is rooted in the economy and "is the product of certain economic relations among the state, classes, and political groups."[57] Once warfare became a common behavior, science and technology acted as the major impetus for the development of war; as science and technology have progressed, warfare has become increasingly intense.[58] Just as progress in technology on land, sea, and air contributed to military confrontation, technological progress in space will result in space warfare: "By looking back through the history of the development of human warfare, we come to find that studies people have carried out of the theory of operational dominance began with land dominance, went through sea dominance, air dominance, and information dominance, and developed to today's space dominance. This has all come about as mankind has continually expanded his endeavors in various domains."[59]

In addition to the technological perspective, Jia Jun Ming introduces Marxist commentary

[52] Ibid., 40.
[53] Yanjun, Shuixian, Daguang, and Tong, *On Space Dominance*, 9.
[54] Ibid, 11.
[55] Yanjun, Shuixian, Daguang, and Tong, *On Space Dominance*, 13.
[56] Cai Fengzhen and Tian Anping, *Air and Space Battlefield and the Chinese Air Force* (Beijing: PLA Press, 2004), 3.
[57] Ibid., 86.
[58] Jun Ming, *On Space Operations*, 1.
[59] Daguang, *On Space Warfare*, 27.

on the human component by stating, "What is regrettable is that mankind is still unable to part company with warfare at this point, and mankind is destined to face the test of warfare and in particular of space operations."[60] Historical forces have led to the dawn of space warfare, which will only continue to intensify and define the 21st century: "the trend toward the militarization of space cannot be reversed."[61]

After the dialectical materialist framework led to the belief that space warfare is necessary to securing information dominance and is an inescapable reality, the CPC shifted its focus to the laws of space operations. The individual laws, or conclusions, are numerous and broad in nature. Nevertheless, Li Daguang summarizes "The Basic Laws of Contending for Space Dominance," set the context upon which more specific laws of space operations can be developed and understood. The author's first law invokes a Clausewitzian view of war: "contending for space dominance must serve a country's political and security interests and requirements."[62] Similarly to other domains of warfare, space is the "continuation of politiks by other means."

Next, Daguang asserts that as "powerful support of a nation's overall actual strength," space dominance must be one of the primary national objectives to be realized.[63] In contrast to the second law, Daguang's third law implores policymakers to adhere to the principles of "Limits and Appropriateness."[64] The principle of limits calls for space military strengths to be used efficiently and practically in an effort to protect against an economic collapse akin to the Soviet Union's.[65] The principle of appropriateness clarifies the principle of limits by seeking to prevent inadequate resource allocation to space military strengths, cautioning against an approach to space policy that is too limited.[66]

The last general law that Daguang recognizes is in regard to the international environment. The author notes that the current space environment is highly regulated by international treaties and laws, which forces the developers of space strategy to operate in a constrained manner at the current time.[67] Nevertheless, the Chinese see these constraints as limiting the United States, giving China the opportunity to close the space technology gap.

More specific laws of space operations are developed within scope of the basic laws that describe the state and future of the cosmic space environment. Operational laws cover subjects ranging from space forces organizational theory, personnel development, and space deterrence to manned offensive operations during a conflict in space. The nature of these laws rests in the application of the elucidated guiding principles, applying these principles in a strategic and tactical manner to achieve space and information dominance.

IMPLICATIONS FOR CHINA'S SPACE STRATEGY

Chinese space analysts consider a comprehensive range of potential space strategies and tactics. According to Jiang Lianju, space operations are "military confrontational activities that two hostile sides engage in primarily in space. Their essence is that they are a series of operational actions where two hostile sides use their space

[60] Ibid., 7.
[61] Ibid., 12.
[62] Ibid., 85.
[63] Ibid., 86.
[64] Ibid., 87.
[65] Daguang, *On Space Warfare*, 87.
[66] Ibid., 88.
[67] Ibid., 89.

strengths as their main operational strengths and space as their main battlefield in order to seize, hold, and use command of space…They play an irreplaceable and unique role in gaining victory in warfare."[68] Due to its broad scope, space operations include space deterrence theory, space defensive and offensive strategies, organizational evolution, and guidance on how to operate within the international environment.

While each of these areas has their own separate characteristics and strategies, they are all united by the universal characteristics of the space domain. All operations in space will occur in the vast expanse of space, where confrontation will be intense. However, space warfare will also manifest itself on ground based targets.[69] The main reason for the proliferation of conflict from the space domain to the other domains lies in the nature of informationized conflict, and "the two hostile sides will inevitably mobilize all means to cut off information links between the opponent's space and other battlefield space."[70] Operational actions will be rapid, precise, and highly effective. It is necessary to achieve rapidity, precision, and efficacy because space operations and deployment will be highly dispersed, while weapons and space technology will be highly concentrated.[71] Additionally, space operations are less likely to occur over a longer time period because space support missions "are arduous."[72]

The general framework and guidance for space operations loosely adhere to establishing awareness, carrying out defensive operations, and engaging in offensive operations if necessary.[73] The primary focus is to gain awareness in order to secure China's own space assets: "Space operations overall are defensive, but in specifics, space operations actions are not confined to defense; instead, active space offensive actions are adopted during the process of defense."[74] The Chinese develop their space strategy based on the concepts of active defense, full spectrum integration, and focusing on controlling space. More specifically, active defense can be thought of "as a shield of clever attacks…it is defense whose goals are passive but whose means are active."[75] Active defense is the foundational concept for space operations, and full-spectrum integration describes the mechanism and organizational form of space operations. If achieved, active defense and full spectrum integration will lead to the control of space.[76]

Operationally, the PLA states that space deterrence and actual warfare will be the two main forms of space conflict in the 21st century.[77] For the CPC, space deterrence theory centers on influencing the opponent's psyche and operational tempo, preventing them from launching an attack. The objective of space deterrence is to both deter operations in space as well as an overall war. Space deterrence extends beyond the military sphere and is a strategic political contest over the international order.[78]

Chinese analysts consider many different levels of space deterrence. The lowest intensity option is to simply develop space strengths in a manner that results in your opponent concluding that victory is

[68] Lianju, ed., *Lectures on the Science of Space Operations*, 6.
[69] Ibid., 20.
[70] Ibid., 40.
[71] Lianju, ed., *Lectures on the Science of Space Operations*, 40-42.
[72] Ibid., 46.
[73] Ibid., 42.
[74] Lianju, ed., *Lectures on the Science of Space Operations*, 50.
[75] Ibid., 51.
[76] Ibid., 51.
[77] Ibid., 56.
[78] Jun Ming, *On Space Operations* (Beijing: National Defense University Press, 2002), 93.

impossible, preventing conflict before it begins. The next level includes demonstrations of space strength, such as the anti-satellite (ASAT) missile test in 2007, and space military exercises, which are combat like space deterrent activities.[79] Space military exercises signify a shift from low intensity deterrence operations to more confrontational deterrence operations. The last nonviolent deterrence phase is preparing space forces for deployment.[80] If none of the nonviolent deterrence theories are effective, then overawing, punitive space strikes will be used.[81]

The Chinese are clear that punitive strikes should only be used as a last resort and when "other means of space deterrence are ineffective."[82] The specifics of the punitive strike can vary in nature from soft kill information attack, such as space blockades, to hard kill kinetic attacks. Regardless of which specific deterrence level is used, deterrence actions must be unified and integrated, and cautious decision making is necessary to prevent deterioration into warfare.[83] Space deterrence seeks to intimidate the enemy and prevent warfare, but it is imperative that space forces are prepared to rapidly shift from deterrent to warfare operations.

The main objective of space defensive operations is to protect China's space assets and capabilities. Their defensive posture calls for passive defense techniques with the ability to rapidly attack and counter attack if necessary to protect themselves. One of the foundational defensive tactics is the camouflaging of satellites and space assets. The PLA seeks to use camouflage in order to deceive the hostile aggressor. For example, a satellite with military capability can be designed to appear and function as if it were a commercial spacecraft. Other deception strategies include blending space satellites with the outer space environment and using virtual reality to create fake targets for the enemy.[84] Stealth technology can be used to deceive the enemy by applying absorptive materials, eliminating reflective surfaces, and including surfaces that refract energy.[85]

Satellites and other spacecraft should also be dispersed into a constellation pattern. The miniaturization of space technology will make this principle more feasible in the future. By dispersing "hundreds" of micro-satellites, the Chinese endeavor to eliminate any single nodes of failure, allowing for functionality to be unimpaired if one part of the constellation is eliminated.[86] Spacecraft should also be able to execute orbital maneuvers, avoiding a direct threat.[87]

However, if the above strategies fail, then the Chinese plan on developing counter attack capability to preserve their space operational strengths. In a counter-attack, offensive space weapons would be used to eliminate hostile targets that are posing a direct threat.[88] Importantly, counter attacks must be on the same operational scale as the threat.[89]

While all of the above defensive strategies addressed assets in the space environment, joint ground protection is also necessary to ensure the survival of space assets. Ground control stations, launch sites, and support facilities are just as vital to the space

[79] Lianju, ed., *Lectures on the Science of Space Operations*, 157.
[80] Ibid., 157.
[81] Ibid., 160.
[82] Ibid., 160.
[83] Ibid., 161.
[84] Jun Ming, *On Space Operations*, 88.
[85] Jun Ming, *On Space Operations*, 88.
[86] Ibid., 89.
[87] Ibid., 90.
[88] Ibid., 91.
[89] Ibid., 91.

operation. Similar to constellations of satellites, the PLA reasons that ground bases should be deployed over a broad area.[90] If possible, ground assets should be concealed and mobile, preventing the enemy from obtaining the requisite information to carry out a strike.[91]

The air force, navy, and army will form a joint defensive system. ICBMs pose one of the most significant threats to space assets, which is why the Chinese are committed to developing a National Missile Defense system and Theater Missile Defense system similar to America's.[92] The Chinese vision of defensive space operations and strengths is integrated in nature, combining strategy and technology at multiple levels to ensure the survival of their space capability and, therefore, their national security.

Space offensive strengths are second to space defensive strengths in Chinese space strategy. This corresponds to their overall operational framework of active defense. Another reason is that Chinese analysts predict that during the early 21st century the focus will be on "developing space information weapons and equipment…comprehensively raising China's military space information assistance and support capabilities…offensive operations in space will appear, [but] their scale and intensity will be quite limited."[93]

Nevertheless, China considers a broad range of space offensive strategies. The objectives of space offensive strengths are to "annihilate enemy space satellites in an effective manner and suppress enemy satellite launches while ensuring that their own satellites avoid [attack] or minimally suffer attack."[94] Most of these offensive tactics focus on disrupting satellites through hard kill or soft kill weapons. Hard kill weapons use kinetic energy based weapons and direct energy weapons (high powered electromagnetic weapons) to permanently destroy or impair an enemy spacecraft.[95] On the other hand, soft kill weapons, such as low powered lasers and electromagnetic pulses, are designed to incapacitate an enemy spacecraft.[96]

Also, the Chinese consider many more potential offensive weapons: orbital bombing from space to Earth, manned spaceflight missions for military purposes, the use of space stations as military bases, earth to space weapons (ASATs/lasers), and high altitude weapons that can target ground and space assets simultaneously. However, these are considered potential avenues for development, and the authors remain noncommittal when discussing them.

Lastly, the Chinese acknowledge that unmanned operations will play a significant role in all space operations, including offensive operations. Because a human may not be able to process the "integrated and highly coordinated operational actions in multidimensional surface, aerial and space environments…occasions will occur where there will be unmanned combat or where robots will face one another."[97]

Just as technology, theory, and tactics are evolving, the organizational layout of the PLA must evolve as well. If organization remains stagnant, then China will be unable to seize space dominance. Currently, the PLA system sees itself as a "tree structure," but the

[90] Ibid., 91.
[91] Ibid., 92.
[92] Ibid., 92.
[93] Ibid., 112.
[94] Wangrong and Chunhui, *Space Confrontation*, 105.
[95] Ibid., 82.
[96] Ibid., 82.
[97] Fengzhen and Anping, *Air and Space Battlefield and the Chinese Air Force*, 239.

future organization of China's military must be a "network type of scale."[98] This metaphor accurately summarizes the CPC's beliefs about organizational change. The command and organizational structure have been built in a traditional and linear style and will be inadequate to meet the demands of information warfare. Instead, a network style of command must be set up. This style would allow for faster communication between the Central Military Commission and operational forces. While centralization is important to maintain cohesion, decentralization must also be embraced, allowing individual units to respond rapidly and with precision. China hopes to resolve the contradiction between centralization and decentralization by establishing this network style of command structure.

The development of space deterrence, defensive operational strengths, and offensive operational strengths must occur within the current international context. China understands that the international community is a restraining factor to the complete maturation of space warfare: "There are an ever-greater number of international factors restraining military actions in outer space, and these have a comprehensive effect on space operations."[99]

However, China realizes that they have benefited from international laws limiting space operations. For example, when China has weaker space technology relative to their competitor, the guidance is to oppose space weaponization, adhere to the law, and apply "selective measures in peacetime that complicate or restrict the powerful enemy's ability to weaponize space."[100] In the future, of course, international law could hinder China's ability to fully informationize their forces. This contradiction would lead China to adopt different strategies based on "China's newfound position of parity or even superiority over the enemy."[101] As China's space power grows, they will have the opportunity to directly affect international law and try to craft an international law system that is more conducive to their goals: "The contradiction between international law and the militarization of space is not immutable; at some point it may be resolved, and some other contradiction [may] take its place."[102]

THE REALIST CRITIQUE

Although the source material is inundated with dialectical materialism, in terms of philosophy and diction, the possibility remains that China's space strategy and perspective could be driven by balance of power politics. On the surface level, this is a logical argument. Many of the People's Republic of China's recent moves to strengthen their international standing fit nicely with the realist lens. The overlap between balance of power and dialectical materialism is a result of their mutual reliance on contradictions. The nature of power politics is founded in the contradictions that arise from unequal power in the international realm.

In fact, relatively recent changes in the PRC's military structure were driven by power politics and contradictions. In 2015, President Xi Jingping detailed a set of military reforms that significantly altered the organization of the PLA.[103] Essentially, three "new services" were incorporated into the PLA: Ground

[98] Ibid., 323.
[99] Lianju, ed., *Lectures on the Science of Space Operations*, 88.
[100] Banks, "Questions on China Space Strategy."
[101] Ibid.
[102] Ibid.
[103] Dean Cheng, "Look Out, America: China's New Military Forces are Awakening," http://nationalinterest.org/blog/the-buzz/look-

Forces Command, PLA Rocket Force, and Strategic Support Force. The Strategic Support Force has been tasked with focusing on cyber and space warfare, a clear attempt for China to modernize these capabilities and increase its standing on the international stage. The PLA Rocket Force, historically known as the Second Artillery, will be responsible for "China's conventional and nuclear ballistic missiles."[104] China's elevation of the Second Artillery to its own service has its foundation in the Taiwan Strait Crisis of 1996. During the Crisis, China realized that although they had around 200 short range ballistic missiles (SRBMs) deployed across from Taiwan, their accuracy prevented any meaningful targeting of military, transportation, or command and control targets.[105] Since then, Beijing has invested in the modernization of their ballistic missile arsenal, attempting to rebalance power in the region and attain the advantage.

The security dilemma, an application of realism and a core contradiction, could also be having an impact on Chinese space doctrine. The PRC believes that the United States is committed to seizing the space domain and exerting dominance over it. President Kennedy's quotation from the 1960s summarizes how the Chinese understand American intentions in the space domain. President Kennedy stated, "seizing space supremacy is the main content of the next 10 years. Whoever controls space will control the Earth."[106] China is not planning for a general war against the United States, but they are developing their theory and capability of active defense to defend their security interests against U.S. encroachment.[107]
The security dilemma can be viewed as another manifestation of the balance of power. Because China is concerned that the United States may encroach on their national interests in the space domain, they aggressively develop their active defense capability. In turn, the United States responds to China by further developing space capability.

The realist lens seems promising on its surface, but it can only provide an incomplete answer. Realist analysis applies the rational actor model to international players, which is not a safe assumption in geopolitics and international relations. Dialectical materialism offers a deeper "why" than the realist perspective can provide. The nature of the dialectic results in laws that are "deterministic and probabilistic" in some form, which are supplemental to realist philosophy.[108]

Although the PRC certainly includes objective and subjective factors when discussing operational success, there has been a recent shift toward technological determinism under President Xi Jingping's national innovation initiative.[109] As a result, elucidation of laws of the space domain and space operational theory has a tendency to be deterministic. These laws then offer conclusions that overlap but do not replicate the realist perspective. The answers do not lie wholly on one side. Both realism and dialectical materialism affect Chinese space doctrine.

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out-america-chinas-new-military-forces-are-awakening-14872, Accessed 21 April 2017.
[104] Michael S. Chase, "China's Second Artillery Corps: New Trends in Force Modernization, Doctrine and Training," *China Brief*, Volume 6 (December 2006), http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5btt_news%5d=32342#.Vvni8NiIOUm, accessed 21 April 2017.
[105] Ibid.
[106] Wangrong and Chunhui, *Space Confrontation*, viii.
[107] Banks, "Questions on China Space Strategy."
[108] Banks, "Questions on China Space Strategy."
[109] Ibid.

Determining the degree to which the dialectic actually impacts China's space strategy can be tricky. On a general level, dialectical materialist thought shapes how China sees the history and future of space strategy; this is illustrated by their belief that space will play a significant role in the chaotic revolution leading to the Age of Information. The potential of space capability to aid in resolving contradictions within China and in the international domain is also an expression of dialectical thinking. The methodology that Chinese military analysts use is dialectical materialist in nature, as they consistently attempt to identify the laws that govern space capability and space operations theory.

On the other hand, some experts outside of China posit that the CPC references dialectical materialist thought to silence its critics. In 2013 and 2015, President Xi held a "Politburo study session to underscore his commitment to Marxism and socialism."[110] President Xi has been more consistent in valuing dialectical materialism than his predecessor and claims that the goal of these study sessions is to "help leaders understand Marxist philosophy in even more depth."[111] Nevertheless, Zhang Ming, a political scientist at Renmin University, summarizes the skeptical view, "It's a political declaration that party leaders have to do from time to time."[112] Dialectical materialism certainly provides context in which to view macro global patterns, but the next question is, does it have an effect on specific policy?

The concept of asymmetry and asymmetric warfare further complicates finding an answer. Based on the contradiction between Chinese and American military capabilities, PLA and CPC thinkers understand that in order to be competitive in a potential conflict with the United States, they will have to target specific American vulnerabilities in order to level the playing field. Space military technology is an enabling force in balancing military technology.

A 2015 RAND report studied the "trajectory of Chinese capability from 1996" and sought to predict what their capability will be in 2017.[113] The study focused on counterspace technology, and two important takeaways were that China has rapidly modernized its space force, and although China's space capabilities are not equal to America's, they have the capability to pose "significant challenges to U.S. operations."[114] RAND measured Chinese counterspace ability in two contexts: a Taiwan scenario and a Spratly Islands scenario. In both scenarios, RAND projected that Chinese counterspace capability would have "equal parity" when compared to U.S. space capability.[115] China's focus on counterspace technology could be interpreted as a manifestation of asymmetric warfare, driven by the contradiction between Sino and American military capability.

One area where dialectical materialism provides insight is on which space and counterspace technologies China pursues. Although "it is not yet clear whether the PLA has promulgated a formal doctrine for military space operations," they have aggressively focused on developing certain

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[110] Zhuang Pinghui, "China President Stresses Marxist Materialism in Effort to Silence Critics," *South China Morning Post*, January 27, 2015, http://www.scmp.com/news/china/article/1692861/silencing-hiscritics-presidentcites-his-marx, accessed May 3, 2017.
[111] Ibid.
[112] Ibid.
[113] Eric Heginbotham, "The U.S.-China Military Scorecard," http://www.rand.org/pubs/research_reports/RR392.html, accessed 21 April 2017.
[114] Heginbotham, "The U.S.-China Military Scorecard."
[115] Ibid.

capabilities.[116] According to Dean Cheng's analysis, China has focused on developing the following space capabilities: ability to enter space, ability to exploit space, ability to control space, anti-satellite weapons, cyber weapons, directed energy weapons, rapid space launch capability, and better space situational awareness.[117]

In addition, the CCP is committed to developing a manned space flight program.[118] The motivations of China's manned space program extend beyond the realist and asymmetric warfare rationale. From the realist point of view and asymmetric warfare perspectives, manned space programs contribute to national prestige and do provide limited military usefulness. However, the overarching goals of the programs are "to utilize outer space for peaceful purposes, promote mankind's civilization and social progress, and benefit the whole of mankind; and to meet the growing demands of economic construction, national security, science and technology development and social progress, protect China's national interests and build up the comprehensive national strength."[119]

These goals of the manned space program readily fit into the dialectical materialist perspective. In comparison to other military space technology, manned flight is significantly more expensive and time consuming to develop, so an asymmetrical or realist rationale does not adequately explain why China is so committed to their manned spaceflight program. Referring back to Li Daguang's Principles of Limits and Appropriateness provides insight into why China is pursuing this capability. Because manned space flight satisfies dialectical materialist thinking about the future role and potential of space, it is appropriate that China develops this capability alongside its other military space capability.

The precise degree to which military analysts and the CPC use dialectical materialism to make strategic and tactical decisions is, even among China watchers, probably unknowable. In essence, the contradictions among dialectical materialism, realism, and asymmetrical warfare are manifested in this essay. One of the great obstacles to resolving these contradictions analytically is the lack of formalized military space doctrine, which is still under development by the PLA. Perhaps the only clear answer is that Chinese space strategy is significantly affected by realist tendencies, asymmetric warfare, and dialectical materialism.

U.S. POLICY RECOMMENDATIONS

Moving forward, the United States must strengthen its understanding of dialectical materialism and how it factors into the CPC's decision making. After the end of the Cold War, the Pivot to the Pacific occurred at a lethargic pace due to exigent events such as the Invasion of Iraq and Afghanistan. As a result, widespread expertise in Asia is lacking among policymakers, Congress, and the Department of Defense.

Source material for this work demonstrates that Chinese analysts follow a general pattern of deduction when approaching a topic. Once basic laws have been uncovered, assuming that they do exist, then evolution in theory follows. Because the dialectic is tied

[116] *PLA's Interest in Space Dominance* (2015) (testimony of Dean Cheng).
[117] Ibid.
[118] Mark A. Stokes and Dean Cheng, "China's Evolving Space Capabilities: Implications for U.S. Interest," April 26, 2012, https://www.hsdl.org/?view&did=708400, accessed May 3, 2017.
[119] Ibid.

intimately with their decision making processes, an improved understanding of it in the context of the CPC would enable the United States to better predict how the CPC will react to American presence or operations in the region and gain insight into the formulations of the PRC's strategy across all domains.

From a military perspective, the United States must focus on developing resilience in military space capability. While PLA analysts are vague on implications of the principle of active defense, China could well decide to attack U.S. space assets during a conflict. It is possible that as China's military space capability grows, the probability of space military operations becomes more likely.

In Phillip Saunders' testimony before the U.S.-China Economic and Security Review Commission, he provided recommendations that the U.S. military should adopt to make American space assets less suitable targets for attack. One key area is developing logistical support to rapidly replace damaged or destroyed satellites. However, this becomes increasingly difficult as China's ASAT capabilities increase.[120] Miniaturization and constellation dispersion of satellites would reduce vulnerability and decrease the consequences of the loss of one satellite.[121] The U.S. should also explore intermingling space assets with other foreign governments, which would increase the political risk of an attack.[122]

From a more tactical perspective, the United States must be able to effectively attack and destroy Chinese ASAT systems, potentially using space based weapons.[123] Lastly, the United States military could also transfer some of its intelligence and reconnaissance systems to non-space tactical reconnaissance systems, reducing the degree to which the military relies on space.[124] The United States military also has the obligation to modernize informed battle management and command and control (BMC2). In the Age of Information, with "the growth in the volume of information available and an anticipated increase in duration and intensity of potential future combat operations, the potential for saturation of centralized decisionmakers using this ISR requires a relook at tactical command and control."[125] Moving to a nodal approach promises to establish more resilient BMC2 systems, reducing the burden on space military assets.[126]

CONCLUSION

The Communist Party of China is committed to rapidly improving their space operational strengths. Their reasoning and motivation for focusing on space capabilities is driven by their dialectical materialist perspective on the development of warfare and of the space domain.

From the Chinese perspective, the evolution of warfare in other domains suggests that space warfare is inevitable: "From the history of military development perspective, when humankind marched form the land to the sea, command of the sea was created. When humans were able to ride in an aircraft to leave the ground, command of the air was created. Thus, when humans began to gain mastery of the technology to enter space, this

[120] *China's Space and Counter-Space Programs* (2015) (testimony of Phillip C. Saunders).
[121] *China's Space and Counter-Space Programs* (2015) (testimony of Phillip C. Saunders).
[122] Ibid.
[123] Ibid.
[124] Ibid.
[125] Tom Nicholson and Nelson Rouleau, "Order in Chaos: The Future of Informed Battle Management and Command and Control," *The Mitchel Forum* 10 (March 2017), http://media.wix.com/ugd/a2dd91_d636e1c1d2474badbd8979d3bb700b50.pdf, accessed May 3, 2017.
[126] Ibid.

also created command of space."[127] The struggle in space will be more intense than any previous conflict due to vast benefits of controlling the space domain. The promise of space dictates that "whoever controls space controls the entire world. Space will become a new domain in the future for the fierce struggle between nations because space affects the fundamental interests of nations."[128]

The People's Republic of China is focused on the space domain because it seeks to alleviate two main contradictions that the CPC must address. The Age of Information and new information revolution will rely on space as a propulsive force. By enhancing their space capability, the CPC believes they can improve their economic standing, strengthen their culture, and secure the survival of the Party. In addition to this fundamental domestic contradiction, space capabilities will help ameliorate the contradiction between the United States military technological capability and China's. The space domain is the focus, because it can be developed rapidly, leading to a quick shift in space operational strengths.

The PLA considers a variety of tactics to incorporate into their space strategy. Their overall framework for space operational theory includes active defense and full spectrum integration. China's first objective in space is to defend their space capability, protecting their national security interests. However, active defense includes offensive operations that are deemed necessary to protect space assets. China's space theorists identify space deterrence, space defense, and space offense as the three main types of space operational theories. Within each category, PLA analysts again explore a range of options.

Although a specific, tactical space strategy has not been adopted, one necessary step to successfully implement new space operational theory is to evolve organizational layout to achieve a balance between centralization and decentralization for effectively engaging in informationized conflict. As a result, the United States should reduce vulnerability on space assets while redefining our command and control system to stay competitive moving forward in the 21st century.

Although other lenses such as balance of power politics and asymmetric warfare can offer some justification for China's space strategy, dialectical materialism is integral to understanding the logic and rationale behind it. As Sun Tzu wrote, "If you know your enemies and know yourself, you will not be defeated in a hundred battles." Understanding the dialectical materialist perspective enables us to know our competitor, adequately preparing the United States for future challenges in the space domain.

[127] Ning Wangrong and Ling Chunhui, *Space Confrontation*, 2nd ed. (Beijing: Junshi Yiwen Press, 2010), viii.

[128] Ibid., vii.

WORKS CITED

Banks, John T. "Questions on China Space Strategy." E-mail message to author. April 15, 2017.

Borodulina, T. *On Historical Materialism: A Collection*. Moscow: Progress Publishers, 1976.

Buckley, Chris. "China's Communist Party Declares Xi Jingping 'Core' Leader." *The New York Times*, October 27, 2016, https://www.nytimes.com/2016/10/28/world/asia/xi-jinping-china.html?_r=0.

Chase, Michael S. "China's Second Artillery Corps: New Trends in Force Modernization, Doctrine and Training." December 19, 2006, http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=32342#.Vvni8NiIOUm.

Cheng, Dean. "Look Out, America: China's New Military Forces Are Awakening." January 11, 2016, http://nationalinterest.org/blog/the-buzz/look-out-america-chinas-new-military-forces-are-awakening-14872.

China's Space and Counter-Space Programs (2015) (testimony of Phillip C. Saunders).

Daguang, Li. *On Space Warfare*. Beijing: Military Science Publishing House, 2001.

Daguang, Li., Shuixian, Wan., Tong, Guo., and Yanjun, Liu. *On Space Dominance*. Beijing: National Defense University, 2003.

Fengzhen, Cai, and Tian Anping. *Air and Space Battlefield and the Chinese Air Force*. Beijing: PLA Press, 2004.

Hegel, GWF. *Philosophy of Right*. Translated by S.W. Dyde. Ontario: Batoche Books, 2001.

Heginbotham, Eric, et al. "China's Military Modernization Increasingly Challenges U.S. Defense Capabilities in Asia." September 14, 2015, http://www.rand.org/pubs/research_reports/RR392.html.

Kissinger, Henry. *On China*. New York: Penguin Books, 2011.

Krepinevich, Andrew F., and Barry Watts. *The Last Warrior Andrew Marshall and the Shaping of Modern American Defense Strategy*. New York, NY: Basic Books, 2015.

Kupchan, Charles. *No One's World: The West, The Rising Rest, and the Coming Global Turn*. New York, 2013: Oxford University Press.

Lianju, Jiang, ed. *Lectures on the Science of Space Operations*. Beijing: Military Science Press, 2013.

Ming, Jia Jun. *On Space Operations*. Beijing: National Defense University Press, 2002.

Nicholson, Tom, and Nelson Rouleau. "Order In Chaose: The Future of Informed Battle Management and Command and Control." *The Mitchel Forum* 10 (March 2017). March 2017, http://media.wix.com/ugd/a2dd91_d636e1c1d2474badbd8979d3bb700b50.pdf.

Nye, Joseph S. *The Future of Power*. New York: Public Affairs, 2012.

Pinghui, Zhuang. "China President Stresses Marxist Materialism in Effort to Silence Critics." *South China Morning Post*, January 27, 2015, http://www.scmp.com/news/china/article/1692861/silencing-hiscritics-presidentcites-his-marx.

PLA's Interest in Space Dominance (2015) (testimony of Dean Cheng).

Rummel, R.J. *Understanding Conflict and War: Volume 3 Conflict in Perspective*. Beverly Hills, California: Sage Publications, 1977.

Stokes, Mark A., and Dean Cheng. "China's Evolving Space Capabilities: Implications for U.S. Interest." April 26, 2012, https://www.hsdl.org/?view&did=708400.

Wangrong, Ning, and Ling Chunhui. *Space Confrontation*. 2nd ed. Beijing: Junshi Yiwen Press, 2010.

SOURCE NOTE

The primary source material for this work is Chinese translations generously provided by Mr. Byron Hall. The majority have been published through the Military Science Press, which publishes writings on topics that are of particular concern to the People's Liberation Army or Central Military Commission. These documents contain doctrine based thinking of the Chinese leadership on the preparation and conduct of war as well as serious studies by Chinese analysts and military officials to impact Chinese space strategy.

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Communicating Cyber Consequences

Timothy Goines

More consideration ought to be accorded "loud" cyber weapons for signaling resolve in 21st century deterrence contests.

> "Deterrence is at times a necessary or useful instrument of foreign policy, but the correct and prudent use of deterrence strategy is by no means self-evident or easily determined in all circumstances."[1]

In their seminal text, Alexander L. George and Richard Smoke thoroughly examined the topic of deterrence, tracing its historical roots and conducting case studies on its use.[2] The product of this intense study was a formula that encapsulates the essence of deterrence theory. "In its simplest form, deterrence is merely a contingent threat: 'If you do x, I shall do y to you.' If the opponent expects the costs of y to be greater than the benefits of x, he will refrain from doing [x]; he is deterred."[3] Since its pronouncement, this formula has been codified in Department of Defense (DoD) doctrine, most recently in the DoD's "Deterrence Ops Joint Operating Concept" and it's "Cyber Strategy."[4]

Unfortunately, in this simple form, the formula is misleading. It tends to convince the reader that deterrence is a simple balancing act and all a deterring state must do is increase the costs to outweigh the benefits. This omits a fundamental aspect of deterrence, the actor's *perception* of the anticipated costs and benefits. In other words, it is not the *actual* costs and benefits that the actor weighs within this formula, but the *anticipated* costs and benefits. Therefore, if an actor perceives the costs to be higher than the actual costs, the deterring party benefits from this miscalculation. Conversely, if an actor perceives the costs to be lower than the actual costs, it is to the deterring party's detriment, regardless of the actual costs.

A more accurate formulation is as follows: if the *anticipated* costs of a proposed action exceed the *anticipated* benefits of that action, the actor is less likely to engage in the action and is deterred. This revised formulation flows naturally from the original. As George and Smoke note, it is a contingent threat, and if the opponent *expects* the costs to be greater, then he is deterred.[5] Additionally, this formulation, revised from DoD orthodoxy, makes sense: the actor in practice is unable to know precisely the costs and benefits prior to his action; those occur after and in response to the act.

Consequently, formulation of an effective deterrence strategy should focus on increasing

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[1] Alexander L. George and Richard Smoke, *Deterrence in American Foreign Policy: Theory and Practice* (New York: Columbia University Press, 1974), 3. Maj. Timothy Goines, USAF is a faculty member of the Department of Law, U.S. Air Force Academy.

[2] See generally, George and Smoke, *Deterrence in American Foreign Policy*.

[3] George and Smoke, *Deterrence in American Foreign Policy*, 48.

[4] Department of Defense (DOD), Deterrence Ops Joint Operating Concept, Version 2.0 (Washington, DC: Office of the Secretary of Defense, December 2006), http://www.dtic.mil/doctrine/concepts/joint_concepts/joc_deterrence.pdf; and DOD, Department of Defense Cyber Strategy (Washington, DC: Office of the Secretary of Defense, April 2015).

[5] George and Smoke, *Deterrence in American Foreign Policy*, 48.

anticipated costs and decreasing anticipated benefits. This article focuses on the former in the cyber domain. Specifically, how should the United States increase the anticipated costs of cyber actions in order to effectively deter adversaries?

The key to increasing anticipated costs in the cyber domain is not novel or unique; nations have effectively communicated and continue to communicate consequences to their adversaries within other domains (i.e. air, land, and sea) through declaratory policies, signaling, and response actions. Therefore, the solution to increasing anticipated costs in the mind of the adversary within the cyber domain is a familiar one. But, perhaps the most difficult aspect of communicating cyber consequences is not the *ways* to increase costs, but the selection of the appropriate *means* to effectively communicate within the cyber domain—one that possesses the appropriate characteristics. This article proposes a solution, which is, loud cyber weapons.

Loud cyber weapons are cyber weapons that can be definitively traced to the deterring party. When using these new cyber weapons, the "deterrer" does not obscure the operation or its source from being discovered by the victim and correctly attributed. Currently, much of military cyber operations are kept secret in an attempt to avoid detection by the target nation and, if discovered, attribution. Loud cyber weapons would turn this paradigm on its head, exposing its means, methods, and source to target nations and the international community.

This article first explores the foundations of an effective deterrence strategy, evaluating examples that demonstrate it in practice, and affirming the importance of communication for effective deterrence policy. In the second part, this article highlights the lack of communication within the cyber domain, delineates the characteristics of effective signaling and follow-through, discusses how each is present in effective signaling examples, and uses these characteristics to evaluate the proposed solution—use of loud cyber weapons.

DETERRENCE THEORY FOUNDATIONS

Requirements

George and Smoke articulated three requirements of deterrence: "(1) the full formulation of one's intent to protect a nation; (2) the acquisition and deployment of capacities to back up the intent; and (3) the communication of the intent to the potential 'aggressor.'"[6] Each of these three requirements serve a critical purpose, giving rise to particular attributes of an effective deterrence strategy: a system of rules, credibility, commitment, and communication. A short discussion of these requirements and attributes will assist in identifying characteristics of effective communication, which will be used to analyze the proposed solution for the cyber domain.

The first requirement, the full formulation of one's intent to protect a nation, is distilled into a system of rules. In this context, a system of rules is a domestic policy wherein the deterring state defines its thresholds for certain adverse actions (considering specific domestic targets and competing actors) and corresponding responses. It is created by considering a number of factors, including "the decision to attempt deterrence in a given case…the perception and analysis of the threat…the U.S. national interests in the case, and the determination of what kinds of responses…" are appropriate.[7] The process of fully forming intent serves two purposes

[6] Ibid., 64.

[7] Ibid.

for a deterring state. First, it organizes the deterring state's thoughts on unwanted adverse actions into a practical, rule-based approach. Secondly, it informs the deterring state's executive on what actions are to be deterred and what institutional tools are available for policy implementation.

Second, a deterrence strategy must include the acquisition and deployment of capacities to back up the intended response. This serves to lend credibility to a deterrence strategy and to demonstrate that a deterring state is committed to enforce its system of rules. Naturally, if the adversary is not convinced that the deterring state has capability to impose costs, the actor is unlikely to be deterred. For example, if the deterring state has a system of rules that requires a response when an adversary enters its territorial waters, yet it lacks adequate Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) or naval assets, then deterrence, when tested, is likely to fail.

Finally, an effective deterrence strategy must communicate intent to the potential aggressor. While the first two requirements of deterrence are critically important (and the emphasis of George and Smoke's extensive study), the focus of this paper is on this third requirement—communicating potential consequences to the adversary. If an actor does not know about potential costs, the actor cannot justify changing its behavior. Within this requirement, other attributes of deterrence strategy are empowered. For example, in order for a system of rules to be effective, they must be communicated to inform the adversary. Likewise, the credibility of a deterring state's intent is only effective if its capabilities are understood by the adversary, convincing a challenger that cost imposition by the defense is possible. Lastly, a nation must communicate its commitment to a deterrence strategy, convincing the target actor that political will for cost imposition is likely.

Oftentimes, communication of a deterrence strategy is accomplished in three ways, typically employed sequentially: declaratory policy, signaling, and follow-through. First, a deterring state should make their system of rules public through declaratory policy. This communicates to adversaries which actions and targets will produce a negative response and the likely magnitude of this response. Historically, with respect to nuclear deterrence, the United States declared that any launch of a nuclear weapon would result in a retaliatory strike.

In the event declaratory policy itself does not deter and a malicious act is anticipated, a deterring state may seek to further communicate their credibility and commitment through the use of signaling. Signaling by a deterring state demonstrates intent to enforce its system of rules.[8] For example, if a country has a system of rules that declares an invasion will be met with significant force, this state may demonstrate its credibility and commitment by amassing troops along the border. It should be noted that signaling can take many forms, from a traditional "show of force" to less direct methods, like conducting a public test on a new weapons system.[9]

Finally, if deterrence is still not successful after signaling, a state may actually impose the corresponding costs in response to the malicious act; in other words, it may follow-through on the threatened costs by imposing

[8] Ibid.

[9] See, for example, the recent Chinese ASAT test – Bill Gertz, "China ASAT Test Part of Growing Space War Threat," *Washington Free Beacon* (February 23, 2018).

them. This further reinforces the state's credibility and commitment to its system of rules. While it may not serve the deterrent function for the initial challenge, it does serve as a deterrent for future malicious acts. For example, if another state probes a deterring state (despite the various warnings), the state may respond with considerable force in order to communicate their capabilities and commitment against future invasions.

The bottom line is that these forms of communication are critical to the success of a deterrence strategy because they apprise an adversary of potential costs, increasing their estimation of the anticipated costs. A crucial component of any deterrence strategy is to ensure the communications piece is addressed and employed.

Case Studies of Deterrence in Practice

States routinely employ this methodology when attempting to deter other states from engaging in certain conduct. The following is a brief discussion of four relevant examples where the deterring state used tactics in an effort to communicate its system of rules, credibility, and commitment to adversaries. In some cases, their efforts were effective; in others, a missing component undermined their larger deterrence policy.

1. U.S. Deterrence of a Soviet Union Nuclear Strike

Perhaps the best example of where a deterring state made repeated efforts to communicate the potential costs of a particular action is the United States attempt to deter the Soviet Union from engaging in nuclear warfare throughout the Cold War. Notably, the United States successfully employed the three requirements for an effective deterrence strategy. First, through the trials of the Cold War and its aftermath, the United States fully formed its intent to protect itself and its allies against potential nuclear strikes and, in the event of a nuclear attack, to respond with a retaliatory strike. Second, the United States developed, and still maintains, the acquisition and deployment capacities to back up the intent.

Most importantly, though, the United States communicated this policy, and used signaling to convince potential adversaries that it was committed to the policy and that the threat was credible. Over the course of the Cold War, the United States threatened the Soviet Union that any nuclear launch would lead to a "massive retaliation" whereby the United States would destroy the full range of value targets in the Soviet Union.[10] When the declaratory policy alone did not appear to be deterring the Soviet Union, the United States then demonstrated its credibility and commitment to this threat through signaling.

In this instance, signaling was not amassing troops along a border, but rather, the development, testing, and deployment of nuclear weapons across the nuclear triad. For example, the United States conducted 1,024 tests of their nuclear weapons from 1945–1992, more than any other country.[11] This testing sent a strong message to the Soviet Union that the United States had both the commitment and credibility necessary to enforce its policy. As a result, the Soviet Union could better estimate the potential costs and factor them into its decision calculus.

2. U.S. Deterrence of North Korea

A more contemporary example can be found in recent events between the United States and North Korea. Since its establishment in the 1950s, North Korea's nuclear

[10] Amy Woolf, *U.S. Nuclear Weapons: Changes in Policy and Force Structure*, CRS Report for Congress (January 23, 2008).

[11] Rebecca Harrington, "The dark history of nuclear testing reveals one uber-powerful front-runner," *Business Insider* (January 6, 2016).

development program has been the subject of intense scrutiny from the United States and the international community.[12] With varying degrees of success, many diplomatic efforts have been attempted throughout the years to stop the program and halt the proliferation of nuclear weapons.[13] Upon the election of President Donald Trump, the U.S. approach to North Korea became a more aggressive deterrence approach—the United States sought to deter North Korea from developing and testing nuclear weapons through more aggressive rhetoric and signaling.

For example, after North Korea launched its twentieth ballistic missile in 2017 and tested what many believed to be a thermonuclear device, President Trump announced that he was stationing three carrier strike groups in the area of operations in close proximity to North Korea.[14] A single carrier strike group is typically comprised of an aircraft carrier, which can hold up to sixty aircraft (including F/A-18 strike fighters), along with destroyers and cruisers, both of which are equipped with the Aegis anti-ballistic missile system and Tomahawk cruise missiles.[15] They can also be accompanied by attack submarines, but their locations remain secret.[16] While stationed near North Korea, the three carrier strike groups conducted a joint exercise, with participation from South Korean and Japanese warships.[17]

As with the first example, the United States followed the expected pattern, ensuring each of the three requirements were met. First, as mentioned above, the United States during the Cold War fully formed its nuclear weapons policy—making a clear statement that the use of nuclear weapons is not tolerated.

However, in recent years, the United States has gone even further, focusing not only on the use of nuclear weapons, but also their development and testing. For example, the United States ratified the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in 1968 in an effort to reduce the spread of nuclear weapons technology.[18] More recently, after the Cold War, the United States signed two Strategic Arms Reduction Treaties (START and New START) to reduce the superpower stockpiles of nuclear weapons.[19]

The two efforts make clear that the United States wants to limit the number of nuclear weapons and the number of nations with nuclear weapons capabilities. For example, when reports surfaced that Iran was violating its commitment to the NPT and developing its nuclear program, the United States attempted to thwart it, eventually reaching a (temporary) deal with Iran to stop their nuclear weapons development.[20] Given these measures, the United States has fully formed its desire to stop the proliferation of nuclear weapons.

Second, to back up its intent, the United States indicated that it will use either the threat of nuclear strike or conventional weapons to prevent the proliferation of

[12] Nuclear Threat Initiative, "North Korea," *NTI*, https://www.nti.org.
[13] Ibid.
[14] Ankit Panda, "What 3 U.S. Supercarriers in the Asia-Pacific Means for North Korea," *The Diplomat* (October 30, 2017).
[15] Brad Lendon, "North Korea: 3 U.S. aircraft carriers creating 'worst ever' situation," *CNN* (November 20, 2017).
[16] Ibid.
[17] Ibid.
[18] "Treaty on the Non-Proliferation of Nuclear Weapons (NPT)." UN Department for Disarmament Affairs, United Nations, http://disarmament.un.org/treaties/t/npt.
[19] Department of State – New START Treaty, "Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms" (April 8, 2010).
[20] BBC News, "Iran nuclear deal: Key details," *BBC.com* (October 13, 2017).

nuclear weapons. In either case, the United States has the acquisition and deployment capacities to use either option, lending credibility to the potential costs.

Finally, the United States communicated this policy and, more recently, employed signaling to demonstrate its resolve. For example, the United States communicated this policy directly to North Korea and its closest ally, China. First, the United States made clear through press releases and otherwise that it would not tolerate North Korea's continued development of nuclear weapons.[21] Through the course of this administration and the previous one, there is no question on the U.S. stance.

Unfortunately, this policy alone did not deter North Korea from further developing its nuclear weapons program. As a result, President Trump took the next step in the deterrence communication process and signaled U.S. commitment and capability by stationing the three carrier strike groups in the area of operations. This sent a powerful message. By stationing these groups near North Korea, which have the capacity to shoot down ballistic missiles with the onboard Aegis system, the U.S. communicated both the credibility of its intent and the commitment to follow through. This communication allowed North Korea to conduct a more accurate assessment of the potential costs of their nuclear weapons development.

Fortunately, a follow-through was not required as North Korea made a commitment to halt their nuclear weapons program.[22] In turn, the United States softened their deterrence efforts towards North Korea. Whether this commitment will be successful is yet to be seen; however, the use of deterrence to get North Korea to negotiate with the United States was rather successful.

3. China's Deterrence of Space-Based Operations

In 2018, China conducted another Anti-Satellite weapon (ASAT) test under the guise of a missile defense interceptor trial.[23] In the test, China used the DN-3 anti-satellite interceptor, which is capable of being launched from land, directly ascending, and striking a satellite orbiting Earth.[24] For the United States, which relies heavily on satellites for communication, location data, and intelligence, the message was loud and clear: China has the commitment and credibility to engage in space warfare and disable space-based operations. However, when considering what larger deterrence message China was attempting to send, the message is more ambiguous.

China has likely fully formed its intent to protect their nation, and the ASAT test (and the many before it) demonstrates that China possesses the acquisition and deployment of capacities to back up the intent. But, as far as the communication requirement, China failed in the first step—to communicate a declaratory policy or system of rules. As a result, what are the United States and other similarly situated nations supposed to take from this ASAT test and its predecessors? Without a clear system of rules, the target states are left with little information to predict future behavior and calculate potential costs.

[21] President Trump has repeatedly tweeted about North Korea and its leader, Kim Jung Un. See, for example, Peter Baker and Michael Tackett, "Trump Says His 'Nuclear Button' Is 'Much Bigger' Than North Korea's," *New York Times* (January 2, 2018).

[22] Joshua Berlinger, "Singapore Summit: Asia Reacts to the Trump-Kim meeting," *CNN*, 12 June 2018, wwww.cnn.com.

[23] Bill Gertz, "China ASAT Test Part of Growing Space War Threat," *Washington Free Beacon* (February 23, 2018).

[24] Ibid.

So, while China's ability to wage space war is undisputed, the larger deterrence message is lost on potential adversaries.

With that said, there can be some strategic benefits to ambiguity (e.g., How will China use ASAT capabilities in the future? What could trigger an ASAT response? What action is China trying to deter?). This ambiguity could serve China well, given the United States and other countries' reliance on space assets and their significant vulnerabilities. Ambiguity could cause doubt in the mind of adversaries, fearing that certain actions may result in certain conduct. Even so, this level of decision-making paralysis is unlikely. What is more likely is that, given a lack of clear rules, adversaries will use this ambiguity as justification to "poke and prod" China to determine what they can do and what provokes a response.

What is clear is that China's ASAT test did communicate something, but the scope of its deterrent effect is less certain. This emphasizes the importance of each step of an effective deterrence strategy, including the need to communicate the system of rules.

4. U.S. Deterrence of China's Claim to the South China Sea

In August of 2017, the U.S.S. John S. McCain, a U.S. Navy destroyer, traveled close to Mischief Reef in the Spratly Islands, an area over which China has territorial disputes with its neighbors, including Brunei, Malaysia, the Philippines, Taiwan, and Vietnam.[25] The United States has long criticized China's construction of islands, used for military purposes, throughout the South China Sea and has asked for more international participation regarding the area.[26] There is little doubt that this maneuver was meant to send a message regarding the U.S. position. In fact, this was the third mission of this kind (a freedom of navigation operation [FONOP]) during the Trump presidency, with the administration vowing to conduct more operations in the area.[27]

While it may seem at first glance that this was not a deterrence operation, it was. The United States was attempting to deter China from continuing to claim the South China Sea as its territory. This particular scenario follows the expected pattern. First, the United States declared its dissatisfaction for the tactic used by China to expand its territorial waters, especially over a highly traversed area in the South China Sea, and repeatedly warned that it will not recognize the area as China's territory. Second, the United States demonstrated the acquisition and deployment capacities to be able to back up its intent that this area remain international waters; namely, by traversing it with naval sea craft.

Finally, the United States communicated its stance on the South China Sea to China and the international community on several occasions, demanding that China stop claiming land within the area.[28] The United States attempted diplomatic efforts to stop China's militarization. For example, President Obama urged a peaceful resolution in May 2016.[29] The United Nations found that China had no legal basis to claim historic rights for the bulk of the South China Sea (which the United States supported).[30] Unfortunately, such efforts were unsuccessful. Thus, the United States moved

[25] Idrees Ali, "U.S. destroyer challenges China's claims in South China Sea," *Reuters* (August 10, 2017).
[26] Ibid.
[27] Ibid.
[28] William Pesek, "Making Sense Of The South China Sea Dispute," *Forbes* (August 22, 2017).
[29] Katie Hunt, "South China Sea: Court rules in favor of Philippines over China," *CNN* (July 12, 2016).
[30] Ibid.

to the next step in the process—signaling—by sending the U.S.S. John S. McCain into the area.

It is important to note that the United States used a U.S. Navy Destroyer to conduct this FONOP. Instead of using commercial sea craft, which might communicate a desire to have freedom of navigation, the United States used a U.S. Navy ship, essentially informing China that the United States desires to have freedom of navigation in this area and will ensure this by force, if necessary. So, when the U.S.S. John S. McCain was approached by two Chinese warships, the destroyer had the necessary weapons to respond, if provoked.

While resolution of China's claims over the South China Sea is yet to be determined, this operation is a good example of deterrence strategy in action. The operation was the latest in a series meant to signal U.S. displeasure with China's policy and a willingness to engage, if necessary. As the United States continues its stance on China's policy, the recent series of FONOPs leave little doubt over U.S. resolve, commitment, and credibility.

THE CYBER DOMAIN AND DETERRENCE

Given the number of nations with cyber capabilities, the cyber domain has become a viable space to employ deterrence actions. Although it is a different domain analytically, the requirements of an effective deterrence strategy *remain the same* and the need to communicate the potential consequences remains paramount. The second part of this article explores how to best communicate a state's deterrence policy within the cyber domain. This begins with recognition of a fundamental problem with the current employment of cyber actions. Then, it evaluates requirements of a signal and follow-through sequence, discussing how these can be found in examples of deterrence in practice. Finally, it applies these requirements to the proposed solution—loud cyber weapons.

At the outset, it should be noted that this article focuses on how best to employ actions within the cyber domain for the purpose of deterrence, whether those actions deter an adversary in the cyber domain or in other domains (i.e., land, sea, air, or space). In other words, deterrence actions can have an intra-domain effect and a cross-domain effect. This article does not attempt to distinguish between the two, as most traditional deterrence actions have similar potential effects. Rather, this article focuses on how to employ actions within the cyber domain to deter adversaries both inside and outside of the cyber domain.

A Fundamental Problem with Current Cyber Employment

Previous examples serve to demonstrate the importance of communicating a deterrence strategy through declaratory statements, signaling, and follow-through; communication allows the adversary to understand the system of rules, commitment, and credibility and better calculate the potential costs. Unfortunately, communication within the cyber domain has proven elusive. Herein lies a fundamental problem with the current cyber employment. In short, cyber capable nations employ virtually no tactics in the cyber domain in an effort to communicate potential costs, the credibility of potential cost imposition, or its commitment to imposing these costs. There are various reasons for this.

One significant contributing factor is that nearly all cyber operations are classified as "Top Secret." For example, the Presidential

Policy Directive that used to govern U.S. cyber operations policy (PPD 20) itself was classified as Top Secret. It was recently replaced by President Trump, but the new order is also classified.[31] Another example of the classified nature of cyber operations is the Vulnerabilities Equities Process (VEP). Only recently, President Trump released an unclassified version of the document, describing the process by which the United States assesses known cyber vulnerabilities and risks to national security, the American people, and the dissemination of information.[32] This process existed, in some form, since 2008. While a redacted version of the document emerged through a Freedom of Information Act request in 2016, it was only recently communicated to the U.S. public in un-redacted form.[33]

Regardless of the reason for its classification, the covert nature of cyber operations creates a lack of communication within the cyber domain. For example, there have been virtually no publicly acknowledged cyber actions by the United States within the last twenty years. This is not to say that there have not been cyber actions conducted by the United States. For example, the cyber-worm "Stuxnet" unleashed on Iran's nuclear facility has been reportedly attributed to a joint operation between the United States and Israel.[34] Similarly, Edward Snowden released documents in 2013 that revealed a cyber operation involving the United States hacking into Tsinghua University and Huawei, China's largest telecommunications company.[35] Likewise, in the early years of the Obama administration, the United States reportedly developed a cyber operation, Nitro Zeus, which was designed to disable Iran's air defenses, communications systems, and power grid.[36] The operation was meant to be employed if diplomacy failed to curb Iran's nuclear weapons program.[37]

None of these operations were ever acknowledged by the United States, which means that an adversary has little-to-no information regarding U.S. capabilities, the credibility of its threat to impose costs, and the U.S. commitment to imposing them. Instead, from a potential adversary's perspective, the absence of cyber operations conveys that the United States lacks the capability to impose costs, credibility regarding threats, the commitment to follow through, or a combination of these three, within the cyber domain. This does little to alter the decision-making calculus or increase the likelihood of deterring the adversary.

COMMUNICATING CONSEQUENCES IN THE CYBER DOMAIN

Given this fundamental problem, the key to increasing anticipated costs in the cyber domain is to communicate the potential consequences through cyber actions; specifically, consequences that an adversary

[31] Ellen Nakashima, "Trump Gives the Military More Latitude to Use Offensive Cyber Tools against Adversaries," *The Washington Post* (August 16, 2018).
[32] White House, "Vulnerabilities Equities Policy and Process for the United States Government," (November 15, 2017), accessible at https://www.whitehouse.gov/sites/whitehouse.gov/files/images/External%20-%20Unclassified%20VEP%20Charter%20FINAL.PDF
[33] Electronic Privacy Information Center, "Vulnerabilities Equities Process," Epic.org, accessible at https://epic.org/privacy/cybersecurity/vep/.
[34] Kim Zetter, "An Unprecedented Look at Stuxnet, the World's First Digital Weapon," *Wired* (3 November 2014), accessible at https://www.wired.com/2014/11/countdown-to-zero-day-stuxnet/.
[35] Kenneth Rapoza, "U.S. Hacked China Universities, Mobile Phones, Snowden Tells China Press," *Forbes* (June 22, 2013).
[36] David E. Sanger and Mark Mazzetti, "U.S. Had Cyberattack Plan if Iran Nuclear Dispute Led to Conflict," *The New York Times* (February 16, 2016).
[37] Ibid.

could suffer within the cyber domain. As noted above, the use of cyber actions in this manner is not limited to intra-cyber domain deterrence. Potential consequences within cyber can deter adversary actions both inside and outside the cyber domain.

This is not a novel or unique solution. As noted in our previous examples, nations effectively communicated and continue to communicate consequences to their adversaries within other domains (i.e., air, land, and sea) through a declaratory policy, signaling, and follow-through. Thus, the notion of increasing anticipated costs in the mind of the adversary within the cyber domain is a familiar one. However, the challenge arises when a deterring state must determine the means to effectively communicate signaling and follow-through within the cyber domain. This challenge becomes particularly difficult when considering both signaling and follow-through.

Declaratory Policy

The initial step of communication (a declaratory policy) is fairly straight forward. A deterring state should communicate its declaratory policy through press releases, speeches, and other engagements with the international community. Providing a system of rules to potential adversaries makes it clear what actions the deterring state intends to respond to and what targets it intends to protect. In regards to cyber actions, a deterring state should clarify their intent to use cyber actions as a mechanism to impose costs, specifically highlighting the potential use of cyber acts to deter adversaries regardless of the domain.

For example, the United States has already engaged in a version of this throughout the last ten years. In fact, the National Cyber Strategy, updated by President Trump in September 2018, articulates that the United States will impose consequences "to deter future bad behavior."[38] Admittedly, this policy, and its predecessors, lack clarity and specificity. For example, it states that it will impose consequences on "malicious cyber actors in response to their activities against our nation," but it does not define "malicious" or what activities would trigger a response action.[39]

Additionally, aside from these rather ambiguous proclamations, the United States rarely communicates more specific threats. For example, in the Stuxnet and Nitro Zeus operations above, the United States could have communicated a specific declaratory policy to Iran that any continued development of their nuclear weapons program would result in a debilitating cyber response. At the very least, this would have drawn a clear line in the sand, allowing Iran to better understand the possible costs and consider those costs prior to continuing their nuclear weapons program.

The importance of a clear declaratory policy should not be undervalued. Lack of clarity does not usually serve to benefit the deterring state. As noted in the Chinese ASAT test discussed above, failure to communicate the system of rules typically serves to confuse the adversary and frustrate deterrence efforts. Naturally, adversaries are more likely to use this ambiguity as an excuse to "poke and prod" a deterring state to determine what provokes a response.

[38] President, *National Cyber Strategy of the United States of America* (Washington, DC: Office of the President of the United States, September 20, 2018).

[39] Ibid.

Therefore, as in other domains, a critical first step to successfully employing cyber acts to communicate potential consequences is to establish a clear declaratory policy and communicate that policy to potential adversaries.

Signaling and Follow-Through

Once a clear declaratory policy has been established, a deterring state should be prepared to utilize the next steps in the communication process to ensure adversaries understand its system of rules, commitment, and credibility and better calculate the potential costs. These next steps are the use of signaling and follow-through.

Unfortunately, in the cyber domain, the use of signaling and follow-through is nascent. For example, neither the United States nor any other nation has ever publically acknowledged employing a cyber operation, much less used a cyber operation for pure signaling reasons. However, deterring states have used signaling and follow-through mechanisms throughout history in other domains. These can be used to form a baseline of what is required for an effective signal and follow-through.

Based on a study of successful signaling and follow-through actions, there are five essential characteristics:

1. Deterring State Self-Identification

Any effective signal and follow-through must communicate the deterring state's identity. Identification is important in order for the adversary to link the action to the declaratory policy and to confirm the intended or actual enforcement of the system of rules, the commitment to enforcement, and the credibility of future threats. If a challenger does not know who conducted the signal or response, they are less likely to consider these actions in future decisions regarding that state, losing the desired effects of the operation.

In the cyber domain, the difficulty of attribution (the ability to identify the actor) is a recurring issue. Some states tend to capitalize on this technical challenge when engaging in covert operations. As a result, states who are the victim of cyber acts may be unwilling to respond (in any domain) out of the fear of inaccurate attribution. Thus, an argument could be made that signaling could undermine this tactical advantage.

Importantly, this article does not advocate for the complete elimination of covert cyber operations. Rather, covert cyber operations could still be utilized, when appropriate; similarly to how states continue to employ both covert and overt air, land, or sea operations. There is no doubt that these covert operations can have a deterrent effect. However, with signaling and follow-through actions, it is important to identify the actor because the purpose of the signal or response is to communicate a message. That message is lost if the deterring state is not clearly identified.

2. Clear Message

Any signal or follow-through should communicate the commitment and credibility in clear terms. In other words, the message must indicate that the deterring state is committed and their threat is credible; there is rarely a benefit to ambiguity in this regard. Additionally, the message should be closely linked to the system of rules/declaratory policy.

Ideally, a signal would communicate a message along these lines: "You appear to be preparing to do [x]. According to our declaratory policy, we will respond to your action by doing [y]. We have the capability and commitment to respond in this manner. This action is to confirm our intent to follow-

through on this declaratory policy." Similarly, a follow-through action should communicate a message along these lines: "You have done [x]. According to our declaratory policy, we informed you that we would response to your action by doing [y]. We have conducted this action in accordance with our declaratory policy."

3. Capability Demonstration

Communication via signaling and follow-through requires that the deterring state adequately demonstrate the capability to conduct the actions specified in their declaratory policy. If the deterring state cannot demonstrate their capacity to impose the threatened costs, it is unlikely to factor into an adversary's decision calculus. If, for example, the Chinese ASAT missile test was not successful, a space faring nation that was contemplating a challenge would not give any weight to the threatened costs. Similarly, in the cyber domain, if a threatened action is not demonstrated as being technically feasible, it will have little effect on an adversary's calculus.

4. Tailoring to the Target

A signal or response must be carefully tailored to the adversary, focusing on how the capability is likely to impact their cost determination. In other words, the message must "speak the language" of the adversary and concentrate on those costs that will persuade the adversary. For example, if the challenger lacks any functioning satellite, it is doubtful that China's recent ASAT missile test would alter their decision calculus. Similarly, if a state lacks a dependency on cyber capabilities, employing adverse cyber acts would prove fruitless.

This can be the most complicated of the requirements because knowing what the adversary values is not always obvious. Nuclear deterrence was simpler because total destruction is a universally feared cost. However, determining what North Korea's leader, Kim Jong-un, values is exponentially harder, and threatening total destruction tends to lose its effectiveness without any follow-through. Nevertheless, it is the job of the deterring state to identify what the adversary values and then tailor a signal or response to increase their anticipated costs.

5. Adversary Identification

While it is inherent in the previous characteristics, it is important to expressly state the significance of identifying the adversary in a signal or follow-through action. In other words, the deterring state should identify the target state. This characteristic has two parts. First, the deterring state should properly identify the target state before any signaling or follow-through action. This ensures the response is properly tailored, demonstrating the correct capability, and sending the correct message. In the event a deterring state misidentifies the adversary and then uses the above requirements to tailor a signal or response, this effort will have little effect on the actual challenger. In fact, it might even embolden an actor who believes they can operate without consequence.

Second, it must also identify the target within the signal or follow-through. This ensures the intended receiver knows they are the intended receiver. This particular aspect tends to be more important in the domains that lack clear borders (i.e., cyber). In a traditional domain, proximity to a state's border, territorial waters, or airspace was sufficient to identify them as the target state. However, in a borderless domain, a deterring state must be more overt, ensuring any errant recipients of the message are aware of its intended target.

Case Studies: Revisited

The deterrence examples provided in Part I illustrate how the five characteristics for

communicating consequences determine successful signaling in other domains.

1. U.S. Deterrence of a Soviet Union Nuclear Strike

When the declaratory policy of "massive retaliation" alone did not appear to be deterring the Soviet Union, the United States demonstrated its credibility and commitment through signaling. In this instance, signaling was the development, testing, and deployment of nuclear weapons for the nuclear triad. As a prominent example, this analysis focuses on development and testing of nuclear weapons and delivery systems (Intercontinental Ballistic Missiles, or ICBMs).

Aside from the second characteristic (a clear message) which is discussed below, the testing of nuclear weapons and ICBMs met the requirements of a successful signal. First, during the height of the Cold War, there was no question regarding which country was developing nuclear weapons and ICBMs and then testing various prototypes. The tests were detectable around the world, and the United States did not hide these tests.

Second, each test served to demonstrate the U.S. capability to strike the Soviet Union. Third, the message was tailored to the Soviet Union. While nuclear deterrence did not require much, if any, tailoring, the United States did tailor their testing to the Soviet Union, the only other peer competitor in the development and deployment of nuclear weapons and ICBMs. Fourth, identifying the target of U.S. signaling was rather easy since there were few nuclear capable states and even fewer to deter. If there was any question, the development of ICBMs that possessed the range to reach the Soviet Union was fairly clear evidence that the Soviet Union was the primary target.

With regard to clarity of the message, the testing conducted by the United States was an attempt to clearly communicate U.S. commitment to developing, maintaining, and deploying functional nuclear weapons. Unfortunately, this message was open to misperception. Ideally, the United States should have declared: "The Soviet Union appears to be preparing to launch a nuclear strike. According to our declaratory policy, the United States will respond to any nuclear strike by engaging in a massive retaliatory strike, effectively destroying the full range of value targets in the Soviet Union. The United States has the capability and commitment to respond in this manner. This test of [a nuclear weapon or its delivery system] is to confirm U.S. intent to follow-through on this declaratory policy." However, this message was often lost, leaving many within the Soviet Union to believe that the United States was preparing to launch a first strike. This was a version of the "security dilemma," leading to multiple crises and near-breakdowns of deterrence throughout the Cold War.[40]

2. U.S. Deterrence of North Korea

After North Korea launched its twentieth ballistic missile in 2017 and tested what many believed to be a thermonuclear device, President Trump announced that he was stationing three carrier strike groups in the area of operations in close proximity to North Korea. Once there, the U.S. Navy conducted a joint exercise with participation from South Korean and Japanese warships. This was, in

[40] Robert Jervis, *Perception and Misperception in International Politics* (Princeton, N.J.: Princeton University Press, 1976). For examples, see Nate Jones, Ed., *The Soviet Side of the 1983 War Scare, Briefing Book #647*, National Security Archive, The George Washington University, https://nsarchive.gwu.edu/briefing-book/aa83/2018-11-05/soviet-side-1983-war-scare, accessed 5 November 2018; and also The John F. Kennedy Presidential Library and Museum, *Cuban Missile Crisis*, https://www.jfklibrary.org/learn/about-jfk/jfk-in-history/cuban-missile-crisis, accessed 8 November 2018.

no uncertain terms, a signal to North Korea that possessed each of the five characteristics.

First, the deterring state was identified. When the carrier strike groups arrived off the coast of North Korea, there was no confusion over whether they were assets of the United States. President Trump announced the stationing of the naval assets to the area, and each flew the U.S. flag. It should be noted that it is rare for the United States to announce the location of their carriers, so the publication served to remove any doubt that these assets belonged to the United States.[41]

Second, the message was clear; given the timing of President Trump's deployment of the naval assets, which occurred shortly after North Korea's twentieth test of a ballistic missile, the stationing of the carrier strike groups properly linked the actions of North Korea to the response action. It was then further linked to the U.S. declaratory policy on stopping nuclear proliferation. Third, the mere presence of the carrier strike groups in the vicinity demonstrated U.S. capability to be in Korean waters within a matter of days. Further, while inside the Seventh Fleet Area of Operations, the carrier strike groups conducted an exercise, demonstrating their ability to work together against a common target.

Fourth, the message was tailored to North Korea and Kim Jung-un, whose actions confirmed that he does not respond to a light touch and that he pays close attention to the movements of U.S. strategic assets near the Korean peninsula.[42] Finally, the United States properly identified North Korea as their target state. This was accomplished through statements by President Trump, the timing of the response action (shortly after the missile test), and the proximity of the naval assets to North Korea.

While the overall success of the U.S. deterrence strategy for North Korea is still being determined, this signaling example appears to have been a successful communication of U.S. intent, commitment, and credibility.

3. China's Deterrence of Space-Based Operations

China recently conducted another ASAT test of the DN-3 anti-satellite interceptor, which is capable of being launched from land, directly ascending, and striking a satellite orbiting Earth. As discussed in Part I, this action was not as effective as it could have been if it had accomplished the first step of communicating a deterrence strategy—communicating the declaratory policy. Consequently, adversaries were unable to determine the threshold for such a response action or to make sense of China's intent.

Despite this, there were some deterrence benefits of the test, and it did possess many of the requirements of an effective signal. First, due to the nature of the operation and the constant monitoring of space launches, it was obvious to determine the identity of the launching state. Second, this was, if nothing else, a capability demonstration—ensuring everyone capable of detecting the launch was aware of China's ability to strike space assets from a terrestrial launch. Third, it was tailored to, what we assume is, the target states—all space-faring nations. While most signals should consider engaging in a more tailored approach, in rare circumstances (for example, nuclear deterrence), no specific tailoring is needed if simply trying to communicate a capability.

[41] Ankit Panda, "What 3 U.S. Supercarriers in the Asia-Pacific Means for North Korea," *The Diplomat* (October 30, 2017).

[42] Ibid.

The two most glaring omissions from China's ASAT test were that the message was not clear and the target states were not identified. This is largely due to the disguising of the launch as a missile defense interceptor test. As a result, China's message was ambiguous, not tied to a declaratory policy, and lacking any indication of a system of rules. Coupled with the lack of a clear identification of the target states, an adversary is unlikely to know whether they were an intended recipient and what message to take from this action.

These omissions hinder the deterrent effect of China's ASAT test. As a result, there continues to be uncertainty regarding space assets and China's position.

4. U.S. Deterrence of China's Claim to the South China Sea

When the U.S.S. John S. McCain, a U.S. Navy destroyer, traveled close to Mischief Reef in the Spratly Islands, there was little doubt that this maneuver was meant to send a message regarding the U.S. position over the disputed area. In fact, this was the third FONOP mission during the Trump presidency, with the administration vowing to conduct more operations in the area.[43] This signaling measure met the requirements for an effective signal.

First, similarly to the carrier strike group stationed off the coast of North Korea, the identification of the U.S. destroyer was indicated by the flags flown aboard. In addition, when approached by the Chinese sea craft, the U.S.S. McCain identified itself, and China later declared the U.S. action as "provocative."[44]

Second, the message was clear, albeit not necessarily articulated in the manner proposed above. Instead of publicly voicing the purpose of the mission, the United States relied on a common practice associated with international waters and the law of the sea—freedom of navigation.[45] While uninformed observers might be confused by the action, the message was clear to a savvy international diplomat. Notably, the Chinese understood the message, later condemning the operation by stating that "the operation had violated international and Chinese law and seriously harmed Beijing's sovereignty and security."[46]

Third, the sending of the U.S.S. McCain, a destroyer, was a demonstration of the capability of the U.S. Navy. While it did not engage in a hostile act (according to U.S. policy), the ability to project power in the area was an indication of the ability to do so later. Fourth, this action was tailored to the Chinese and their claim over the South China Sea, specifically communicating the U.S. position on the nature of the area. Finally, given the proximity of the operation to both China and the disputed area, the target state was identified. The success of this signaling action can be seen by the Chinese response, which stated, "China is resolutely opposed to this kind of show of force . . . ."[47]

Cyber Consequences

The same requirements for an effective signal and follow-through action in other domains can be translated to the cyber domain. Therefore, any suggested cyber signaling or follow-through must meet each of the above characteristics for the best chance of being effective. Consequently, any proposed solution must (a) disclose the identity of the deterring state; (b) clearly communicate the message; (c) demonstrate the capabilities of the deterring state; (d) be

[43] Ibid.
[44] Idrees Ali, "U.S. destroyer challenges China's claims in South China Sea," *Reuters* (August 10, 2017).
[45] Ibid.
[46] Ibid.
[47] Ibid.

tailored to the target adversary; and (e) properly identify the adversary.

1. Proposed Solution: "Loud" Cyber Weapons

If the United States employed "loud" cyber weapons as signals and follow-through actions within the cyber domain, it would have a better chance of effectively communicating its system of rules, its commitment, and the credibility of its threats. As defined above, loud cyber weapons are cyber weapons that can be definitively traced to the actor; they do not disguise the source, the nature, or the effects. When employing loud cyber weapons, the actor does not obscure the operation or its source from being discovered by the victim and correctly attributed.

As proposed, the United States would employ loud cyber weapons consistent with their declaratory policy and in response to adverse actions—whether these actions were employed in the cyber domain or other domains. These would functionally serve as a cyber "show of force," commonly practiced in other domains. When evaluated under the requirements outlined above, loud cyber weapons meet all the requirements of an effective signal and follow-through.

a. Self-Identification

By its nature, a loud cyber weapon identifies its origin and architect; it does not disguise these in an effort to achieve surprise. This provides the needed link between the act, the effects, and the deterring state. It informs the adversary about who carried out the act, confirms enforcement of the deterring state's system of rules, and demonstrates the deterer's commitment to enforcement and maintaining credibility of future threats. The result is that the challenger has no question about who coordinated the act and is able to determine the deterring state's intent. With covert cyber weapons, an adversary may know of the effects of an act, but not know who was behind it. This undermines the effectiveness of signal and follow-through. Employing loud cyber weapons allows adversaries to better estimate the costs of any potential response from the deterring state. Consequently, future deterrence messages and threats will likely be taken more seriously and should increase the adversary's anticipated costs.

b. Clear Message

Loud cyber weapons offer a unique advantage over covert cyber weapons and conventional weapons. With both covert cyber weapons and conventional weapons, the message can be lost if not properly executed or linked to the initial action and declaratory policy. Loud cyber weapons, on the other hand, can communicate the message more overtly, through incorporation into code. Since covert cyber operations attempt to disguise their identity, a deterring state is unwilling to put identifying information within the code; in fact, they often attempt to hide such indicators. Even if the deterring states does not wish to be so direct, it can fall back to employing cyber weapons in the same manner as conventional signaling and follow-through actions. This can be done by linking loud cyber operations through public statements or conducting the operation soon after the triggering event. In either case, the adversary is able to receive a clear message, which will be factored into their future decision calculus.

c. Capability Demonstration

This is perhaps the most beneficial aspect of loud cyber weapons. With the current covert nature of cyber weapons, many state and non-state actors suspect that the world powers, including the United States, have significant cyber capabilities. However, there is confusion over their actual capabilities because they are rarely publically

acknowledged. As a result, an adversary is left to guess the potential costs that would be imposed by these deterring states. The only guidance they have in anticipating the costs are vague policies by the world powers. For example, one U.S. policy declares that it will respond "through its defense capabilities . . . at a time, in a manner, and in a place of our choosing . . . ."[48] This does little to communicate the anticipated costs to potential challengers.

Furthermore, many adversaries might not anticipate *any* cost imposition due to a lack of publicity of past efforts by these world powers to respond to cyber acts or signal their intent to do so. Much like an ASAT missile test that fails to launch successfully, a lack of known cyber responses does little to deter adversaries.

Loud cyber weapons offer a solution to this. By not disguising the effects, they broadcast the deterring state's capabilities to adversaries and beyond while demonstrating state commitment to enforcing rules and bolstering the credibility of threats. For example, many adversaries might actually be subject to a signal or follow-through response from the United States, but due to the covert nature of the operation, the effects (and therefore, the capabilities) are unknown to the target. More overt use of cyber weapons clears up any ambiguity surrounding cyber operations and fully informs adversaries of the deterring state's policy. Consequently, potential challengers are better equipped to calculate anticipated costs associated with an adverse action.

d. Tailoring to the Target

Like conventional tactics, loud cyber weapons offer the flexibility to be tailored to the specific target actor. Importantly, though, loud cyber weapons expand the spectrum of options available to deterring states when determining how to signal or follow-through, both within the cyber domain and outside of it. For instance, if the United States wanted to signal to North Korea that it would not tolerate their continued nuclear weapon development, they could employ options ranging from a traditional show of force (i.e., aircraft flying in close proximity, a carrier strike group being stationed in the area, or amassing troops in South Korea) or it could employ a loud cyber weapon. Thus, loud cyber weapons provide an expanded set of viable options to tailor the message to the target actor's specific interests. Accordingly, the deterring state is better equipped to tailor its cost impositions, and consequently, an adversary is better positioned to assess the range of likely costs the deterring state may impose.

e. Adversary Identification

As explained above, this requirement has two functions. First, proper identification helps the deterring state better tailor the signal or follow-through to the target state. Second, it helps identify the target state, which is particularly important when operating within a borderless domain.

Loud cyber weapons do not necessarily offer an advantage over conventional and covert cyber weapons in the first function of this requirement; it is equally important to properly identify the actor in all domains in order to properly tailor the signal or follow-through action. But, perhaps it is more important to correctly identify the target actor when employing loud cyber weapons. As compared to covert cyber weapons, loud cyber weapons will actually make matters worse in the event that a deterring state misidentifies the challenger. For example, if a covert cyber weapon were targeted at the wrong actor, the target might not even know

[48] DOD, Cyber Strategy, 11.

they were the victim of a deterrence response; the same is not true for loud cyber weapons. The issue does arise in other domains, albeit, with less difficulty of attributing responsibility to deterring states.

Much is made of the attribution problem for identifying adversaries in cyber operations. Fortunately, many of the world powers are getting better at attributing cyber actions. Instead, the more recent challenge is timely attribution, and this complicates, but does not foreclose, deterrence operations. After all, it is the deterring state's obligation to link the previous adverse act to its response, even if delayed.

Additionally, the second function is equally important. Because the cyber domain is borderless and nations are interconnected, there is always possible an errant spread of the cyber weapon (for example, a worm that propagates further than intended). So, it is important for loud cyber weapons to specifically name the target to avoid potential misperception and escalation. All things considered, as long as a state properly identifies the target actor, loud cyber weapons meet the requirements of an effective signal/response.

2. Challenges

While loud cyber weapons offer an effective method for signaling and follow-through actions, certain challenges exist in practically employing them.

First, the effectiveness of a deterrence strategy relies heavily on anticipated cost imposition; however, in the cyber domain, the costs are all relatively low compared to other domains. For example, in nuclear deterrence, the likely cost is a retaliatory strike that would most likely result in significant (if not, total) destruction. An adversary is less willing to provoke this result; there is a significantly narrow margin of error in nuclear deterrence. For the cyber domain, the most likely damage for a signal or follow-through action is relatively minor (perhaps a computer or network is temporarily inoperable or data is lost), and the cost is relatively small. A passionate adversary is unlikely to be deterred by such an insignificant consequence.

However, the key to employing loud cyber weapons (like deterrence in all domains) lies in the tailoring of the response to the target; after all, not all actors will be deterred by the same costs. For those actors who will not be deterred by cyber weapons (whether covert or overt), imposing such a cost would not be effective, and the deterring state should consider other signals or follow-through options (for example, a different domain).

Further along these lines, due to the likelihood of low cost imposition, many adversaries will be more willing to test the deterring state's resolve. This is in marked contrast to other domains. As discussed above, in nuclear deterrence, the margin of error is narrow, but in the cyber domain, drastic retaliation is unlikely, and may offer little added signaling value. Given a panoply of available cross-domain options, challengers may poke and prod the cyber deterring state in an effort to determine whether it is truly committed to its system of rules.

However, this only cements the importance of fully forming a deterrence strategy. A deterring state must contemplate various scenarios and tailored responses, even outside of cyber weapons and the cyber domain. This should be distilled in the nation's system of rules. Furthermore, low magnitude, cross-domain retaliation reinforces the need to tailor signals and follow-through actions to the effects which will most likely impact an actor's decision calculus.

Second, there are often questions regarding the legality of using cyber weapons, especially when there is a use of force implication. Due to the many questions on how international law applies to cyber operations (an area that is very unsettled at this point), this is a complex topic that should be more fully evaluated. In any case, it does not foreclose use of loud cyber weapons entirely. Instead, it is incumbent upon the deterring state to examine international law applicable to cyber operations and carefully craft a signal and follow-through action that does not run afoul of international law. With that said, the use of loud cyber weapons may actually help states provide more clarity to the international community on their position regarding the law governing cyber operations, which is currently being defined and refined by academics.[49]

Third, given the nature of cyber weapons (they suffer from being rendered obsolete over time and can rarely be used after an actor learns of their vulnerability), there is a significant chance that using loud cyber weapons could compromise a nation's cache of cyber weapons. Furthermore, considering the various disparate agencies within a government that operate in the cyber domain and the somewhat finite availability of cyber weapons, use of loud cyber weapons could cause internal conflicts and degrade some operations. Therefore, if loud cyber weapons are employed, a deterring state must carefully consider these practical complications.[50]

Fourth, use of loud cyber weapons may create problems of misperception and escalation. For misperception, the clarity of the state's message and, ironically, its capacity to authenticate against "false flag" operations will largely control the potential for misperception. Understandably, however, this is not fool-proof. Therefore, a deterring state must be prepared for potential misperception and accept an enhanced element of transparency for their loud cyber operations. For escalation, it is possible for cyber weapons to aggravate matters; two nations may go back-and-forth, increasing tensions rather than resolving them. This is an issue that is not unique to loud cyber weapons. Any signal or follow-through action can escalate matters. Therefore, it is up to the deterring state to consider this potential consequence and factor that into their decision.

CONCLUSION

A necessary component to any deterrence strategy is communication; it allows the adversary to better estimate costs, preparing the way for a more accurate decision calculus. Unfortunately, finding a cyber equivalent for deterrence communication has been somewhat illusory. Nevertheless, the key to communicating potential costs in the cyber domain is not groundbreaking; nations need only look to their traditional methods from other domains (i.e., signaling and follow-through). What is unique, on the other hand, is the suggested solution—loud cyber weapons. Upon closer examination of loud cyber weapons, there is support for their use in the characteristics of traditional signaling and response actions.

While this paper argues for use of loud cyber operations, there are many other concerns that must be addressed prior to their employment. For example, what actions would generate a response? What effects would be employed?

[49] Michael N. Schmitt, ed., *Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations* (Cambridge, UK: Cambridge University Press, 2017).

[50] For a potential solution, see Timothy M. Goines, "Overcoming the Cyber Weapons Paradox," *Strategic Studies Quarterly* Vol. 11, No. 4 (Winter 2017): 86-111.

How should a deterring state better incorporate loud cyber weapons into a unified deterrence posture? These concerns should be considered and discussed.

Regardless, the proposal here represents a viable solution to lack of communication within the cyber domain. In short, loud cyber weapons provide nations with a useful tool for deterrence in the cyber domain to effectively communicate potential costs of a challenger's action, thereby affecting the decision calculus of adversaries and increasing the likelihood of success.

Building Beyond Samba and Soccer: Why Brazil Ventured a Nuclear Program

Saint-Clair Lima da Silva

Contrary to conventional wisdom on Brazil as a case of nuclear proliferation, archival evidence indicates that, rather than geopolitical rivalry with Argentina, enduring desire for national autonomy—honor more than sword or shield—drove Brazil during the 1980s to master its own uranium enrichment cycle.

In 1987, the President of Brazil officially announced Brazilian mastery of the uranium enrichment cycle, unleashing a wide-ranging fear that the newly acquired capacity would be tied to construction of a nuclear bomb.[1]

Although this unsettling prospect never materialized, the Brazilian nuclear program remains steeped in controversy and engages different theories for why the Brazilian government started it in the first place. Explanations such as "extreme megalomania to create the bomb"[2] or "to serve the interests of German private capital, which provided technology and equipment for the program,"[3] seem to be, to say the least, precipitate. Most of the debate has been grounded on speculations rather than on documented evidence. Recently, reams of documentation on nuclear statecraft have become available through declassification. These documents shed light on a wide range of subjects about the international politics of nuclear weapons, and they have the potential to reshape the ways that scholars think about important aspects of the nuclear age.[4]

This study focuses on the reasons that led Brazil, "a peaceful country by tradition and belief," to pursue nuclear technology, a costly endeavor heavily condemned within the international community. A longstanding assumption in nuclear proliferation discussions is that states seek to develop nuclear weapons when they face a significant military threat to their security that cannot be met through alternative means; if they do not suffer such threats, they will voluntarily remain non-nuclear states[5].

Students familiar with South American history might argue that this concept could, *de facto*, explain the Brazilian case. Brazil and Argentina, the most influential countries in South America, have been rivals since before their independence from Spain and Portugal was achieved. During negotiations for the Latin American Nuclear Weapons-Free Zone treaty (NWFZ) between 1964 and 1967, the two countries sought to preserve the right to conduct "Peaceful Nuclear Explosions"

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[2] *Revista Veja*, "Sarney Arma Seu Ciclo," September 1987, *Arquivo Veja, 992*, accessed December 07, 2014, http://veja.abril.com.br/arquivo_veja/capa_09091987.shtml.

[3] Rafael Vaz da Motta Brandão, "O Negócio do Século: O Acordo de Cooperação Nuclear Brasil-Alemanha" (Master Diss., Universidade Federal Fluminense, 2002).

[4] This paper relies on extensive use of primary sources made available by the Nuclear Proliferation International History Project in the Woodrow Wilson International Center in collaboration with Fundação Getúlio Vargas. I would like to record my special obligation to those institutions.

[5] Scott Sagan, "Why Do States Build Nuclear Weapons? Three Models in Search of a Bomb," *International Security 21*, no. 3 (1997): 54-86, p. 54.

(PNEs), which they argued could augment their security, sovereignty, socioeconomic prosperity, and prestige.
Our research, however, challenges the traditional wisdom asserting that Brazil attempted to develop nuclear weapons to face Argentina in an arms race. The key independent variable in the Brazilian decision to start a nuclear program does not rest on a security dilemma. It builds on a rooted conception of Brazil's national identity: specifically, its value on autonomy.

Autonomy is a fundamental concept for Brazilian foreign policy, but one not generally well understood in the North Atlantic World. The construction of a nuclear bomb was never a primary goal for Brazil. The program materialized Brazilian long-lasting aspiration for technological independence and, ultimately, state independence.

The Brazilian government initiated the secret "Autonomous Program," also known as the parallel program, in 1978, under American pressure for its attempt to develop nuclear technology. This essay builds the theoretical argument for why the Autonomous Program, rather than responding to the supposed compelling security threat from Argentina, addressed a broader, national, sovereign desire for greater autonomy in the direction of Brazil's foreign affairs.

WHY STATES BECOME NUCLEAR

The predominant tendency in studying nuclear proliferation is to assume that external threats to state security drive efforts to reach the nuclear threshold.[6] This concept is largely based on the Neorealist theory of International Relations, in which states exist within an anarchical system and must, therefore, rely on self-help to protect their sovereignty and national security.

Without rejecting this claim, Scott Sagan, in his work "Why Do States Build Nuclear Weapons?" provided a more comprehensive approach to the study of nuclear proliferation. Sagan suggested three models to assess the reasons motivating the search for a nuclear bomb. He held that the actions of a state in the international system should be assessed not only through the security lens but also by a set of domestic and cognitive variables, such as state institutions, the effect of societal decision-makers on foreign policy, and perceptions (or misperceptions) of systemic pressures.[7]

A distinct approach to the subject was developed by Victor Cha when analyzing North Korea's nuclear endeavor.[8] Cha used metaphors to represent the reasons behind the nuclearization of a state. His first image was the shield that would ensure against acts by the United States and others to crush the North Korean regime. Sword was the second symbol, representing aggressive and revisionist purposes. Cha's third metaphor was the badge, a symbol of prestige for an otherwise bankrupt regime.

The political scientist Jacques Haymans developed a compelling theory based on the notion that decisions to go or not to go nuclear reflect the psychology of the leaders who make them.[9] Haymans argued that big decisions are likely to stem from something

[6] Michael Barletta, "The Military Nuclear Program in Brazil," *Center for International Security and Arms Control* (August 1997), p. 2.
[7] Fareed Zakaria, "Realism and Domestic Politics: A Review Essay." *International Security* Vol. 17, No.1 (1992), p. 179.

[8] Victor D. Cha, "North Korea's Weapons of Mass Destruction: Badges, Shields, or Swords?" *Political Science Quarterly*, Vol. 117, No. 2 (Summer, 2002), p. 211.

[9] Jacques E. C. Hymans, *The Psychology of Nuclear Proliferation: Identity, Emotions and Foreign Policy*

other than a straightforward material cost-benefit calculation. In the case of the decision to go nuclear, which is located in the arena of high international politics, the relevant factors are nevertheless found in the leader's national identity conception. In his words, "there are discrete decisionmaking pathways leading from different national identity conceptions, through emotions, to ultimate nuclear choices."

This research adopts Scott Sagan's framework to analyze the Brazilian case in that it provides distinct and well-defined models to explain why states engage in proliferation. Sagan's first approach is the traditional "security model," according to which states build nuclear weapons to increase national security against foreign threats, especially nuclear threats. The "domestic politics model" envisions nuclear weapons as political tools used to advance parochial domestic and bureaucratic interests. The third line of reasoning, the "norms model," considers the fact that weapons acquisition, or weapons development, provides an essential normative symbol of a state's modernity and identity.[10] It is precisely this model that provides the strongest explanation for Brazil's nuclear trajectory.

In the next pages, we analyze the contributions of each of these three models on the Brazilian impetus to achieve nuclear capability.

THE BRAZILIAN NUCLEAR PROGRAM IN HISTORY

Brazilian internal debates on nuclear energy started in 1945 when the country was supplying atomic minerals for the Manhattan Project.[11] By that time, deliberations concerned whether to utilize and preserve the country's own natural resources to produce atomic energy.[12]

In 1947, the Brazilian National Security Council, comprising the president and the most important ministries in his cabinet, held a meeting to discuss a proposal made by the United States for the creation of an international acquisitions institution. The new organization would have exclusive rights for the acquisition of raw materials in the production of nuclear fuels using a quota system.

During this meeting, the primary concern of Brazilian officials was possible restrictions by outside authority of the country's minerals from its own soil for energy production. The discussion focused on a statement that would accept the American proposal while ensuring the use of raw minerals as an alternative source of energy for Brazil.

In its response, Brazil supported the creation of the international agency charged with the control of atomic minerals. Nevertheless, the reply stated that "because Brazil was poor in current fuels, such as coal, we believe that it should not relinquish the right to utilize its own raw material for peaceful purposes and under the control of the international agency,

(Cambridge: Cambridge University Press, 2006).

[10] Sagan 1997, 55.

[11] Brazil has known resources of 278,000 tons of uranium—5% of world total.

[12] Minutes (1), August 27, 1947, Brazilian National Security Council, Tenth Session, Brazilian Nuclear History, Nuclear Proliferation International History Project, Wilson Center.

after having supplied the quota assigned to it for world distribution."[13]

Several years later, Brazil acquired its first research reactor, thanks to a cooperation agreement signed with the United States under the program "Atoms for Peace." In the early 1950s, Brazilian activities in the nuclear sector were essentially confined to academic and theoretical studies on the nature of the materials. In 1964, beginning a pattern that would encompass almost all South America, a coup and permanent military government took control in Brazil. The military ruled the country until 1985, and the decision to develop indigenous nuclear technology materialized, earlier, in 1972. At that time, Brazil acquired a uranium power reactor from the United States, which supported its first nuclear power plant: *Angra I.*

The world oil crisis of 1973 advanced Brazilian nuclear plans and, in 1975, Brazil signed a nuclear cooperation agreement with West Germany. The agreement envisioned the construction of eight nuclear power plants along with full technology transfer related to the nuclear fuel cycle, and the design, engineering, and manufacturing of nuclear power plant components.

Although Brazil invested heavily to assemble an industrial structure and acquire technology required for the construction of nuclear power plants and to produce uranium concentrate, the 1970s witnessed renewed international concern against nuclear proliferation. India successfully tested its nuclear device (1974), and numerous developing countries such as Argentina, Iraq, Libya, Pakistan, South Korea, Taiwan, and Brazil made strides in the field of nuclear technology.[14] In response, U.S. President Jimmy Carter, encouraged by the American Congress, made nuclear non-proliferation a top policy priority early in his administration. Even before entering office, in November 1976, Carter gave a speech that set the tone for a very assertive stance on non-proliferation, specifically, to block the sale of fuel reprocessing plants from France and West Germany, respectively, to Pakistan and Brazil.

Carter's vice-president, Walter Mondale, in an official visit to FRG President Helmut Schmidt, reiterated his administration's viewpoint and requested that the German-Brazilian agreement be suspended for review.[15] The demand triggered negative responses from both the Brazilian and German administrations and led to an immediate souring of US-Brazil relations. Expressing Brazilian government reaction, an official of the Ministry of Mines and Energy stated that the nuclear program would continue…

"at least to the extent it depends on us, against all internal and external pressures. The Germans know that we acted with seriousness in signing the agreement. We do not want the atomic bomb. We want to be independent, to construct our future, and to prevent (the effects of) any future world petroleum and energy crisis. Brazil will not give way."[16]

Constraints imposed by the United States, perceived as an external actor meddling in the

[13] Currently, coal accounts for less than 6% of Brazil's total primary energy supply. The country imports 50% of the coal consumed. Minutes (1) 1947.

[14] Dani Nedal, "US Diplomatic Efforts Stalled Brazil's Nuclear Program in 1970," *Nuclear Proliferation International History Project*, Wilson Center (Jul 2012), https://www.wilsoncenter.org/publication/us-diplomatic-efforts-stalled-brazils-nuclear-program-1970s.

[15] Ibid. FRG stood for Federal Republic of Germany (West Germany).

[16] Cable (1), Nov. 19, 1976, US Embassy in Brazil, "Brazilian Public Reaction to US Nuclear Policies," History and Public Policy Program Digital Archive, National Archives and Records Administration.

country's sovereignty, had great bearing on technical and political aspects of Brazil's nuclear program. The construction of *Angra I* by the American company Westinghouse was severely delayed, as were the *Angra II* and *Angra III* plants, also specified in the initial agreement. U.S. opposition to the transfer of German ultracentrifugation technology led to a German-Brazilian joint investment focusing on the development of enrichment by jet nozzle, which ultimately proved to be technically and economically impractical. Most important were the safeguards placed in the arrangement between Brazil and Germany and the subsequent tripartite agreement with the IAEA. Together, they imposed severe limits to the range of research and experimentation that could be performed in Brazil with materials, technology, and facilities associated with the German agreement.

The development of nuclear technology through cooperative agreements with other countries could not meet Brazil's aspirations. Given the constraints imposed by major powers and international regimes, if the country wanted to make real progress on enrichment technology, the argument went, it would have to work covertly and by cooperating with other countries on the margins of nuclear regimes. The rationale led to the creation, in 1978, of the Autonomous Nuclear Program, also known as the parallel program, free of safeguards and supposed to develop Brazil's indigenous enrichment process.

Military and civilian institutions were secretly assigned specific pieces of the nuclear project. The strategy was based on an association between the technical areas of the Navy, Army, Air Force and the National Nuclear Energy Commission (CNEN), supervised by the General Secretariat of the National Security Council. Several projects were assigned to the participating institutions.[17] The Air Force was responsible for developing the technology of uranium enrichment by laser. The Army would develop the technology of nuclear-pure graphite, with the objective of manufacturing moderators for natural uranium reactors. CNEN was assigned a variety of projects, ranging from the production of uranium compounds (natural and enriched), fuel reprocessing for the production of plutonium, and the preparation of metallic uranium and its applications.

Ultimately, two projects assigned to the Navy stood out: *Project Cyclone*, aimed at uranium enrichment through the process of ultracentrifugation, and *Remo*, which focused on the development of naval propulsion technology to equip nuclear submarines.[18] According to the report of a former Minister of the Navy, the construction of the first ultracentrifuge was completed in December 1981 through the work of seven engineers under the leadership of a Navy officer who had been studying nuclear energy in the United States from 1975 to 1978.[19] The minister explained that "among the technicians who worked on its development, there was a group dedicated exclusively to the nationalization of components, since they could not be purchased abroad, as a result of external pressures contrary to our project."[20]

[17] Memorandum (1), Danilo Venturini to João Baptista de Oliveira Figueiredo, February 21, 1985, Secretary-General of the National Security Council, Autonomous Projects in the Nuclear Field, Brazilian Nuclear History, Nuclear Proliferation International History Project, Wilson Center.

[18] Memorandum (1) 1985.

[19] Then Captain Othon Luis Pinheiro da Silva.

[20] Brasil, Congresso Nacional, 1990, Relatório Final Da Comissão Parlamentar Mista De Inquérito Destinada A Apurar O Programa Autônomo De Energia Nuclear. Brasília: Senado Federal, 8, http://www2.senado.leg.br/bdsf/item/id/194598.

In September 1982, an isotopic uranium enrichment experience was successful, employing an entirely indigenous ultracentrifuge. In September 1984 the operation of the first mini-cascade of ultracentrifuges was initiated. Three years later, after the first centrifuges "accumulated thousands of hours of operation," José Sarney, the first civilian president after the military dictatorship, officially announced Brazilian mastery of the uranium enrichment cycle. In his announcement, Sarney highlighted "a fact of greater transcendence in the scientific history of the country."[21]

Worth noting, the announcement was not followed by the development of a nuclear bomb or attempts to develop or acquire vehicles to deliver a nuclear warhead (strategic bombers, intercontinental ballistic missiles, or submarine-launched ballistic missiles). Presumably, the country took the opposite direction because in 1988 Brazil promulgated a new constitution where it openly renounced the development of nuclear weapons.

In 1991, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) was set up.[22] Conversations led to the Quadripartite Agreement among Brazil, Argentina, ABACC and the IAEA, which entered into force in 1994 with full-scope safeguards under IAEA auspices including naval facilities.

Brazil became a member of the Nuclear Suppliers Group in 1996. The country traditionally opposed the Nuclear Non-Proliferation Treaty (NPT), arguing that it did not exempt peaceful nuclear explosions for civil engineering and that it addressed non-proliferation rather than the more fundamental question of nuclear disarmament.[23] It was only in 1998 that Brazil signed the NPT as a non-nuclear-weapon state under President Fernando Henrique Cardoso.[24]

SECURITY MODEL: ARMS RACE AGAINST ARGENTINA?

History provides compelling arguments favoring the security model as an explanation for national nuclear quests. Britain and France are seen to have built nuclear weapons due to the growing Soviet military threat. Also contributing to their initiatives was reduction in credibility of the U.S. nuclear guarantee to NATO allies, once the Soviet Union was able to threaten retaliation against the United States. China developed the bomb because Beijing was threatened with possible nuclear attack by the United States at the end of the Korean War and again during the Taiwan Strait crises in the mid-1950s. After China developed the bomb in 1964, India, which had just fought a war with China in 1962, was bound to follow suit and detonated what was called a "Peaceful Nuclear Explosion" (PNE) in May 1974. After the Indian explosion, however, the nascent Pakistani weapons program had to move forward according to the security dilemma: facing a recently hostile neighbor with both nuclear weapons and conventional military superiority, the government in

[21] José Sarney, "Ao Anunciar a Vitória do Programa Autônomo de Tecnologia Nuclear" (speech, Brasilia, DF, September 04, 1987), Casa Civil da Presidência da República do Brasil, http://www.biblioteca.presidencia.gov.br/ex-presidentes/jose-sarney/discursos/1987/76.pdf

[22] In the same year, Brazilian president Fernando Collor de Melo finalized the "Parallel Program", as an attempt to reinsert Brazil in the international system.

[23] Nevertheless, the country signed the Tlatelolco Treaty on the regional prohibition of nuclear weapons in 1967.

[24] Tlatelolco refers to the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean.

Islamabad sought to produce a nuclear weapon as quickly as possible.[25]

Due to the enormous destructive power of a nuclear device, any state that seeks to maintain its national security must balance against a rival state that develops nuclear capacity by gaining access to a nuclear deterrent itself. Strong states can adopt the costly but self-sufficient policy of developing their own nuclear weapons. Weak states can join a balancing alliance with a nuclear power, exploiting a promise of nuclear retaliation by that ally as a means of extended deterrence. For developing countries, acquiring a nuclear ally may be the only option available.[26]

Karsten Frey has argued that, although security-centered explanations have deficiencies, it is reasonable to assume that the desire for self-preservation figures prominently in the preference system of any state with regard to its nuclear choice. This desire, however, is guided less by relative power distribution than by security perceptions that originate from nuclear weapons' symbolic stature as the ultimate weapons and the embodiment of the human fantasy of invulnerability. In other words, from the viewpoint of the "proliferant," nuclear weapons figure as totems of power, which increase the perception of security. Notably, the motivation for doing so is the actor's abstract sentiment of fear, not necessarily existing danger.[27] This concept is critical when we assess the Brazilian security environment during the period when the country pursued nuclear capability.

Brazil peacefully settled all of its unresolved territorial disputes with neighboring countries early in the twentieth century. As a result, for over a hundred years the country has considered itself "geopolitically satisfied," with state-building progressing through diplomatic negotiation rather than engagement in military disputes.[28]

Interstate relations within South America have been remarkably placid, to a degree unmatched in most other regions of the world. Regardless of enduring bilateral rivalries and several militarized interstate crises, countries in South America in general paradoxically avoided large-scale, intra-regional war. In two hundred years (1816-2016), they waged four major wars in the nineteenth century, one in the first half of the twentieth century, and none since the end of the Chaco War between Bolivia and Paraguay in 1935.[29]

Miguel Angel Centeno attributes this relative scarcity of international wars in Latin America to the absence of a strong centralizing state authority during a long period of the region's history.[30] Because Latin American states developed so late, in the late nineteenth century, there were simply too many conflicts occurring within each state for these countries to have much energy to fight one another. Centeno argues that the internal struggles, the never-resolved social and economic divisions, and lastly, the inertia

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[25] Sagan 1997, 59.
[26] Sagan 1997, 57.
[27] Karsten Frey, "Nuclear Weapon as Symbols: The Role of Norms in Nuclear Policy Making," *IBEI Working Papers 3* (2006), p. 11. Frey expresses similar concepts as Robert Jervis in his classic *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1978).
[28] Maria Regina Soares de Lima and Mônica Hirst, "Brazil as an Intermediate State and Regional Power: Action, Choice and Responsibilities," *International Affairs* Vol. 82, No. 1 (Jan 2006): 21-40, p. 22.
[29] Felix E. Martín, "The Militarist Peace in South America, 1935-2003" (paper prepared for delivery at the 2004 Annual Meeting of the American Political Science Association, Washington, DC, Sep. 2004), p. 2.
[30] Miguel Angel Centeno, *Blood and Debt: War and the Nation-State in Latin America* (University Park, PA: Penn State University Press), 2002.

of peace "made it practically unimaginable to break with the geopolitical status quo in Latin America."[31]

The most troubling rivalry in South America nevertheless pitted Argentina and Brazil. Beginning before they achieved independence from Spain and Portugal, the rivalry heated up in the nineteenth century when Hispanic nations opposed Brazil's attempts to maintain a presence in the area of Rio de la Plata. Countries engaged in repeated armed clashes, the most important being the Cisplatine War (1825-28) between Argentina and Brazil. Even after most of the border conflicts were settled, the rivalry between these countries persisted.[32]

By 1979, however, the two countries achieved an important diplomatic rapprochement, concluding the "Acordo Tripartite" among Brazil, Paraguay, and Argentina over the construction of a hydroelectric dam on the Paraná River located on the border between Brazil and Paraguay.[33] The agreement constituted a key factor in stabilizing relations in the region and is considered the gold standard with respect to international politics and diplomacy.[34] After harmonization between the most prominent actors of the continent, regional integration continued apace in South America: Brazil and Argentina engaged in fruitful cooperation, and this appeared to lay the foundation for South American integration.

As early as 1967, civilian bureaucracies engaged in nuclear research both in Argentina and Brazil were already seeking "a direct exchange of ideas between Brazilian and Argentine technicians to establish broader contact and cooperation between the two countries in the field of nuclear energy."[35] Beginning in 1976, Brazil bore the brunt of American pressure to change its nuclear program with the Federal Republic of Germany. Remarkably, to balance the pressure from Washington, Brazil found support only from Argentina.[36] Collaboration between the two countries on nuclear subjects was reinforced from 1980 as a consequence of signing cooperation agreements and by means of diplomatic events such as the 1988 visit of Argentine President Alfonsín to the isotopic enrichment plant in Iperó.

In many cases, Buenos Aires and Brasilia coordinated their policies concerning international non-proliferation regimes.[37] Both governments decided to impose limits on their respective nuclear programs and to rewrite their doctrines of national security, transforming the neighbor into a partner. They created formal mechanisms for generating mutual trust, as was the case of the "cross-check," method by which inspectors

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[31] Ibid.

[32] H. Jon Rosenbaum, "Argentine-Brazilian Relations: A Critical Juncture," *The World Today* Vol. 29, No. 12 (Dec. 1973): 537-538.

[33] Argentina was concerned that, in the event of a conflict, Brazil could open the floodgates, raising the water level in the Río de la Plata and consequently flooding the capital city of Buenos Aires.

[34] Tullo Vigevani, Gustavo Favaron, Haroldo Ramanzini Júnior and Rodrigo Correia, "O Papel da Integração Regional para o Brasil: Universalismo, Soberania e Percepção das Elites," *Revista Brasileira de Política Internacional* Vol. 51, No. 1 (2008): 477.

[35] Letter (1), Director of the Argentinian National Atomic Energy Commission (CNEA) to Argentinian Foreign Ministry, December 29, 1967, Possible agreement for nuclear cooperation between Brazil and Argentina, Brazilian Nuclear History, Nuclear Proliferation International History Project, Wilson Center.

[36] Memorandum (2), Héctor A. Subiza, Head of the Latin American Department of the Argentinian Foreign Ministry to the General Political Directorate, August 23, 1979, Cooperation with Brazil in the Nuclear Field, Brazilian Nuclear History, Nuclear Proliferation International History Project, Wilson Center.

[37] Carlos Patti, "O Programa Nuclear Brasileiro entre Passado e Futuro," *Boletim Meridiano* Vol. 47, No. 140 (2013), p. 54.

from a country evaluated nuclear facilities of the other.[38]

In 1983, Argentina achieved uranium enrichment by gaseous diffusion. A letter was sent from Argentine President Reynaldo Bignone to notify Brazil of the achievement before it was announced publicly. After reiterating the full and steadfast adherence to the policy of non-proliferation of nuclear weapons, the letter described Argentina's achievement as having "important regional projections, since it constituted a significant step toward Latin American self-sufficiency in a highly transcendental area."[39]

In his response, Brazilian President João Figueiredo congratulated Argentina and stated that the two countries "have already developed excellent cooperation on nuclear matters, and will continue to work in this manner for mutual benefit and the economic and social development of the entire Latin American community."[40] Appropriately, President Sarney subsequently sent an emissary to Argentina to inform President Raúl Alfonsín in 1987 that Brazil had obtained uranium enrichment technology. The political gesture was much appreciated in Buenos Aires.[41]

Even so, a contemporary report by the Central Intelligence Agency of the United States assumed that the announcement in late 1983 of Argentine enrichment capability greatly spurred the Brazilians.[42] It argued that some military officers believed that Buenos Aires had built, or could build, nuclear weapons and that Argentina posed a potential military threat. In any case, the report also confirmed that relations between the countries were quite good.

If the two countries did not fully trust each other due to some inherent wariness, Brazil and Argentina were nevertheless positively engaged in settling their antagonism and in cooperating on nuclear issues. Their collaboration in nuclear policies is perceived by some scholars—along with the Itaipu Dam agreement—as a hallmark of disjunction from their traditional rivalry.[43]

In effect, Brazil and Argentina shared the view that nuclear capacity was a right of every sovereign state. Both countries perceived as a constraint great powers' exclusivity and exceptionalism on nuclear matters. During conversations between presidents Alfonsín and Figueiredo to prepare

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[38] Rodrigo Mallea, Matias Spektor, and Nicholas J. Wheeler, "Origens da Cooperação Nuclear: Uma História Oral Crítica entre Argentina e Brasil," transcripts from As Origens da Cooperação Nuclear entre o Brasil e a Argentina Conference (Rio de Janeiro, 21-23 March 2012).

[39] Letter (2), Argentinian President Bignone to Brazilian President Figueiredo, November 19, 1983, Folha de São Paulo, History and Public Policy Program Digital Archive, 4.

[40] Letter (3), Brazilian President Figueiredo to Argentinian President Bignone, November 19, 1983, Brazilian Nuclear History, Nuclear Proliferation International History Project, Wilson Center.

[41] Rodrigo Mallea, "Resolving the Dilemma of Nuclear Mistrust: From Foz do Iguacu to the Constitution of ABACC (1985-1991)", Nuclear Proliferation International History Project, Wilson Center (Aug 15, 2013), https://www.wilsoncenter.org/publication/resolving-the-dilemma-nuclear-mistrust-foz-do-iguacu-to-the-constitution-abacc-1985-1991.

[42] Estimate, Director of Central Intelligence, October 21, 1983, "Brazil's Changing Nuclear Goals: Motives and Constraints", Freedom of Information Act Electronic Reading Room, Central Intelligence Agency, http://www.foia.cia.gov/sites/default/files/document_conversions/89801/DOC_0000787519.pdf.

[43] See Thomaz Guedes da Costa, "La Percepcion de Amenazas Desde El Punto de Vista de Los Militares Brasileros en Las Decadas del 70 y 80" (1993), and Everton Vieira Vargas, "Átomos na Integração: a Aproximação Brasil-Argentina no Campo Nuclear e a Construção do Mercosul," *Revista Brasileira de Política Internacional* Vol. 40, No. 1 (1997).

a joint declaration on the renunciation of nuclear explosives, there were clear efforts to undermine any possible security dilemma or arms race:

"I consider it of great importance for each of our countries, for their bilateral relationship and their image in front of the international community in general, that both could dissipate, in Latin America, in the USA and Europe, any idea of rivalry or ulterior motives in our respective nuclear programs, as well as not creating an opening through which someone could try to play us against one another."[44]

Argentinians considered "of great importance to maintain a relationship of cooperation and confidence with Brazil in the area, due to the benefits that this relationship could signify for both countries in terms of resistance to the nuclear regimes as envisioned by the great powers."[45] The belief that it was necessary to avoid great powers' constraints in nuclear matters repeatedly echoed in Brazilian declarations.

The joint action of Brasilia and Buenos Aires was decisive in negotiations of the Treaty for the Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco), between 1964 and 1967. In 1968, both countries refused to ratify the Treaty on the Non-proliferation of Nuclear Weapons (NPT) because they considered it discriminatory. Coordinated action of the two states in the international system sought to keep open supply routes of materials and nuclear technology and to legitimize their policies and projects in the nuclear field.[46]

In his seminal article, Sagan saw the Brazilian case as a perfect illustration of the security model. He judged that protracted rivalry between the two major South American countries motivated the search for nuclear power as a pathway to nuclear weapons. Sagan considered their refusal to complete the necessary steps to join the Latin American nuclear weapons-free zone as a consequence of their rivalry.[47]

Contrary to Sagan's assumption in this case, archival evidence attests that Brazil and Argentina positively engaged in bilateral cooperation on nuclear issues. They understood that their best strategy was to stick together against pressures of the non-proliferation regime, preserving their autonomy vis-à-vis the international system.[48] Brazilian resistance to join the NWFZ stemmed from its belief that the treaty should only come into effect upon unanimous adherence by Latin American nations, extra-regional nations with territories in Latin America, and the world's nuclear powers. From Brazil's perspective, one rogue nation could endanger Latin America's very existence.[49]

Certainly, hawkish statements were also part of the Brazilian discussions concerning the development of nuclear capacity. In 1967, during a session of the National Security Council, the Minister of Industry and Commerce stated: "to say that Brazil will not

[44] Memorandum (4), Brazilian Ambassador Roberto Abdenur to Minister Saraiva Guerreiro, January 10, 1985, Brazil-Argentina. Nuclear energy, Brazilian Nuclear History, Nuclear Proliferation International History Project, Wilson Center, http://digitalarchive.wilsoncenter.org/document/116862.

[45] Memorandum (4), 1985.

[46] Vargas 1997, 44.

[47] Sagan 1997, 61.

[48] This argument is also present in Togzhan Kassenova, *Brazil's Nuclear Kaleidoscope* (Washington, DC: Carnegie Endowment for International Peace, 2014), 22.

49 Ryan Alexander Musto, "Latin America's Nuclear Weapon Free Zone: Fifty Years Later," Wilson Center, Sources and Methods (14 February 2017), https://www.wilsoncenter.org/Tlatelolco-at-50.

make arms with nuclear energy someday is an illusion. It will not be in our days, we may not wish it, but it may become an imperative of national security."[50] The statement is a clear reference to the use of the nuclear program to develop nuclear weapons.[51]

But, as Matias Spektor accurately points out in his research article, although some of the ministers present at the gathering made "references to the possibility that Brazil might use nuclear power for national security purposes as well," this possibility was left unspecified. It is also significant that there was no mention of Argentina or any other state as a threat against which Brazil might have to guard itself.[52] Brazilian leadership saw the nuclear program mainly as a method to achieve autonomy, not deterrence.

In 1990, five years after democracy had been reinstated in Brazil, a Joint Parliamentary Committee of Inquiry was created to investigate the "autonomous nuclear program." During one of the sessions, the former minister of the Navy, Admiral Maximiano da Fonseca, supported the argument that the parallel program was kept secret "not to hide from public opinion," but to protect the project and the Brazilian government from the tremendous international opposition. He cited several examples of equipment sales and bans on technology transfer in this area. For him, "the major powers assume that only they, exclusively they, have the right to produce nuclear artifacts." He argued that United States pressure was very strong: "Mainly American. They lead all this. The (pressure) of them is terrible. It was terrible at that time."[53]

Although security explanations convey much of the conventional wisdom about Brazil's nuclear program, the first presumption is that its foremost objective was to build a nuclear weapon aimed at balancing Argentinian power. We cannot rule out this factor as a contributor to the Brazilian enterprise, but it was not its main objective, even when the program changed to a secret character. For example, no simultaneous development of a nuclear delivery system—neither strategic bombers nor a ballistic missile program—accompanied the program.[54]

Extensive documentation shows that the Brazil-Argentina rivalry greatly *decreased* by the time Brazil proceeded with its secret nuclear program. Ultimately, the two countries joined in diplomatic efforts to face the pressure of international non-proliferation policies. In reality, today, their nuclear programs are considered a milestone in bringing the two countries together toward a stable, peaceful relationship.

DOMESTIC FACTORS INFLUENCING BRAZIL'S DECISION

Whether or not the acquisition of nuclear weapons serves the national interest of a state, it is likely to serve parochial

[50] Minutes (2), October 04, 1967, Brazilian National Security Council, Fortieth Session, Brazilian Nuclear History, Nuclear Proliferation International History Project, Wilson Center, http://digitalarchive.wilsoncenter.org/document/116914. In 2009, vice president and former minister of defense, José Alencar, told Brazilian newspaper *O Estado de São Paulo* that nuclear weapons could provide Brazil with a deterrent power and result in more "respectability" from the international community.

[51] Within the documents analyzed, this is the main reference to nuclear weapons.

[52] Mathias Spektor, "The Evolution of Brazil's Nuclear Intentions," *The Nonproliferation Review*, Vol. 23, No. 5-6 (2016), p. 635-652.

[53] Brasil, 1990.

[54] See Yogesh Joshi, "The Imagined Arsenal. India's Nuclear Decision-Making, 1973–76," in the Nuclear Proliferation International History Project, Wilson Center.

bureaucratic or political interests of at least some individual actors within the state. Sagan's second model of nuclear proliferation focused on domestic actors that encourage governments to pursue a nuclear bomb. Actors interested in the acquisition of nuclear weapons commonly belong to the military, the military-industrial complex, the nuclear scientific establishment, and the political class. Frequently, the common interest of these actors leads to the formation of a coalition, a "strategic elite," which seeks administrative as well as communicative power.[55]

Sagan posited that when such actors form coalitions and are strong enough to control the government's decision-making process—either through their direct political power or indirectly through their control of information—nuclear weapons programs are likely to thrive. Brazil's first real strides in the field occurred under the military regime that ruled from 1964 to 1985. In 1967, the government of General Artur da Costa e Silva drew up a detailed plan for the full development of nuclear energy and, simultaneously, adopted a policy of firm opposition to the Non-Proliferation Treaty (NPT) while concurring, albeit with reservations, on the NWFZ in Latin America.[56]

Naturally, military roots had—and still have—an overwhelming influence on Brazil's nuclear program. Brazil is the only non-nuclear-weapon state in which the military leases uranium enrichment technology to the civilian nuclear program. When the autonomous program was created, all three branches of the Brazilian military were engaged in the nuclear effort. Moreover, the Navy's pursuit of uranium enrichment was the most determined and sustained effort of the entire parallel nuclear program. The Navy's nuclear-fuel-cycle commitment was largely driven by its ambition to build a nuclear-powered submarine. They implemented the initial stage of the fuel-cycle project at an impressive speed, working out of Brazil's Nuclear Energy Research Institute (IPEN, University of São Paulo). By 1981, the Navy built two centrifuges for uranium enrichment, and by 1984, it ran nine centrifuges at IPEN. The Air Force and the Army's projects eventually fizzled, but the Navy's program continued, unabated by changes in the Brazilian political landscape after 1985.[57]

Under civilian governments, the Navy program persisted, and its survival was never jeopardized, despite fluctuating funding levels. In the early 1990s, Brazil's second civilian president after the dictatorship, Fernando Collor de Mello, fully disclosed the parallel nuclear program and publicly condemned it. Notwithstanding stated objections, his appointment of Admiral Mario César Flores, one of the main supporters of the submarine program, as the minister of the Navy guaranteed enough funding for the program to survive.[58]

Whereas Brazil's domestic political situation and its regional environment underwent major transformations, the Navy's nuclear-fuel-cycle and nuclear submarine projects remained as constant elements of Brazil's nuclear landscape. This constancy was possible because, even after the military government transitioned out of power and the first civilian president took office (1985), the military retained significant authority, and managed to withstand top-down political pressures.

[55] Frey 2006, 14.
[56] Patti 2013, 51.
[57] Patti 2013, 53.
[58] Kassenova 2014, 27.

Furthermore, the Navy's aspiration to develop a nuclear-powered submarine was well established. In 1967, during the National Security Council meeting that discussed the guidelines for Brazilian nuclear policy in President Costa e Silva's government (1967-1969), the minister of the Navy emphasized the importance of nuclear energy since it could be used to propel a nuclear vessel. He stressed that the "Navy has been dealing with the question of nuclear energy because it considers that indispensable."[59]

Scott Sagan correctly pointed out that the Brazilian Nuclear program served interests of the atomic industry bureaucrats and the military.[60] However, contrary to what Sagan asserted, the military, in fact, managed to maintain the program despite new civilian regimes. The role of the military services, particularly of the Brazilian Navy, was fundamental to the nuclear program. Although construction of a nuclear bomb was not a primary goal for Brazil, the military understood (and expressed) that, once nuclear capacity was achieved, only "a political decision" would be necessary to develop nuclear weapons.[61]

THE NORMS MODEL: NATIONAL IDENTITY AS THE MOST IMPORTANT FACTOR

"It is necessary that Brazil make it clear to the United States and the world the difference between antagonizing confrontation and confrontation for autonomy. The type of world that Brazil wants is multipolar, in which the South American system will have autonomy vis-à-vis the American system." [62]

Helio Jaguaribe, Brazilian sociologist, political scientist, and writer

Sagan's third model focuses on norms concerning nuclear capacity, seeing nuclear decisions as serving important symbolic functions—both shaping and reflecting a state's identity. According to this perspective, state behavior is determined not by leaders' cold calculations about national security interests or their parochial bureaucratic benefits, but rather by deeper norms and shared beliefs about what actions a state understands as legitimate and appropriate in international relations.

Helio Jaguaribe's quote opening this section is one among countless declarations that reflects the paramount significance a particular image has to Brazilian intellectuals, military officers, political leaders, and in fact to all Brazilian society: the concept of an autonomous state. Brazilian political scientist José Flávio Saraiva Sobrinho comprehensively traced the concept of autonomy in Brazil's foreign policy since the country's independence from Portugal in 1822.[63] In certain historical periods, like the early 1960s, the concept of decision autonomy became jargon in Brazilian foreign policy. The idea penetrated various social and political layers in society, from the cabinets in parliament to the streets. It appeared in the vaunted "Independent Foreign Policy," which marked the governments of

[59] Minutes (1) 1967.
[60] Sagan 1997, 71.
[61] Estimate 1983.
[62] Quoted by Monica Hirst in "As Relações Brasil-Estados Unidos Desde Uma Perspectiva Multidimensional: Evolução Contemporânea, Complexidades Atuais e Perspectivas Para o Século XXI" (Ph.D. diss., Universidade Federal do Rio Grande do Sul, 2011).
[63] José Sombra Saraiva Sobrinho, "Autonomia na Inserção Internacional do Brasil: Um Caminho Histórico Próprio," *Contexto Interancional* Vol. 36, No. 1 (2014).

presidents Jânio Quadros and João Goulart (1961-1964).[64]

Interestingly, when Saraiva provided an example to illustrate the importance of autonomy to Brazil, he cited Admiral Álvaro Alberto Mota e Silva, who represented the country at the United Nations Atomic Energy Commission in 1947 and delineated the first proposal to establish a Brazilian nuclear program. According to Saraiva, Mota e Silva asserted Brazilian nuclear potential as a way to achieve autonomous scientific national progress.

Decision autonomy, ingrained in the "nature" of the country, did not change throughout democratic or authoritarian regimes. Appreciating the importance of this concept to the Brazilian nation is central to understanding that a key concern for the Brazilian military was possible interference of the major powers in Brazilian foreign policy. Constraints would be exerted, the argument goes, by controlling technological flows and armament transfers for the country. The concern boosted Brazilian determination to establish a national military industry. From the 1970s, Brazil's fixation on national autonomy supported efforts of nationalization for projects and components that would integrate supplies to the three services.[65] In the 1980s, Brazil addressed this aspect as not just a hypothesis, but a real factor emerging out of foreign pressure.

Autonomy as an element of Brazilian identity permeated numerous documents, meetings, and speeches concerning Brazil's nuclear program. It was present from the proposal to establish a nuclear endeavor in 1947, to the nationalistic speech announcing the success of independent uranium enrichment by President José Sarney in 1987. In his speech, Sarney lamented the difficulties and restrictions imposed by foreign states. He reaffirmed the "determined purpose of acquiring broad and unhindered access to the full extent of scientific knowledge and its practical applications." [66]
Karsten Frey argued that receptivity towards nuclear capacity is closely related to the idea of international prestige. A strong sense of sovereignty and the search for the "right place at the table" in the international arena is often translated into a pronounced sense of national prestige and status. States aim at status through the display of power, usually to increase it.[67]

Prestige, however, was *not* Brazil's foremost motivation in its search for nuclear capacity. Brazil's desire to influence international rules and regimes is better assessed under the concept of autonomy. A secret report of the General Secretariat of the National Security Council to the Brazilian President, wherein development of the "autonomous program" was discussed, illustrates this assertion:

"The right to use nuclear energy for peaceful purposes, to support our technological independence and as a perspective of progress for all of Latin America, constitutes a basic foundation of the National Nuclear Energy Policy." [68]

The report decried U.S. sanctions to the program that created "all sorts of obstacles, first of a technical nature and subsequently presenting overt political motives, with repercussions in the economic field."[69]

[64] José Sombra Saraiva Sobrinho, Política Externa Independente – PEI (2014), 10.
[65] Costa 1993, 206.
[66] Sarney 1987, 368.
[67] Frey 2006, 4.
[68] Memorandum (1) 1985.
[69] Memorandum (1) 1985.

Brazil was indeed eager to establish itself as independent and self-sufficient in the nuclear realm.[70] The demands for its rightful "place at the table," a persistent Brazilian phrasing, in the case of nuclear development related to autonomy rather than prestige. The premise of Brazil's stance on the global nuclear order was that the order itself was unfair, that it benefited nuclear-weapon states, and that it put undue pressure on countries that did not possess nuclear weapons. Nuclear justice and the fight against "double standards" were at the heart of Brazilian beliefs and nuclear rhetoric.[71]

When we assess the Brazilian nuclear program, oriented toward the fundamental importance of autonomy for Brazilian identity, we understand how the program managed to progress despite international sanctions, economic difficulties, a radical change in the political regime, and the expected technical challenges. Nuclear capacity reified achievement of autonomy, and autonomy was profoundly etched in Brazilian politics.

The military initiated the autonomous program when they were ruling the country. Nonetheless, security concerns were only contributing factors to the development of the nuclear enterprise. The military, particularly the Navy, embraced emotional and nationalistic conceptions of autonomy and carried these as a flag, defended in the same way that the military conceives any given assignment: as a "mission" on behalf of the nation.

CONCLUSION

This article has argued against the commonly held assumption that Brazil developed a secret nuclear program to balance against Argentina, a long-time opponent. When the country made its first nuclear steps, Brazil saw nuclear capacity as an alternative means for energy generation, and as an ambitious endeavor that would bring international prestige. After setbacks caused by pressures of the United States and international nuclear regimes, the country determinedly latched onto the project as if it represented the national flag. Ultimately, Brazil's autonomous nuclear program was a mechanism of resistance against the international system, seen as discriminatory and designed to restrict the country's inalienable right to noninterference in its internal affairs.

Despite the rivalry of Brazil and Argentina, their respective programs for developing nuclear capacity ultimately became the cornerstone for extensive cooperation between the South American powers. Brazil and Argentina articulated together their approaches to international regimes and responses to systemic pressures against their programs. Their nuclear organizations engaged in some degree of cooperation and this new dynamic of collaboration decidedly transformed South America as a whole, opening the way for freer trade and consolidation of democratic regimes.

Certainly, military control of the nuclear program greatly contributed to the resilience of the project. The autonomous program was initiated when the military governed the state, and the Navy vigorously protected its service interest in nuclear developments in order to implement a nuclear-powered submarine. However, once the military regime had been voted out in 1985, the democratic government did not undercut the program. When announcing that Brazil finally mastered the uranium enrichment cycle, the first civilian president after the dictatorship praised the fact

[70] Kassenova 2014, 3.

[71] Kassenova 2014, 5.

as an enormous achievement in the scientific history of the country.

Brazilian diplomatic initiatives habitually express the desire to forge a uniquely Brazilian way in becoming a global player. This compelling belief influenced many of the country's subsequent nuclear decisions. Fiery reactions came in response to constraints imposed by American nonproliferation sanctions that were perceived as aggression against "the right to utilize nuclear energy for peaceful purposes, as a primary factor of national development."[72] The sanctions—and it should be stressed they were not applied exclusively to Brazil—were taken as a restraint hampering Brazilian autonomy, which was a natural right strongly intertwined with the country's identity. The removal of impositions and perceived offenses by the United States almost certainly would have minimized the problem of strong emotional response—either humiliation or pride—and would likely have minimized the sense of "mission" that the Brazilian military ultimately embraced.

This archival research demonstrates how domestic and normative factors were decisive in sustaining Brazil's pursuit of nuclear capacity. The importance of autonomy to Brazilian identity can be observed in numerous reports and speeches. More recently, the Brazilian government issued an announcement stating that its first nuclear-powered attack submarine would start operations by 2021.[73] When inaugurating the facilities of the nuclear submarine, President Dilma Rousseff emphasized "the importance and pride we feel when we look there and see written, 'Made in Brazil'. The local content, the domestic content of what is produced here, shows the strength of the Brazilian capacity."[74]

Despite technological difficulties, pressures from the international nuclear regime, and a domestic change from military to democratic government, strong and commonly held values on Brazilian autonomy led the country to press forward its nuclear program. The main fuel boosting Brazil's determination to attain nuclear power was ingrained national fixation on autonomy.

This study should inspire further research on the motivations and purposes of nuclear programs that run against long-term goals of the widely subscribed Nuclear Nonproliferation Treaty (NPT). Today, the world witnesses resurgent and assertive nuclear programs across several regions. North Korea, for example, despite strong pressures from the international community and halts in testing, continues to hold onto its nuclear reactors and weapons labs.

If the primary motivation for North Korea's program were purely to increase national security against an external rival like South Korea in alliance with the United States, then various initiatives of goodwill should have led to abandonment of Pyongyang's nuclear weapon ambitions. So far, they have not.

In 2018, United States President Donald Trump declared that a Nuclear Deal with North Korea "would take years," a shift from

[72] Minutes (2), 1967.
[73] See Travis Stalcup, "What is Brazil up to With Its Nuclear Policy?" *Georgetown Journal of International Affairs* (Oct. 2012), and Paul D. Taylor, "Why Does Brazil Need Nuclear Submarines?" *U.S. Naval Institute* Vol. 135, No. 6 (Jun. 2009).
[74] Dilma Rousseff, "Cerimônia de Inauguração da Unidade de Fabricação de Estruturas Metálicas - UFEM" (speech, Itaguaí, RJ, March 01, 2013), Casa Civil da Presidência da República do Brasil, http://www2.planalto.gov.br/acompanhe-o-planalto/discursos/discursos-da-presidenta/discurso-da-presidenta-da-republica-dilma-rousseff-na-cerimonia-de-inauguracao-da-unidade-de-fabricacao-de-estruturas-metalicas-2013-ufem-itaguai-rj.

his 2017 posture which demanded, "Pyongyang has to disarm rapidly." [75] What other reasons may be contributing to—or determining—the resilience of North Korea's program? The Brazilian case indicates that the explanation for North Korea's long-standing nuclear program may not rest solely on security concerns.

[75] David Sanger, "North Korea Nuclear Deal Could Take 'Years', Trump Suggests," *The New York Times*, September 26, 2018, https://www.nytimes.com/2018/09/26/world/asia/trump-korea-nuclear-deal.html.

Arms Control and Deterrence in the Age of Cross-Domain Coercion

Damon Coletta

For deterrence, now, first seek arms control.

The old relationship linking deterrence, defense, and arms control served U.S. policy makers for decades during the Cold War.[1] It was manifest through the Spirit of Geneva (1955) and the Reykjavik Summit (1986). Much later, during the rise of cross-domain coercion and following Russia's annexation of Crimea, the same idea reemerged in NATO's Warsaw Communique (2016).[2]

In each case, strategic deterrence came first, ahead of credible conventional defense, and neither deterrence nor defense were to be in doubt before entering into arms control. President Ronald Reagan captured the core principle during ultimately successful Intermediate Range Nuclear Forces (INF) Treaty ratification debates, toward the end of the superpower rivalry, when the ambition of arms control proposals was climbing: "trust but verify." Verification would work, back then, and arms control would endure, if the United States were negotiating from strength.

By the time of Russia's hybrid war in Ukraine and other events compromising American interests in Europe, the South China Sea, and the Middle East, the old principle was fraying, showing its insufficiency. Even before the Warsaw Communique, adversaries found ways to work around U.S. material superiority in conventional defense or strategic deterrence, using cross-domain attacks to alter positions on the geopolitical chessboard without drawing a massive U.S. response.

Unlike the situation during the Cold War, deterring aggression below the nuclear threshold in the age of cross-domain coercion will more likely be accomplished by first creating more reasons to maintain cooperation with rising regional powers, reasons including technological benefits and strategic stability attainable through 21st century arms control.

Inability during the 20th century to close the case that deterrence and defense were assured handicapped the original bid for a grand bargain, the Baruch Plan for international control of nuclear arms after World War II. More recently, and less understandably, it undercut hopes that arms control in the form of cooperation on regional missile defense aimed at rogue actors could cement a new U.S.-Russian strategic partnership after 9/11.[3]

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[2] Goodby (2006); Mandelbaum and Talbot (1986/87); NATO, "Warsaw Communique" (August 3, 2016). As a sample of the large literature on deterrence, defense, and arms control, see Snyder (1961); Schelling and Halperin (1961); Carnesale and Haass (1987); Smoke (1993); Cimbala (2001); Morgan (2003); Shultz, Drell, and Goodby (2011); Steff (2016); and Kroenig (2018).

[3] The text of NSC 68, "Report to the National Security Council," April 12, 1950 has been uploaded by the Truman Presidential Library (https://www.trumanlibrary.org/whistlestop/study_collections/coldwar/documents/pdf/10-1.pdf); see the section on "International Control of Atomic Energy," pp. 40-43. Goodby and Morel (1993); Stent (2015). Censoring assumptions were applied to analysis of nuclear policy during the Cold War in Pelopidas (2016). Jennet Conant (2017) recounted how such premises, what would become standard postulates of

This latter invocation of an iron law requiring more deterrence before arms control proved particularly frustrating. So many of the world's contemporary security challenges—expansion of Chinese economic and military influence in the South China Sea; terrorist threats emanating from the Middle East; demand for reciprocal restraint in the face of climate change; increasing competition in space; and rising likelihood of states like North Korea and Iran trafficking in nuclear weapons—are amenable to U.S.-Russia cooperation. Yet, any attempt at resetting the relationship between the two largest nuclear powers is held hostage by a new breed of extended crises featuring cross-domain coercion. NATO remains anxious about local strength of its conventional defenses and the reliability of American extended deterrence when violence and ceasefire violations occur in Ukraine.[4] Russia feels insecure as NATO holds its door open for future accession by Georgia and Ukraine, as the United States and Russia both intervene in Syria, and as the United States spends billions on new interceptors for European missile defense and ground-based national defense.[5]

According to the Cold War principle, arms control always came last: no progress was possible without adequate preconditions for deterrence and defense. This axiom became a motor for dynamic tension and relaxation, crisis and détente. Today, in the age of hybrid war, without the immediacy of a nuclear showdown, common understanding of the proper relation between deterrence and arms control is obsolete; it mires protagonists in unproductive, ultimately dangerous, paralysis. Today, instrumental arms control, the kind that promotes coordination of defense postures toward strategic stability, rather ought to come first because it can set the stage for successful deterrence.

STRENGTHENING DETERRENCE NOW

To appreciate why the shift has occurred, including an abrupt change in the U.S. problem set from escalation management to frozen conflict between nuclear powers, it is helpful to turn attention toward the censoring assumptions underlying deterrence policy. Notably, the scientific-analytical definition of deterrence is not identical to the operational one used in defense policy *guidance* such as NATO's Strategic Concept, the U.S. National Security Strategy, or U.S. Air Force doctrine.[6] In *all* these instances, the doctrine is to win, to dominate, to control the adversary when necessary. Reflecting this optimistic policy guidance, operational deterrence is thought to have succeeded in the Cold War by threat of counteraction, preventing the Soviet Union from crossing the inner-Berlin border or exploiting the Fulda Gap in West Germany.[7] In this most crucial case, deterrence worked because the adversary was persuaded that costs of action would outweigh benefits.[8]

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deterrence, stifled the Baruch Plan in *Man of the Hour: James B. Conant, Warrior Scientist*, pp. 368-372.

[4] Adamsky (2018, pp. 164-168).

[5] NATO's Warsaw Communique trumpeted progress on deploying American-organized missile defense sites in Europe (paragraph 57).

[6] NATO, *Strategic Concept: Active Engagement, Modern Defense*, November 19, 2010, available at http://www.nato.int/cps/en/natohq/topics_82705.htm; White House, *National Security Strategy of the United States of America*, December 2017, available at https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905-2.pdf; United States Air Force, *Volume III: Command*, Annex 3-72 Nuclear Operations, available at https://www.doctrine.af.mil/dnv1vol3.htm.

[7] Mearsheimer (1983).

[8] This same maxim underpins a vast literature on 21st century deterrence, e.g., deterrence after the Cold War and deterrence after 9-11. Gray (2000); Payne (2001); Freedman (2004); Long (2008); Paul, Morgan, and

Given this positive framing, it is not surprising that deterrence as policy receives favorable mention in the U.S. National Security Strategy. Enormous military budgets are justified, though few forces are engaged, because an extensive posture is necessary to deter calamities across a variety of conflict domains at points around the globe. The military stands prepared to prevent attacks on the homeland, on allies in Europe or Asia, against soft targets in Iraq and Syria, on the seas, in space, or across cyber. When deterrence fails, the appropriate mix of nuclear, conventional, and special operations forces, in coordination with tools from the whole of government and coalition governments, must *defeat* whichever aggressors in aforesaid domains. Defense capability under deterrence as panacea is always badly needed. More is better since more forces buttress the deterrent: its capability, its communication to adversaries, and, most controversially, its credibility.[9]

Credibility is in the crosshairs, again today, because it is the one requirement that can soak up much of the presumed benefit of deterrence policy as an alternative to fighting. Deterrence, after all, should spare lives and treasure. It protects national interests by keeping opponents at bay without having to strike a mortal blow or slog through a wasting war of attrition. This was the hopeful premise underlying President Eisenhower's New Look: modest investment in nuclear weapons, for brandishing not launch, could contain Soviet aggression after costly conventional stalemates in Korea and Berlin, without having to match every Red Army division left in Europe or Communist-inspired insurgency in the developing world.

For such a threat to give adversaries pause, however, they had to believe that the United States would carry out the punishment once red lines were violated. While few may have doubted Eisenhower's resolve when the United States enjoyed superiority in nuclear capable bombers, by the end of his administration defense policy advisers were urging the President to expand defense spending in order to prevent the Soviets from acquiring overwhelming superiority in the balance of strategic forces.[10] While the actual budget increase would have to abide a new administration and a change of party in the White House, the core issue was clear enough to friend and foe: faced with naked Soviet aggression in Europe, Asia, or the Middle East, would an American president sacrifice New York to save Paris or any other allied city? Once both Cold War superpowers possessed hundreds, eventually thousands, of nuclear weapons, deterrence became a mutual affair. The United States could not launch a "disarming strike" without running the grave risk that the Soviets would survive long enough to launch a devastating salvo of their own.[11]

During contemporary crises that cut across multiple domains of conflict, it appears that the United States and rising regional powers are still mutually deterred from engaging their most terrible weapons. Old school deterrence continues to function at the major conventional and nuclear levels, and yet, 21st century hybrid wars and cross-domain

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Wirtz (2009); Delpech (2012); Lowther (2012). It also matches USAF Annex 3-72.

[9] Payne (2016). Neither does more capability necessarily provoke a destabilizing reaction from the other side. Cunningham and Fravel (2015). In tension with this argument, though, see Haynes (2016).

[10] Goodby (2006, Ch. 2); Bowie and Immerman (1998). Recent research shows that Eisenhower's advisers may have been prescient. "[S]tates that enjoy nuclear superiority over their opponents are more likely to win" (Kroenig 2013, 141).

[11] Lieber and Press (2006) shocked the community by suggesting deviation from Cold War restraint: an attempt by the United States to break out from mutual deterrence and achieve nuclear primacy that could be used for coercion or "compellence."

gambits are multiplying not receding. Successful deterrence in the age of cross-domain coercion must demand a logic of state behavior that is missing from classic Cold War theories.[12]

TWO TRADITIONS OF NUCLEAR DETERRENCE

American economist Thomas Schelling articulated the dilemma best in his seminal *Arms and Influence* (1966). Published when the nuclear arms race was well underway, Schelling's book aspired to reach a broad audience, pointing out how straightforward logic underlying complex national security decisions of maximum gravity followed the rules of familiar games accessible to any educated citizen. Part of the greatness of *Arms & Influence*—Schelling shared the 2005 Nobel Prize for his career contributions—was in how it democratized deterrence and defense. It supplied a *lingua franca* for policy makers to explain growing defense requests and alarming foreign policy crises to the American people, which in turn allowed presidents to lay planks of public support for Cold War policy, and to be held accountable when strategy failed to perform.[13]

As it turned out, policy did not follow Schelling's model or recommendations entirely. In his most resonant scenarios, Schelling emphasized risk and ambiguity over obvious brawn. When two contenders were playing chicken, approaching the precipice, tied at the waist, it did not matter after a certain point whether one was bigger or physically stronger. When either jumped into the abyss, the other must follow. Schelling likened increasing risk of nuclear war to loose gravel at the edge of oblivion.[14] At the final stages of the deterrence game, factors (loose gravel) *outside the control* of either party would determine when everyone went over the cliff—unless, that is, one side conceded first and dropped out of the game.

Winning the game, as long as things did not spin out of control, depended upon conveying resolve, a willingness to stay in and keep inching closer to the edge. Later, when resolve was quantified for formal models, it had to be incorporated into expressions of "expected utility" that could guide players' calculations of whether to escalate or capitulate. The infinite cost of general nuclear war, oblivion in Schelling's metaphor, could not be included as a factor for the finite value of game outcomes. Once the cost of nuclear war was countable and made suitable for the war ledger, this opened the door for deterrence strategies quite divergent from the New Look and from what Schelling explained in *Arms & Influence.*

During the years of rapid expansion for both U.S. and Soviet nuclear arsenals, Secretary of Defense Robert McNamara was famously asked to quantify assured destruction required for successful deterrence at the strategic level. What percentage of industrial capacity and what percentage of the population would have to be placed at risk in order to dissuade the Kremlin from crossing American red lines

[12] An alternate "domain" of low intensity conflict did challenge U.S. interests during the Cold War. The recent expansion of cross-domain options makes using nuclear weapons in response for coercive diplomacy much harder than it was against Soviet-backed insurgencies. Geopolitical stakes are sliced even thinner under cross-domain coercion, and challengers today conceive activities below a conventional redline that generally lies well below the nuclear threshold: like the Islamic State (ISIS) in Iraq and Syria, if they fail to stay below the radar, challengers are likely to cede ground once U.S.-level conventional units are engaged. For complications in leveraging nuclear weapons, even during the Cold War, see Sechser and Fuhrmann (2017).

[13] Dodge (2012).

[14] Schelling (2008 c1966, 99).

and attacking U.S. vital interests?[15] Regardless of McNamara's answer, did there not have to be conditions under which the Soviets would accept very high risk of such well-described, circumscribed destruction? Indeed, this was the basis of strategic stability: the Soviet Union *would* drive a crisis over the cliff in order to hold onto its satellite states in Eastern Europe. For both sides, some geopolitical defeats had to be worse than absorbing a nuclear assault.

Rather than relying on ambiguity, wondering whether the dark shadow cast by thousands of ballistic missiles would deter political aggression, Americans and their European allies debated a purported second school of deterrence, touting the merits of flexible response and escalation dominance.[16] Would it not be safer, more logical, if anticipated Soviet thrusts below the nuclear threshold could be met in somewhat proportional, symmetric fashion? Reducing rather than generating ambiguity was the key to communication. The adversary would know that any step toward the precipice would bring a strong counter-reaction, and any subsequent move to raise the stakes would be similarly cut off. The old deterrence posture in *Arms and Influence* invited players to enter a contest, to achieve geopolitical gains by accepting increasing risk of mutual disaster. By contrast, the new and improved flexible deterrent would make it clear that nothing could be gained *before* the first step was taken toward a "competition in risk taking." [17]

Flexible response or escalation control did provide a certain catharsis for American policy makers, supplying the rationale for burgeoning defense budgets in the 1960s and during the late-Carter and Reagan presidencies. Robust spending—call it deterrence capitalization—translated into a wide array of options that allowed national security officials to feel as if they gained a measure of control; they could now (without embracing Armageddon) adjust the price when the Soviets sought to draw the more powerful United States into Schelling's crude, leveling game of nuclear chicken. Yet, especially after disillusionment in Vietnam, critics of the second deterrence school did not forget how prescient Eisenhower had been in his 1961 Farewell Address when he warned against America's military-industrial complex.[18]

Expanded defense budgets undermined important justifications for flexible response, driving deficit spending, stoking inflation, and straining the relationship between the defense establishment and liberal society.[19] Withdrawal from Southeast Asia, temporary softness in the budget, and rising concern over a hollow American Army exacerbated the challenge of maintaining flexible response and encouraged countercyclical investment in nuclear variety: multiple independently targeted reentry vehicles (MIRVs) at the strategic level; forward deployed short- and intermediate-range nuclear-tipped missiles; radiation enhanced ("neutron") bombs; nuclear cruise missiles (ALCMs and GLCMs); guidance improvements for submarine launched missiles (SLBMs); and mobile land-based (MX) missiles. The scope, magnitude, and relentlessness of nuclear modernization, on both sides of the Cold War, divided national security experts.

Toward the end of the 1970s, a faction from civilian science steeped in the tradition of the Manhattan Project, which beat Germany to

[15] Robert McNamara, "Mutual Deterrence Speech," San Francisco, CA, September 18, 1967, available at http://www.atomicarchive.com/Docs/Deterrence/Deterrence.shtml <<October 20, 2016>>.

[16] Kahn (1965); Gaddis (1982); Yost (2011).
[17] Kahn (2010 c1965, 3).
[18] Baier (2017).
[19] Huntington (1982); Knopf (1998).

the first fission bomb, and the Atomic Energy Commission, which oversaw design, manufacture, and stockpiling of the nation's nuclear arsenal, teamed with arms control advocates linked to the State Department.[20] They resisted the military-industrial juggernaut as consuming inordinate resources while lowering the barrier to general nuclear exchange. The elaborate posture required by flexible deterrence could move the superpowers closer to danger, chipping away at common knowledge of a *condition* of mutual assured destruction (MAD) and nudging the parties toward serious consideration, indeed incipient enthusiasm, for nuclear utilization strategies (NUTS).[21]

Prospects for nuclear utilization under the flexible-control school of deterrence prompted a host of concerns. Within what Lawrence Freedman later termed the second wave of deterrence research, scholars of public policy and government pointed out how dangerous escalating to deescalate appeared from the case studies. The quickening pace of countermoves and rising levels of stress in a crisis raised the likelihood as well for fatal misperception.[22] As the sinews of flexible response were built, deployed, and exercised, executive bureaucracy had to keep pace. This expansion brought new difficulties for maintaining control, particularly during a crisis, raising the specters of inadvertent escalation, unauthorized use, and accidental launch.[23]

ARMS CONTROL: FROM OFFENSIVE LIMITS TO MISSILE DEFENSE AND DISARMAMENT

By the time President Reagan came to office, certainly after the first Congressional session, enthusiasm for flexible response and nuclear utilization was fading. The President did support the B-1 supersonic and B-2 stealth bomber programs, the MIRVed MX missile, and intermediate-range Pershing II deployment in Europe, and yes, politically, this appeared to be a one hundred eighty degree turn from Jimmy Carter's program cancellations toward the end of his presidency. Yet, this reinvigorated nuclear portfolio ignited bitter ideological divisions in Congress and helped generate pressure for renewed negotiations with the Soviet Union that would bring progress on arms control.[24]

Since Robert McNamara's time in the Lyndon Johnson administration, America's commitment to flexible response, its determination to deter by brandishing an array of limited attack options, ranging across the anticipated ladder of escalation with the Soviet Union, shaped its approach to arms control. The Limited Test Ban and Hotline agreements of 1963 addressed immediate dangers of deploying nuclear weapons, which would have plagued governments even if they had stuck with Eisenhower's logic and modest strategic deterrent. Almost as soon as these issues had been concluded, however, the arms race began in earnest, and American attention turned toward institutionalizing ceilings on offensive weapons, modulating Soviet aggressiveness in part by engaging

[20] As a short list of relevant organizations, consider Bulletin of Atomic Scientists; Arms Control Association; Federation of American Scientists; Union of Concerned Scientists; Belfer Center for Science and International Affairs (Harvard Kennedy School); and Stanford's Center for International Security and Arms Control (now the Center for International Security and Cooperation).

[21] Keeny and Panofsky (1981).

[22] George and Smoke (1974); Jervis (1976).

[23] Bracken (1985); Carter, Steinbruner, Zraket (1987); Sagan (1993).

[24] Lebovic (2013, esp. Ch. 4).

them as sovereign equals in strategic arms limitation (SALT) talks.

Eventual limits endorsed in SALT I and SALT II were famously nonrestrictive; they accommodated nuclear build programs already in train so that treaties codified armament rather than turning swords into plowshares. Strategic stability under this full-fledged arms control regime, which from 1968-1986 endured somewhat longer than most State or Defense Department political careers, rested on mutual vulnerability to the adversary's secure offense. Welcoming safe and secure ballistic missiles and long-range bombers, in the other side's offensive posture, implied that effective missile defenses were destabilizing. Accordingly, a crown jewel of 1970s arms control was the Anti-Ballistic Missile (ABM) Treaty, negotiated in conjunction with SALT.[25] In this case, an expensive system that actually might have been built, or experimented with, was prohibited by international legal agreement. Though the ABM Treaty as a straightforward ban read concise and elegant compared to the arcane counting rules for launchers and later warheads that bloated SALT, ABM would nevertheless lose its luster within a decade.

Money spared in missile defense during the 1970s poured into developing more secure and accurate offense. The geopolitical and ideological competition continued as well, with crises in Southeast Asia, Angola, Cuba, Nicaragua, and Afghanistan undermining détente and U.S. defense in the Cold War. By 1982, the fine architecture of flexible deterrence, escalation dominance, strategic containment, and arms control tottered on a foundation of sand. Rather than containing the Soviets until their system could collapse from its own internal contradictions, the U.S. combination of deterrence, conventional defense, and arms control seemed to provide an open invitation for Moscow to play and win at the deadliest of games. Even if the United States could occasionally, as in the 1973 Yom Kippur War, muster the resolve to maintain its position, how long before this strategic Russian roulette ended in catastrophe for both sides?[26]

It was this situation that Ronald Reagan, criticized by contemporaries as ignorant and cavalier but now acknowledged to have thought deeply on nuclear weapons, sought to change. Opponents from the left and some centrist Republicans saw Reagan's rejection of SALT, accompanied by rhetoric promising victory in the Cold War, as an abrupt, populist attack on strategic stability, all that had been painstakingly constructed since 1968. Once superpower summitry rekindled, however, and Reagan received a dynamic interlocutor in new Soviet Premier Mikhail Gorbachev, it became clear that the American President did not seek a nuclear victory as much as a different vision—renegotiated terms of coexistence with the Soviet Union that would redefine the relationships between deterrence, defense, and arms control.

At the strategic level, Reagan as early as the summer of 1982 proposed dramatic *reductions* rather than mere limitations in strategic weapons.[27] These proposals were criticized by the Soviet Union as highly asymmetric, but Strategic Arms Reduction (START) talks continued.[28] At the same time, Reagan approved the *dual-track strategy* that combined arms control negotiations with deployment of highly accurate Pershing II intermediate-range missiles in Europe. Ambassador Paul Nitze, author of NSC-68 (1950), which formally persuaded President Truman to build the "super," the hydrogen bomb, most likely had

[25] Cameron (2018).
[26] Sagan and Suri (2003).
[27] Talbott (1982).
[28] Lebovic (2013, Ch. 4).

President Reagan's true sentiments in mind when, some thirty years later, the same Nitze demonstrated American willingness to forego the Pershing II in his famous "Walk in the Woods" outside Geneva with his Soviet counterpart.[29]

A number of years and some difficult moments in U.S.-Soviet relations passed, but in Reagan's second term, with Gorbachev in charge at the Kremlin, pivotal innovations in defense and arms control gained traction. By the time Reagan and Gorbachev met at the Reykjavik Summit in October 1986, the talks included proposals to *eliminate* land-based ICBMs, and there were parallel efforts afoot to ban ground-launched ballistic and cruise missiles of so-called intermediate range (500-5500 km).[30] While the Reykjavik gambit failed, both arms control initiatives represented a watershed in deterrence. No longer were great powers in the realm of symmetric or flexible response to every variety of militarized threat. True, air-launched and submarine-based missiles remained, but elimination of strategic, ground-based weapons was proposed on the American side as a stage toward a long-term vision in which nuclear missiles (and bombers) were rendered "impotent and obsolete."[31] Moreover, defense now meant more than preparations to raise costs for the author of a conventional invasion; it also comprised mercurial interceptors of some sort to sow doubt in the attacker's mind about the efficiency of his strategic nuclear force.

Even in the most elaborate and flexible of deterrence postures from before, there was a strategic umbrella at the end of every crisis escalation. Getting rid of this top cover through arms elimination and missile defense broke faith with *both* founding schools of deterrence. If the Reagan vision unveiled to the National Security establishment after 1986 came to pass, the United States and the Soviet Union would fold their strategic umbrella and abandon the protection of deterrence as understood since Bernard Brodie's classic, *The Absolute Weapon* (1946).

THE END OF CREDIBILITY AND A NEW CRISIS MODEL FOR STATE BEHAVIOR

The Cold War ended too soon for Reagan's new direction to take effect. Had Reagan fulfilled his dream, the strategic renaissance would have been far more profound than a simple return to Eisenhower-era ambiguity and contemplation of massive retaliation. Eliminating via international arms control all the forces capable of a doomsday nuclear strike would have upended the scientific-analytical concept articulated in qualitative terms by early deterrence theorists like Brodie, Schelling, and Snyder, and subsequently quantified in formal games by Robert Powell in his *Nuclear Deterrence Theory* (1990).

Powell's scholarship, coming out as the Reagan administration and the Cold War were drawing to a close, is especially relevant, here, because its purpose was to encapsulate deterrence as an analytical concept, to find underlying unity among and reveal the calculus behind deterrence policy arguments.[32] Powell's "stage game," the decision element within a larger conflict

[29] Association for Diplomatic Studies and Training, "Paul Nitze and A Walk in the Woods – A Failed Attempt at Arms Control," ADST (c1998-2016), http://adst.org/2016/03/paul-nitze-and-a-walk-in-the-woods-a-failed-attempt-at-arms-control/ <<October 20, 2016>>.

[30] Goodby (2006, 143-147).

[31] Ronald Reagan, "President Reagan's SDI Speech," March 23, 1983, Atomicarchive.com (c1998-2015), http://www.atomicarchive.com/Docs/Missile/Starwars.shtml <<October 20, 2016>>.

[32] Powell (1990).

sequence, distilled the options facing heads of government during a nuclear crisis: a) concede the stake and drop out of the game; b) escalate to the next stage while raising the probability of all-out nuclear war; and c) launch the first attack.[33]

Powell's game looked and played much like Schelling's competition in risk taking with important exceptions. For example, in the deterrence game, even the brinkmanship version in which there was no limited attack option (just accumulation of probability toward all-out war), "the state with the greatest resolve [might] not prevail" because a "weakly committed" player still had incentive, at least early on, to act tough, to try to convince an adversary to back away from a mutually costly contest.[34]

Similarly, the limited retaliation game (an idealized scenario in which the chance of losing control was taken off the table) showed how advantages of possessing calibrated instruments to punish the adversary without total destruction were counterbalanced: the likelihood of nuclear crises declined with flexible tools at the ready, but crises that did occur ran longer and cost more.[35] Together, the brinkmanship and flexible response variants of deterrence encapsulated much of the social science underlying the American nuclear debate and the seesaw politics of how to posture strategic, tactical nuclear, and conventional arms to contain Soviet aggression.[36]

Properly understood, the Reagan revolution upset the ordered relationship among deterrence, defense, and arms control. Taking away the option of general nuclear attack and guaranteeing its elimination through missile defense would break Powell's working model. With all out "nuclear attack" off the table, crisis actors are left with two choices—and only in the limited retaliation variant since there *can be no brinkmanship* without an effective nuclear arsenal. Actors submit or continue to throw (and absorb) costly-but-limited punches. For sufficiently high stakes, that is, a high enough payoff from humiliating the other side, the contestants might slug it out for some time: in an "escalation and defense" world, there is no Armageddon, but there is also precious little deterrence or (further) demand for arms control.

When the Cold War ended, strategic nuclear weapons, and the attack option in Powell's baseline model, remained, so the United States and Russia never had the opportunity to bargain under "Star Wars," defense-dominant conditions. Brinkmanship, rather than being relegated to chilling historical memory, became a real possibility once Russia steadied itself for a return to major power competition.

As maneuvering ensued with Russia in Georgia and Ukraine; with China in the South and East China Seas; and against a potentially nuclear Iran in the Middle East, the beleaguered United States seemed at times to be caught off balance. Just as before, in crises with a less powerful foe, drawbacks of brinkmanship surged to the fore. When a rising power asserted itself in its home region, even past the point of annexing new territory, it was not credible that the United States would respond on its strategic periphery with nuclear weapons. Accordingly, a raft of new scholarship gravitated toward flexible response, now billed as tailored, complex, full

[33] Ibid., 39, 160.
[34] Ibid., 77.
[35] Ibid., 179.

[36] For a widely reviewed account of how this nuclear deterrence logic played against underlying geopolitical concerns, see Gavin (2012).

spectrum, layered, or cross-domain deterrence.[37]

In the near term, at least, all variations on the theme of limited retaliation proved difficult to effect and infeasible to resource, given Congress's sequester of funds to cut the Federal deficit. Once the sequester was lifted, maintaining all three legs of the strategic nuclear triad, upgrading tactical nuclear weapons such as B61 bombs in Europe, and improving conventional prompt global strike still imposed a demanding schedule of payments, many extra billions of dollars annually over the next thirty years.[38] This cost did not include hardening of systems for space and cyber operations or development of increasingly sophisticated offensive capabilities in these new dimensions.

Concepts such as whole of government response, cross-domain deterrence, and new generation warfare emerged after significant, frequently unanticipated setbacks against U.S. interests in the fifteen years since the Iraq War. Even if double the money were made available—one trillion dollars annually and 8% of U.S. GDP—it is unclear, indeed unlikely, that a plus-up deterrence posture could cover all necessary contingencies to achieve escalation dominance.

From the U.S. perspective, which tends to be that of defender, the difficulty in answering every call with Powell's "limited retaliation," calibrated escalation crafted to *deescalate* the crisis, boils down to two inconvenient factors. Rivals to the United States, chafing at the geopolitical status quo, when they hit resistance in one domain, deftly open a new line of action. Despite U.S. superiority on paper, in the number and quality of military systems, the overall impression is yet one of U.S. interests under assault in key power centers: Europe, the Middle East, and Asia. In a previous era, either the United States or the Soviet Union might have put a stop to this unraveling by ratcheting up the risk of nuclear war. Today, however, the second strategic development is that no party, not even the side that enjoys a preponderance of material power, can feign the desire to inaugurate a Cold War-style nuclear showdown. *Whether the putative opponent is Russia, Iran, or China, the United States has been incapable of leveraging its superior nuclear arsenal to defend against cross-domain or hybrid tactics that erode American regional influence.*

The ease of slipping unipolar defense, shifting one's offense to a new domain, and the utter lack of credibility, today, in deterring such an offense through motions that drag the world toward nuclear war herald the tardy arrival of President Reagan's revolution in deterrence, though not the way he intended. Nuclear weapons are poor instruments for deterring cross-domain coercion everywhere not because new missile defense technologies can blast them out of their suborbital trajectory but because *they cannot be invoked* to protect against today's non-nuclear offenses.

Powell's accomplishment, which captured formally the intuition behind great debates of twentieth-century deterrence, is overtaken by events. Critical options in his stage game, limited nuclear retaliation and substantially raising the risk of nuclear Armageddon, are gone or at least off the table. A touchstone

[37] Payne (2001); Lebovic (2007); Paul, Morgan, and Wirtz (2009); Harrison, Shackelford, and Jackson (2009); Lowther (2012); Wenger and Wilner (2012); Jon Lindsay and Erik Gartzke, "Cross-Domain Deterrence as a Practical Problem and a Theoretical Concept," Draft (July 2016) introduction for *Cross-Domain Deterrence: Strategy in an Era of Complexity* (forthcoming), available at http://deterrence.ucsd.edu/_files/CDD_Intro_v2.pdf <<October 20, 2016>>.

[38] Lowther and Cimbala (2016); Roberts (2016).

model restructuring deterrence, defense, and arms control after the revolution is simpler if less intuitive than the standard Cold War crisis game.

DETERRENCE NOW: A GAME OF INCHES

After encroachment of competing states in eastern Europe, Iraq and Syria, and the South China Sea—all during global economic recovery and expanding opportunities for cooperation—the United States plays a new game (described by an old model) of *low cost attrition*.[39] This game structure challenges the old censoring assumptions of deterrence for national security, and it works very differently from Powell's version. In the elegant, limiting case that most forcefully explains the present logic of competition between nuclear powers, states vie for a prize of finite value (v); for any round of the game, each state chooses whether to continue competing at cost (c) or quit the contest at zero payoff. When one state continues a contest as the other state quits, the enduring state does not pay and simply receives the prize (v). Both states play attrition under conditions of relative symmetry.

While this last presumption is false by conventional empirical standards of resource strength, when taking nuclear arsenals and contextual factors (e.g., the stopping power of water and rising regionalism) into account, mathematical simplification actually becomes more relevant as the world appears ever more multipolar and the cost of continuing multi-domain competition drops well below geopolitical prizes as stake.

Under increasing symmetry, then, both players in equilibrium quit a contest with the same low probability (p). For either player "to be indifferent between staying in for one more period and stopping now," payoffs of two viable courses of action must equate to one another: $0 = pv - (1-p)c$, where zero is the payoff from quitting and the right side expression is the expected value of fighting another round. When the cost of fighting or extending the geopolitical competition to a new domain is very low relative to international stakes, the opponent, indeed neither side, has high odds of stopping: $p/(1-p) = c/v$. Under conditions of "low c" relative to v, that is, low cost attrition, the mechanism of cross-domain coercion—in Europe, the Middle East, and Asia—is likely to swing like a frictionless pendulum: the chance (p) of any party seeing the value in stopping is held quite low.[40]

Without the options of Powell's classic deterrence model, that is, without limited nuclear strike or the willingness to pulse the risk of nuclear war, the cost of continuing cross-domain challenges, c, is held low. Ultra-low cost attrition for the United States becomes a trap, slow death by a thousand cuts; resources are not draining dramatically, but the bleeding never stops. Moreover, just because general nuclear war is not on the horizon shaping negotiations or included in our underlying model does not mean it cannot

[39] Fudenberg and Tirole (1991, 119). This was based on a model presented by J. Maynard Smith, "The Theory of Games and Evolution in Animal Conflicts," *Journal of Theoretical Biology*, Vol. 47 (1974): 209-221.

[40] The expression $p/(1-p)$ for odds in economics is often called the hazard rate (that something good will fail), and it neatly maps a rising exponential function to the probability value as p varies from 0 to 1 (Fearon 1995). In this application, we may appropriately call it a success rate because it monotonically follows the probability that players discontinue a costly contest. When c/v is low, state-actors enter a new world in which the hazard rate (in this instance the chance for success) is low. Something bad, the attrition war, will not end; it will go on unless players find a way to manipulate the key parameter, c/v.

happen. Time is not on anyone's side. Eventually, due to misperception or an irrational move (outside the attrition or escalation models), nuclear powers could abruptly return to Powell's deterrence framework and find themselves in a Cuba-style missile crisis.

If so, it will be too late, then, for them to exploit one possible route out of the low-cost attrition trap. During the *ancien regime* of nuclear deterrence, policy makers thought in sequence: deterrence, defense, and then arms control. In the new world, cross-domain attrition promises a revolution in this relationship: arms control, defense, and then deterrence. This is because annual half-trillion dollar efforts to modernize conventional defenses under the third offset or refurbish and replace the nuclear deterrent do not budge the underlying parameter, *c*, in the way they once did. Despite substantial commitments to force structure and nuclear posture, regional adversaries with global reach can at low cost continue to challenge the status quo by touching levers of power across domains, from North Korea nuclear testing to energy prices and climate change. The ticket to play another round of geopolitical attrition in the new global politics is unfortunately quite affordable for all sides.

Nevertheless, even with additional conventional defense and traditional deterrence sidelined for winning this type of game, the potential for innovation and progress in arms control remains. This is because arms control, particularly when it manifests as cooperative defense, does not have to disarm or reduce threat potential in order to be effective; rather it can provide a mutual stream of benefits, in technological exchange or in burdensharing against common external challenges, which accrue only when the attrition game ends.[41] The geopolitical stakes (*v*) of broader conflict go down if winning the original prize entails *loss* of benefits from stillborn defense cooperation. In the foundational logic of low cost attrition, as *v*, the value of winning a spat, declines, *c*/*v*, and therefore the probability of success (that is, stopping the wasteful contest), rises for both sides.

Cross-domain conflict in the world today presents several stubborn characteristics that visionary political scientist Samuel Huntington outlined twenty years ago in *Clash of Civilizations*.[42] Huntington's book responded to what he warned was wrongheaded, or at least incomplete, speculation about the end of ideology as the "end of history," a transcendent condition when differences among states and the distribution of nuclear capability mattered less and all parties resigned themselves to competition according to globalized rules of the game designed for promoting commerce.[43]

Huntington warned that when the clash between communism and liberalism wound down, this did not mean that American-led liberal order would run on its own momentum. Potential for resistance, even great power conflict, interrupting progress of international relations, remained strong.[44] Civilizations structured along common language, religion, and preferential commerce continued to spread from cultural hearths under globalization, reinforcing regional identities that could flood across conventional nation-state boundaries much as ideology had during the Cold War. Powerful nation-states, however, would not disappear. Regional champions, Huntington predicted, could

[41] Carter, Perry, and Steinbruner (1992). Contemporary arguments include Koblentz (2014), Steer (2017), and Rose (2018).

[42] Huntington (1998).

[43] Fukuyama (1993).

[44] Mearsheimer (2001).

polarize local identities, bend them along civilizational lines, and mobilize them for grand strategies, overcoming material deficits to challenge American hegemony.

All this coheres with contemporary security challenges against the United States at world power centers and helps explain why the United States is keen to revisit and reinforce deterrence, now. A generation ago, Huntington moderated his doom and gloom. Cataclysmic deterrence breakdown and conflict among nuclear champions, particularly in the form of an anti-Western alliance against the United States, was not a foregone conclusion. Avoiding catastrophe, though, would demand prudential decisions from the West to figure how to accommodate rising power of the Rest.[45] Huntington's ideas about emerging world disorder and prescriptions to find areas of cooperation were heavily discounted immediately after 9/11, when they seemed to conflate the U.S.-led War on Terror with a nightmarish Western Crusade against Islam. Today, we ignore at our peril the rise of regional champions, international identity politics, and the potential for a defense strategy that leads with practical accommodation.

Huntington, of course, did not foresee concurrent innovations below the grand strategic level in multi-domain operations and cross-domain coercion. These developments make multiple deterrence challenges for the United States more difficult, but they, too, may be accommodated if, beyond Powell (1990), policy makers recognize a new political economy of their situation. The United States' game-theoretic best response given its role as status quo power acknowledges a revolution in deterrence, defense, and arms control. Novel arms control, moving from emphasis on disarmament, closer toward cooperative defense that institutionalizes mutual benefits of strategic stability, may, instead of trailing, now strike a path toward strengthened deterrence and effective defense of the national interest.

[45] Zakaria (2008); Kupchan (2012); Rose (2013).

WORKS CITED

Adamsky, Dmitry. 2018. "Strategic Stability and Cross-Domain Coercion: The Russian Approach to Information (Cyber) Warfare." In *The End of Strategic Stability? Nuclear Weapons and the Challenge of Regional Rivalries*, eds. Lawrence Ruben and Adam Stulberg, pp. 149-173. Washington, D.C.: Georgetown University Press.

Association for Diplomatic Studies and Training. 2016. "Paul Nitze and A Walk in the Woods – A Failed Attempt at Arms Control." ADST (c1998-2016), http://adst.org/2016/03/paul-nitze-and-a-walk-in-the-woods-a-failed-attempt-at-arms-control/ <<October 20, 2016>>.

Baier, Bret with Catherine Whitney. 2017. *Three Days in January: Dwight Eisenhower's Final Mission.* NY: HarperCollins.

Bowie, Robert and Richard Immerman. 1998. *Waging Peace: How Eisenhower Shaped an Enduring Cold War Strategy.* NY: Oxford University Press.

Bracken, Paul. 1985. *The Command and Control of Nuclear Forces.* New Haven, CT: Yale University Press.

Cameron, James. *The Double Game: The Demise of America's First Missile Defense System and the Rise of Strategic Arms Limitation.* NY: Oxford University Press, 2018.

Carnesale, Albert and Richard Haass. 1987. *Superpower Arms Control: Setting the Record Straight.* Cambridge, MA: Ballinger Publishing Co.

Carter, Ashton, John Steinbruner, and Charles Zraket, eds. 1987. *Managing Nuclear Operations.* Washington, D.C.: Brookings Institution.

Carter, Ashton, William Perry, and John Steinbruner. 1992. *A New Concept of Cooperative Security.* Brookings Occasional Papers. Washington, D.C.: Brookings Institution.

Cimbala, Stephen, ed. 2001. *Deterrence and Nuclear Proliferation in the Twenty-First Century.* Westport, CT: Praeger Publishers.

Conant, Jennet. 2017. *Man of the Hour: James B. Conant, Warrior Scientist.* NY: Simon & Schuster.

Cunningham, Fiona and M. Taylor Fravel. 2015. "Assuring Assured Retaliation: China's Nuclear Posture and U.S.-China Strategic Stability." *International Security* 40 (2): 7-50.

Delpech, Thérèse. 2012. *Nuclear Deterrence in the 21st Century: Lessons from the Cold War for a New Era of Strategic Piracy.* Santa Monica, CA: RAND.

Dodge, Robert. 2012. "Game Changer." *Harvard Kennedy School Magazine* (Summer): 26-31.

Fearon, James. 1995. "Rationalist Explanations for War." *International Organization* 49 (3): 379-414.

Freedman, Lawrence. 2004. *Deterrence.* Cambridge, UK: Polity Press.

Fudenberg, Drew and Jean Tirole. 1991. *Game Theory.* Cambridge, MA: MIT Press.

Fukuyama, Francis. 1993. *The End of History and the Last Man.* NY: Penguin Books.

Gaddis, John Lewis. 1982. *Strategies of Containment: A Critical Appraisal of American National Security Policy During the Cold War.* NY: Oxford University Press.

Gavin, Francis. 2012. *Nuclear Statecraft: History and Strategy in America's Atomic Age.* Ithaca, NY: Cornell University Press.

George, Alexander and Richard Smoke. 1974. *Deterrence in American Foreign Policy: Theory and Practice.* NY: Columbia University Press.

Goodby, James. 2006. *At the Borderline of Armageddon: How American Presidents Managed the Atom Bomb*. Lanham, MD: Roman & Littlefield Publishers.

Goodby, James and Benoit Morel, eds. 1993. *The Limited Partnership: Building a Russian-US Security Community.* Oxford, UK: Oxford University Press/SIPRI.

Gray, Colin. 2000. "Deterrence in the 21st Century." *Comparative Strategy* 19 (3): 255-61.

Harrison, Roger, Collins Shackelford, and Deron Jackson. 2009. "Space Deterrence: The Delicate Balance of Risk." *Space and Defense* (USAFA) 3 (1): 1-30.

Haynes, Susan Turner. 2016. "China's Nuclear Threat Perceptions." *Strategic Studies Quarterly* 10 (2): 25-62.

Huntington, Samuel. 1982. "American Ideals versus American Institutions." *Political Science Quarterly* 97 (1): 1-37.

Huntington, Samuel. 1998. *The Clash of Civilizations and the Remaking of World Order.* NY: Simon & Schuster, Reprint.

Jervis, Robert. 1976. *Perception and Misperception in International Politics.* Princeton, NJ: Princeton University Press.

Kahn, Herman. 2010. *On Escalation: Metaphors and Scenarios.* NY: Praeger, c1965.

Keeny, Spurgeon and Wolfgang Panofsky. 1981. "MAD versus NUTS: Can Doctrine or Weaponry Remedy the Mutual Hostage Relationship of the Superpowers?" *Foreign Affairs* 60 (2): 287-304.

Knopf, Jeffrey. 1998. *Domestic Society and International Cooperation: The Impact of Protest on US Arms Control Policy.* Cambridge, UK: Cambridge University Press.

Koblentz, Gregory. 2014. *Strategic Stability in the Second Nuclear Age*, Council Special Report No. 71. NY: Council on Foreign Relations.

Kroenig, Matthew. 2013. "Nuclear Superiority and the Balance of Resolve: Explaining Nuclear Crisis Outcomes." *International Organization* 67 (1): 141-171.

Kroenig, Matthew. 2018. *The Logic of American Nuclear Strategy: Why Strategic Superiority Matters.* Oxford, UK: Oxford University Press.

Kupchan, Charles. 2012. *No One's World: The West, the Rising Rest, and the Coming Global Turn.* NY: Oxford University Press.

Lebovic, James. 2007. *Deterring International Terrorism and Rogue States.* Abingdon, UK: Routledge.

Lebovic, James. 2013. *Flawed Logics: Strategic Nuclear Arms Control from Truman to Obama.* Baltimore, MD: Johns Hopkins University Press.

Lieber, Keir and Daryl Press. 2006. "The Rise of Nuclear Primacy." *Foreign Affairs* 85 (2): 42-54.

Lindsay, Jon and Erik Gartzke. 2016. "Cross-Domain Deterrence as a Practical Problem and a Theoretical Concept." Draft (July) introduction for *Cross-Domain Deterrence: Strategy in an Era of Complexity* (forthcoming), available at

http://deterrence.ucsd.edu/_files/CDD_Intro_v2.pdf <<October 20, 2016>>.

Long, Austin. 2008. *Deterrence from Cold War to Long War: Lessons from Six Decades of RAND Research.* Santa Monica, CA: RAND.

Lowther, Adam, ed. 2012. *Deterrence: Rising Powers, Rogue regimes, and Terrorism in the Twenty-First Century.* NY: Palgrave-Macmillan.

Lowther, Adam and Stephen Cimbala, eds. 2016. *Defending the Arsenal: Why America's Nuclear Modernization Still Matters.* London, UK: Routledge.

Mandelbaum, Michael and Strobe Talbot. 1986/87. "Reykjavik and Beyond," *Foreign Affairs* 65 (2): 215-235.

McNamara, Robert. 1967. "Mutual Deterrence Speech," San Francisco, CA, September 18, available at http://www.atomicarchive.com/Docs/Deterrence/Deterrence.shtml <<October 20, 2016>>.

Mearsheimer, John. 1983. *Conventional Deterrence.* Ithaca, NY: Cornell University Press.

Mearsheimer, John. 2001. *The Tragedy of Great Power Politics.* NY: W.W. Norton & Co.

Morgan, Patrick. 2003. *Deterrence Now.* Cambridge, UK: Cambridge University Press.
NATO. 2010. *Strategic Concept: Active Engagement, Modern Defense*, November 19, available at http://www.nato.int/cps/en/natohq/topics_82705.htm. NATO. 2016. "Warsaw Communique," August 3, available at http://www.nato.int/cps/en/natohq/official_texts_133169.htm.

NSC 68, "Report to the National Security Council." April 12, 1950. Available at the Truman Presidential Library (https://www.trumanlibrary.org/whistlestop/study_collections/coldwar/documents/pdf/10-1.pdf).

Paul, T.V., Patrick Morgan, and James Wirtz, eds. 2009. *Complex Deterrence: Strategy in the Global Age.* Chicago, IL: University of Chicago Press.

Payne, Keith. 2001. *The Fallacies of Cold War Deterrence and a New Direction.* Lexington, KY: The University Press of Kentucky.

Payne, Keith. 2016. "Commentary: Why US Nuclear Force Numbers Matter," *Strategic Studies Quarterly* 10 (2): 14-24.

Pelopidas, Benoît. 2016. "Nuclear Weapons Scholarship as a Case of Self-Censorship in Security Studies." *Journal of Global Security Studies* 1 (4): 326-336.

Powell, Robert. 1990. *Nuclear Deterrence Theory: The Search for Credibility.* Cambridge, UK: Cambridge University Press.

Reagan, Ronald. 1983. "President Reagan's SDI Speech," March 23. Atomicarchive.com (c1998-2015), http://www.atomicarchive.com/Docs/Missile/Starwars.shtml <<October 20, 2016>>.

Roberts, Brad. 2016. *The Case for U.S. Nuclear Weapons in the 21st Century.* Stanford, CA: Stanford University Press.

Rose, Frank. "Russian and Chinese Nuclear Arsenals; Posture, Proliferation, and the Future of Arms Control." Written testimony before U.S. House Committee on Foreign Affairs Subcommittee on Terrorism, Nonproliferation, and Trade, Washington,

D.C., June 21, 2018, https://www.brookings.edu/testimonies/russian-and-chinese-nuclear-arsenals-posture-proliferation-and-the-future-of-arms-control/.

Rose, Gideon, intro. 2013. *The Clash of Civilizations? The Debate: 20th Anniversary Edition.* Special Volume of *Foreign Affairs.* NY: Council on Foreign Relations.

Sagan, Scott. 1993. *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons.* Princeton, NJ: Princeton University Press.

Sagan, Scott. 2000. "The Commitment Trap: Why the United States Should Not Use Nuclear Threats to Deter Biological and Chemical Weapons Attacks. *International Security* 24 (4): 85-115.

Sagan, Scott and Jeremi Suri. 2003. "The Madman Nuclear Alert: Secrecy, Signaling, and Safety in October 1969." *International Security* 27 (4): 150-183.

Schelling, Thomas. 2008. *Arms and Influence.* New Haven, CT: Yale University Press, c1966.

Schelling, Thomas and Morton Halperin. 1961. *Strategy and Arms Control.* NY: Twentieth Century Fund.

Sechser, Todd and Matthew Fuhrmann. 2017. *Nuclear Weapons and Coercive Diplomacy.* Cambridge, UK: Cambridge University Press.

Shultz, George, Sidney Drell, and James Goodby. 2011. *Deterrence: Its Past and Future.* Stanford, CA: Hoover Institution Press.

Smith, J. Maynard. 1974. "The Theory of Games and Evolution in Animal Conflicts." *Journal of Theoretical Biology* 47: 209-221.

Smoke, Richard. 1993. *National Security and the Nuclear Dilemma: An Introduction to the American Experience.* NY: McGraw-Hill.

Snyder, Glenn. 1961. *Deterrence and Defense: Toward a Theory of National Security.* Princeton, NJ: Princeton University Press.

Steer, Cassandra. "Global Commons, Cosmic Commons: Implications of Military and Security Uses of Outer Space." *Georgetown Journal of International Affairs* 18 (1): 9-16.

Steff, Reuben. 2016. *Strategic Thinking, Deterrence and the US Ballistic Missile Defense Project: From Truman to Obama* (London, UK: Routledge, 2016).

Stent, Angela. 2015. *The Limits of Partnership: U.S.-Russian Relations in the Twenty-First Century.* Princeton, NJ: Princeton University Press.

Talbott, Strobe. 1982. "Time to START, Says Reagan," *TIME Magazine* (May 17), http://content.time.com/time/magazine/article/0,9171,921207,00.html.

United States Air Force. *Volume III: Command,* Annex 3-72 Nuclear Operations, available at https://www.doctrine.af.mil/dnv1vol3.htm.¥

Wenger, Andreas and Alex Wilner, eds. 2012. *Deterring Terrorism: Theory and Practice.* Stanford University Press.

White House. 2017. *National Security Strategy of the United States of America,* December, available at https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905-2.pdf.

Yost, David. 2011. “The US debate on NATO Nuclear Deterrence.” *International Affairs*

Zakaria, Fareed. 2008. *The Post-American World.* NY: W.W. Norton & Co.

Cadet Voice
A Curious Trinity: War, Media, and Public Opinion

Laura Olson

The following USAFA cadet Capstone project from spring 2017 won the Best Undergraduate Class Paper Award from the national Political Science honor society, Pi Sigma Alpha. The article appears, below, as submitted, with allowances for Space & Defense *formatting.*

August, 2012- President Obama drew a "Red Line" on chemical weapons use in Syria.[1] Just over a year later, a UN report confirmed Syrian chemical use. Two words, spoken by the most powerful man in the world, generated massive media coverage. Around the world, news outlets and people everywhere looked for Washington's reaction. Words are powerful because of the narrative they create; framing how people see the world. When a powerful enough frame is used, it sways people's views of the world, changing policy by extension. The words the President spoke were powerful because they created a frame for the issue of Syria. People the world over recognized the frame, thereby giving it power.

The media frame the way many see the world; this paper examines the extent of this frame. This paper examines the question, "What drives public support for military intervention in humanitarian crises?" This paper uses the similar systems model to evaluate the difference in public support for intervention using Kosovo and Syria as case studies. Media coverage and public support for intervention is contextualized by significant strategic events. This paper uses the common variables between Kosovo and Syria to isolates the variables which are different and might be responsible the difference in results. In the proper context, strategic changes to US policy can be self-reinforcing in terms of popular support. These actions must echo in the public memory, invoking association with previous positive policies. This echo in turn drives an increase in media exposure, on the issue in question, further increasing public support regardless of the nature of the exposure.

LITERATURE REVIEW

Because of the large role public opinion plays in the policy making process, it has been the source of extensive political science research. This paper evaluates two variant elements regarding past literature on public opinion. The first element is whether public opinion is reasonable and rational, or easily manipulated and unstable. The second is, to what extent do the way media frame their coverage give shape to public opinion.

There are two perspectives on public opinion which merit consideration. On one side lies the Almond-Lippmann Consensus, which holds that public opinion is volatile and unreliable.[2] Alternatively, a number of scholars believe that the public responds to information and events in a logical and

[1] Laura Olson, USAFA '17, is Second Lieutenant in the U.S. Air Force.

[2] Ole R. Holsti, "Public Opinion and Foreign Policy: Challenges to the Almond-Lippmann Consensus, Mershon Series: Research Programs and Debates," *International Studies Quarterly* 36, no. 4 (December 1992): 441, accessed April 15, 2017, JSTOR.

rational way.[3] The Almond-Lippmann Consensus arose in the decades after WWII, based on the concurring opinions of Walter Lippmann and Gabriel Almond. Walter Lippmann's argument is rooted in his 1922 work, where he advanced the thesis that the public is strictly focused on its immediate needs and has neither the time, nor interest to understand international politics.[4] In the years after WWII, he expanded his argument, stating that public opinion was not just uninformed, but was so off track it was dangerous:

"The unhappy truth is that the prevailing public opinion has been destructively wrong at the critical junctures. The people have impressed a critical veto upon the judgments of informed and responsible officials… Mass opinion has acquired mounting power in this country. It has shown itself to be a dangerous master of decision when the stakes are life and death."[5]

Gabriel Almond came to similar conclusions, warning against the volatility of public moods and "cyclical fluctuations which stand in the way of policy stability."[6] His 1956 article was written in Lippmann's style and created the basis for "mood theory," which stated that public opinion was volatile and easily impacted. According to his theory, if public opinion is easily influenced, it should play no role in politics. [7] Together, Almond and Lipmann form the Almond-Lippmann Consensus and the basis for one school of thought on public opinion. This consensus held sway throughout the 50s and 60s and counted many influential supporters in its ranks. Hans J. Morgenthau and George F. Kennan, [8] the source of the American policy of containment both supported this school of thought.[9]

A number of scholars challenged the Almond-Lippmann Consensus, citing the advances in public opinion research since the end of the Vietnam War, as well as numerous studies which prove stability in public opinion.[10] Shapiro and Page found that public opinion towards foreign policy changed in response to "international and domestic events that have been reported and interpreted by the mass media and by policymakers and other elites."[11] This school of thought has gained more traction in recent years, causing the focus to shift to the role that the media play in public opinion and the implications of their role.

The role of the media in public opinion is known as framing, and is considered one determiner of public opinion. A frame aims to reorient a person's thinking towards an issue,[12] Nelson and Kinder define a frame as, "[A frame determines] how [an issue] should be thought about, and may go so far as to recommend what (if anything) should be done."[13] Chong and Druckman define it as the following: "Framing refers to the process

[3] Robert Y. Shapiro and Benjamin I. Page, "Foreign Policy and the Rational Public," *Journal of Conflict Resolution* 32, no. 2 (June 1988): 211, accessed April 15, 2017.
[4] Walter Lippmann, *Public Opinion*, (London: Allen and Unwin), 1922.
[5] Walter Lippmann, *Essays in the Public Philosophy,* (Boston: Little, Brown, 1951), 20.
[6] Gabriel Almond, *The American People and Foreign Policy*, (New York: Praeger. 1950), 85.
[7] Gabriel A. Almond, "Public Opinion and National Security Policy," *Public Opinion Quarterly* 20, no. 2 (1956): 239, accessed April 15, 2017.
[8] George Kennan, American Diplomacy, (Chicago: University of Chicago Press, 1951). 1900-1 950.
[9] Holsti, 443.
[10] Ibid.
[11] Shapiro and Page, 211.
[12] Dennis Chong and Yael Wolinsky-Nahmias, "Managing Voter Ambivalence in Growth and Conservation Campaigns," Ambivalence, Politics and Public Policy, (2005), 104 accessed April 15, 2017.
[13] Thomas E. Nelson and Donald R. Kinder, "Issue Frames and Group-Centrism in American Public Opinion," The *Journal of Politics* 58, no. 4 (1996): 1055-1078.

by which people develop a particular conceptualization of an issue or reorient their thinking about an issue."[14]

The "CNN effect" is a specific type of media framing intended to mobilize support for humanitarian intervention.[15] Supporters of the "CNN effect" perspective believe that media framing of humanitarian crises is directly responsible for public support for humanitarian intervention. [16] Scholars, however, disagree on its public opinion impact. US intervention in Somalia, which is frequently cited as a case study for this claim, remains under contention. The CNN effect's ability to mobilize public support is well documented and can mobilize public support.[17] Other agencies, specifically human rights organizations, play a major role in drawing attention to and pressuring Western governments to intervene through 'human rights shaming'. They draw attention to the worst human rights violations and mobilize interventional efforts.[18] Alternatively, there is evidence that people choose the frames which are consistent with what they believe,[19] instead of being dictated to by outside sources.[20] The emotional connection to the frame, then, is more important than the content of the frame. The news media subsequently plays no real role in fostering public support for military intervention.

Another possible reason for public support for military intervention has no specific name, but will be called the public's collective memory for the sake of this paper. "Vietnam Syndrome" is a well-documented effect in which Americans view conflict in the light of past conflict.[21] While most commonly associated with wars, collective memory also encompasses military intervention. It is impacted by the political climate of the time, which is in turn impacted by previous interventions or their absences. For example, US intervention in Somalia was a reason why the US refrained from intervention in Rwanda.[22] Humanity's failure in Rwanda, prompted intervention in Kosovo.[23] The resultant struggle to direct and redirect action can be seen in public opinion and its influences,[24] although advocacy groups frequently pressure the government directly, instead of working through the public sentiment.[25]

Of the schools of thought considered here, the argument that affirms public opinion is stable and based on logical conclusions, appears to make the stronger argument. More difficult is

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[14] Dennis Chong and James N. Druckman, "Framing Theory," *Annual Review of Political Science* 10, no. 1 (2007): 104, accessed April 16, 2017.

[15] Alynna J Lyon. "Global Good Samaritans: When Do We Heed 'the Responsibility to Protect'?" *Irish Studies in International Affairs* 20, (2009): 45, accessed November 12, 2015.

[16] Amanda Murdie and Dursun Peksen, "The Impact of Human Rights INGO Shaming on Humanitarian Interventions," *The Journal of Politics* 76, no. 1 (2013): 216, accessed November 12, 2015.

[17] Peter Viggo Jakobsen, "National Interest, Humanitarianism or CNN: What Triggers UN Peace Enforcement After the Cold War?". *Journal of Peace Research* 33, no 2 (1996): accessed 11 November 2015.

[18] Amanda Murdie and Dursun Peksen, 216.

[19] P. M Sniderman S. M. Theriault. The Structure of Political Argument and the Logic of Issue Framing. In W. E. Saris & P. M. Sniderman (Eds.) *Studies in Public Opinion Princeton*, NJ: Princeton University Press, 2004. 133–165.

[20] Nelson and Kinder.

[21] Kurt Jacobsen, "Afghanistan and the Vietnam Syndrome," *Economic and Political Weekly* 36, no. 44 (2001): 4182-183.

[22] Jon Western and Joshua S. Goldstein, "Humanitarian Intervention Comes of Age: Lessons from Somalia to Libya," *Foreign Affairs* 90, no. 4 (2011): 48–59, accessed November 12, 2015

[23] Lyon, 44.

[24] Eric A Heinze, "The Rhetoric of Genocide in U.S. Foreign Policy: Rwanda and Darfur Compared," *Political Science Quarterly* 122 no. 3, (2007): 373.

[25] Scott Straus, "Darfur and the Genocide Debate". *Foreign Affairs* 84, no. 1 (2005): 125, accessed November 12, 2015.

to judge whether collective memory or media framing is a larger determiner of public opinion towards intervention.

According to past research, this paper expects some combination of the variables just described. The first possibility is that the public opinion data are reasonable and rational or easily manipulated and unstable, reinforcing the Almond-Lippmann Consensus. Alternatively, should the results prove public opinion reliable, the cause for the different public opinion results between the case studies could be caused by media framing, collective public memory, or some combination of the two. Framing literature contains both supporting and contradicting theories, making this paper a valuable contribution to the field. Most literature is concerned with the impact of public opinion on the decision to intervene, rather than what influences public opinion. The lack of literature on this topic is likely because public opinion research frequently falls into the area of sociology. Examining the political science side of the question offers a fresh perspective to issues already researched extensively.

METHODOLOGY

Elite framing of issues has been tied to US public opinion by scholars for decades.[26] It is widely accepted that media portrayal, slanted one way or another, changes how people view issues. The literature examined presents opposing interpretations for whether ignorance and capriciousness render public opinion useless as a metric. This paper utilizes the most similar systems model using Kosovo and Syria as case studies because of their mulitfactoral parallels: religiously motivated conflict, autocratic styles of government, United States reaction, NATO reaction. This study predicts that either media framing or collective memory is responsible for the changes seen in public opinion. Popular support for air strikes and ground forces, the dependent variable, is evaluated against the volume and type of media coverage for each crisis, the independent variable.

Kosovo and Syria were selected as case studies in this paper because of their similarities, and because both represent cases where the United States took action, making them positive case studies. Humanitarian crises in which the United States intervened were necessary to ensure data availability and issue salience for the American people.

The similar systems approach chooses case studies which have different results despite a great number of similarities. This study will explain the difference in the results by finding the variables which are inconsistent between the two cases.

Public opinion is evaluated by analyzing polling data for each crisis. These polls were obtained through iPOLL Databank from the Roper Center for Public Opinion Research and the Pew Research archives. Because the public support for intervention differed significantly depending on the type of intervention, the two most common forms of intervention, airstrikes and ground forces, were selected to illustrate trends in public support rather than a specific intervention. Similarly worded questions were grouped together, creating some variability in responses. John Zaller's suppositional work on public opinion argues that even minor changes in wording can create large changes in the poll responder.[27] This study attempts to take the data variation into account, but it is

[26] James N. Druckman, "Evaluating Framing Effects," *Journal of Economic Psychology* 22, no. 1 (2001): accessed April 19, 2017.

[27] John R. Zaller, *The Nature and Origins of Mass Opinion* (Cambridge: Cambridge University Press, 2005).

possible that media framing has no impact on public opinion. There were still large gaps in poll data where no polls were found. Where gaps existed because no polls had been conducted, the data were extrapolated to the next data point. Data are presented on a monthly basis, over a period of two years for Kosovo and four years for Syria. When more than one study was available, the results were averaged to present all of the information. Using such long periods of data collection and inference also introduces error when public opinion changes throughout the month due to significant events.

The independent variable, media framing, was operationalized by counting the frequency with which certain key words appeared in the media each month. The *New York Times* was used as the media source because it sets the agenda for other news agencies.[28] This study tracked key words which connote the need to intervene, versus words that would suggest the opposite. The goal was to determine how the *New York Times* framed the Syrian and Kosovo narrative, and to analogize popular response in determination of a framing effect. The words, "civil war," "civil unrest," "internal conflict," and "faction", were aggregated to portray a frame discouraging intervention. Traditionally, the United States has resisted becoming embroiled in the internal disputes of sovereign nations, a concept deeply engrained since the days of isolationism in the 1930s.[29]

The positive words which were intended to indicate a framing that encourages intervention, were "massacre," "suffering," "genocide," "ethnic cleansing," "famine," and "genocide," and "US obligation". The appearance of any of these words was believed to connote a humanitarian obligation to intervene.

The data are presented chronologically in a graph (Fig. 1), contextualized by key events in each crisis. These key events were selected based on their perceived impact on public opinion, occurring right before large spikes or plunges in data.

FINDINGS

Despite the many similarities in the Kosovo and Syria crises, support for intervention varied greatly, indicated in Figure 1. The goal of this study is to isolate the variable responsible for the difference in results seen between the two cases.

A causal and interdependent relationship appears between media coverage, government action, and public opinion, common across Kosovo and Syrian cases. Among the factors relating Kosovo and Syria is the complex relationship between government policies, the media, and public opinion. The media drives public opinion, but is influenced indirectly by government policies. Public opinion, although impacted by the frequency of exposure to certain frames, is also influenced heavily by memory and context of previous governmental policies. This trinity while perhaps intuitive in hindsight, often combines to have unforeseeable results. This relationship establishes not just common variables between cases, but a common interaction between media coverage, public opinion, and government policy change.

These three variables share a complex relationship, with each component fueling the others. Public opinion feeds on media

[28] Guy Golan, "Inter-Media Agenda Setting and Global News Coverage," *Journalism Studies* 7, no. 2 (February 17, 2007): 323, accessed April 17, 2017.

[29] John Milton. Cooper, *The Vanity of Power; American Isolationism and the First World War, 1914-1917* (Westport, CT: Greenwood Pub. Corp., 1969), 271.

coverage, which follows the stories. The most interesting media fodder is provided by internet conjectures, coverage of American strategic changes, and military action. The government ultimately answers to the people for any action it takes, and hopes for approval in serious strategic shifts. For example, public opinion would not support direct action in Syria after Assad's use of chemical weapons. Then, in response to the "Red Line" breach, President Obama bequeathed the decision to a hostile congress, who effectively killed any possibility for intervention. In Kosovo, airstrikes generated more media coverage, focusing the public's attention on the area, causing them to support it- until it cost them something. After public opinion turned against airstrikes, the government advocated for ground troops which enjoyed a higher approval rating. The three variables act; sometimes concurringly, and sometimes opposingly.

The similarities between cases go beyond their surface commonalities. Both countries have autocratic governments struggling with religiously motivated internal division. The former Yugoslav Republic, which once counted Kosovo as a part of its territory was majority ethnic Albanian, and resentment towards its Serbian rulers still rans deep. Syria's internal conflict revolves around pro-Assad forces, ISIS, and a rebel group, all of them hostile to the others. The source of the conflict in Yugoslavia was ethnic and religious between Muslim Albanians and Orthodox Serbs. In Syria the source was religious divisions among Sunni and Shi'ite Muslims. The Polity IV Project qualified Yugoslavia as an autocracy throughout the Kosovo crisis. Although data cuts off in 2013, the Polity Project has defined Syria as autocratic since 1970.[30]

Not only are Kosovo and Syria very similar in their internal politics, but the United States' reaction was similar as well. In both cases the United States joined coalition air strikes and considered using ground troops, but no ground troops were actually deployed.

This paper examines if media framing or collective memory could be the variable which explains the differences in public opinion.

MEDIA FRAMING

Media framing is expected to explain the different public opinion reactions to the similar cases of Syria and Kosovo. This section is dedicated to analyzing media framing and collective memory to explain the changes to public support for military intervention in Syria and then Kosovo. The correlation between media coverage and public support is more nuanced than expected. When research began, a direct correlation between public opinion and the frequency of key words in the media was anticipated. Beyond this initial expectation, support for intervention and an increase in words like "genocide" and "suffering" appeared in the media indicating a framing effect was also expected. There should have been an inverse correlation with the appearance of words like "civil unrest" and "civil war", both of which imply that the conflict was between internal parties. This approach to the study was based in the perception that Americans see it as their responsibility to relieve suffering and prevent genocide, while they resist any effort to intervene in the affairs of sovereign nations.

In the Syria case study the key events which precede a major change in both public opinion and media coverage are the "Red Line,"

[30] Monty Marshall, "Polity IV Project: Political Regime Characteristics and Transitions, 1800-2013," Polity IV Project, June 5, 2014, accessed April 24, 2017.

drawn in July, 2012; UN confirmed chemical weapons use in September, 2013. ISIS declared a caliphate in June of 2014 and rapidly expanded through Iraq and Syria in the following months. Its expansion prompted the first coalition airstrikes two months later. Russian airstrikes commenced a year later. See Figure 2.

This section compares each individual data line to public support for intervention. Upon examination of the graph, shown in Figure 3, three major spikes push the frequency scale over 200, Syrian President Assad's chemical weapons use, and the declaration of an Islamic Caliphate. Then there are minor media spikes of near one hundred. It happens that major shifts in US policy or in the strategic landscape correlate directly to the spikes in media coverage, which in turn relate directly to changes in public opinion. There is a trend of minor spikes in news coverage, followed by a reactionary major spike. A tertiary spike occurs in April of 2013, when President Obama declares a "Red Line" on chemical weapons in Syria. A major spike occurs in September of the same year after Assad uses chemical weapons, and the world looks to United States for a response to the "Red Line" violation. Minor spikes occur when ISIS seizes Raqqa, its first major city, in January of 2014; and when it takes Mosul and Takrit, in June of the same year. The secondary reactionary spike does not occur until the United States launches its first airstrikes, in September of 2014. The same pattern is seen in April of 2015 when ISIS' loss of Takrit is overshadowed by the reaction to Russian airstrikes in September of 2015. In each case, a major strategic change caused by the United States; and later, Russia, is the greatest generator of media coverage.

Ultimately, there appears to be no clear correlation that indicates a framing narrative pushed by the media and adopted by the public. Indeed, there appears to be a positive correlation between mentions of civil war and the public's willingness to intervene, demonstrated back in Figure 2. Indeed, the two results appear to be flipped, with a greater positive correlation shown by the negative framing, and a greater negative correlation seen in the positive framing. Consequently, there appears to be no direct impact of media framing on public opinion. From the figure discussed above, it is clear that there is no direct correlation between the type of coverage and the response in public opinion.

The most compelling narrative occurs when considering the aggregate media attention in Syria explained by significant strategic events, demonstrated in Figure 3. Since the value based framing appears to be ineffective in predicting public opinion, consideration of frequency based framing is warranted. Examining aggregate media coverage better reflects public support for intervention, with the obvious exception of the chemical weapons use in 2013.

A challenge with the data presented is the lack of consistent polling data. There were large gaps in the data during which no polling was conducted. Where data existed, as many as five polls in one month asked nearly identical questions, indicating sporadic periods of intense interest followed by nothing. Although Syria was chosen as case study because of the availability of polling data and issue salience (indicated in Figure 3), it is still far from complete. Its absence means that this study, lacking precision, could have been made more complete had more evenly spaced polls been conducted.

KOSOVO

The representation of data shows the same patterning trends of key political or military events followed by a spike in media coverage. The spike in coverage then leads a subsequent change in public opinion. This representation in the Syria case study appears to apply to Kosovo as well, Figure 4. Though January 1998, is the graphical starting point, however, hostilities between Yugoslav and Albanian Kosovars began long before 1998, when the first Kosovars were killed. The historical chronicling of events began when the Kosovars, who ruled with autonomy, came into conflict with Slobodan Milosevic, the president of Serbia. Milošević, the president of Serbia and Yugoslavia, began restricting their freedoms, and enflamed ethnic tension, already heightened by the breakup of Bosnia-Herzegovina in the mid-1990s. As Kosovo strained for its independence, Yugoslavia was determined to keep its, which heralded a bloody two years that would pull in many of the world's major powers.

January 1998- Ninety Kosovars die, victim of Serbian attacks. In reaction, theUN passes Resolution 1160, imposing an arms embargo on the Federal Republic of Yugoslavia until the Federal Republic of Yugoslavia and the Kosovar-Albanians open a dialog and the Serbs remove their troops from Kosovo. This generates initial public interest in the region; however, tensions continue to escalate despite the efforts of Europe.

While Syria's events are driven by dramatic events, Kosovo is the story of country slowly boiling over. The Kosovo situation slowly deteriorates as refugee numbers mount to 300,000 Kosovars, and NATO fighters conduct aerial demonstrations. Finally, NATO authorizes airstrikes in October, which causes a small spike in soon to be dissipated public attention. Collapsing peace talks, the mal-targeted NATO air campaign—which bombs a civilian train killing twenty, and a refugee convoy killing an additional seventy civilians—generates even more attention. However, these news-worthy events are not associated with a drop in public opinion—rather support for air strikes continues to grow independent of media framing, as seen in March 1999, Figure 5.

Next, support for ground troops, though initially higher than that toward air strikes, drops as the level of the air campaign expands. The correlating historical record shows that in April alone, 400 additional airplanes were requested to support the bombing campaign. Conversely, public support for airstrikes falls off dramatically after an Apache crash sees two American casualties. An additional survey asked people if they would be willing to sustain casualties in the Kosovo situation. Before the crash, 78% said they would; after the crash, that number fell by almost half. Americans were willing to support Kosovo with treasure, but guarded blood jealously. Not detailed in the graph, but important to the validity of public opinion as a metric was overall awareness of the Kosovo crisis. Far from being ignorant of the issues, before airstrikes were conducted, a third of Americans were following the issue. After America engages in the air campaign, the involved number rises to almost 90 percent.

Besides the concurring spikes in December, 1998 caused by the Yugoslav and Serbian forces breaking the cease-fire, the media anti-intervention and the media pro-intervention frame appear to occur independently, as opposed to Syria where they were directly correlated. Different results between case studies would normally mean that the variable explains the difference in results. However, in this case, the difference does not appear to

correlate to changes in public opinion. Rather it relates to overall media coverage, as shown in Figure 4.

DISCUSSION

This study finds that the public's opinions logically follow events and that the more the United States is invested in an area, the more people become interested in the region. These findings that public opinion is stable and well-reasoned do directly contradict the "Almond-Lippmann Consensus". Within the realms of this study public opinion as a metric has been validated, therefore remains the question: What drives public support for military intervention?

Some think that media frames determine the public's opinion, rather, we see that the media's role is to shine a light on issues frequently determined by the government. The "CNN effect," then, does not change public opinion instead, it is how the people see humanitarian crises in the context of previous conflicts that changes public opinion. Also conclusively greater total coverage had a greater influence on public opinion. The media can direct the focus of the public, but has little power to influence its opinions. Whether this is because people choose frames for emotional reasons, as the literature suggests, is outside the declared realm of this study. However, it could be the focus of future research.

Treated as isolated incidences, the public reactions to Kosovo and Syria appear to be random, but taken in the context of previous US interventions, the public's reaction is completely logical. President Obama's "Red Line" and Assad's subsequent use of chemical weapons is eerily similar to Saddam's use of chemical weapons against the Kurds, which brought about the First Gulf War. In even more recent memory is the 2003 invasion of Iraq, which was precipitated by outrage against weapons of mass destruction. The lack of an American response to the violation of our "Red Line," is consistent with the literature's support that the success of past interventions impacts the likelihood of future interventions. The public loosely categorizes American interventions abroad. As an example, Iraq was reminiscent of the First Gulf War, which was hugely successful. However, Syria is reminiscent of Iraq, which resulted in a decade long war without a successful outcome. In the people's eyes, ISIS is an extension of American policy failures in Iraq. Instead of seeing evil and trying to fix it, the public sees Syria as another Iraq waiting to happen.

Similarly, Russia's use of airstrikes in Syria brings back the eerie specter of the Cold War, a narrative made more compelling by Russian aggression in other areas. When Russia launched airstrikes in September of 2015, support for airstrikes specifically began to drop, falling off significantly, as media coverage of the skirmish decreased towards the middle of 2016.

With all other variables nearly identical, the difference between Syria and Kosovo was casualties. Kosovo was strongly reminiscent of Somalia, as the internal conflict and disproportionate level of media coverage can attest. The internal conflict with international mediators and UN intervention from the beginning, reminded Americans of what can happen when they send their sons and daughters overseas. It was for this reason that support for a NATO air campaign was so strong. When the phrasing of the polling questions changed to ask about unilateral action, support dropped by as many as twenty percentage points. As soon as Americans died, so did the support for that military action.

That support for airstrikes fell in Kosovo indicates that the connection to Somalia had been made. Americans were utterly casualty adverse. Simultaneously, the connection to Somalia was not completely formed, indicated by the remaining support for peacekeeping ground forces. Instead it appears that casualties invoked the collective memory of Somalia, and immediately changed public opinion and ultimately American policy.

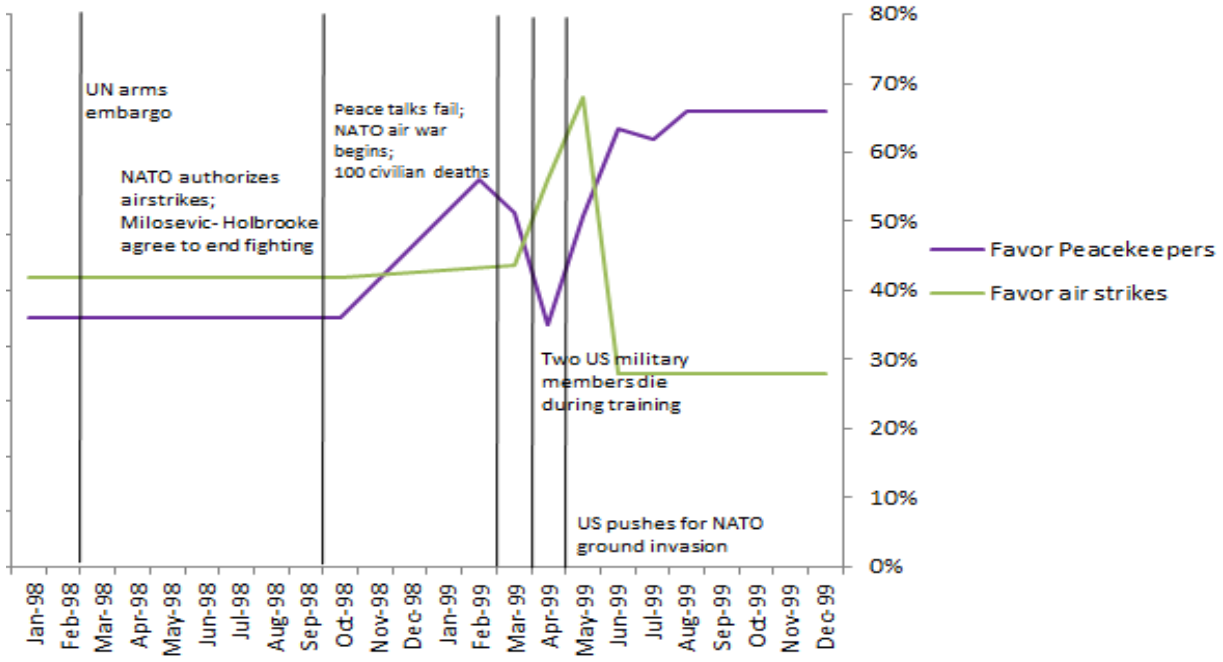
The responses to published opinion and public record of historical events should not be viewed as the only factors when international conflicts are happening in real time. Data points and data spikes cannot account for the knowledge known by actors at each point in the cycle of a crisis. Deeper correlations and causations may yet be brought to bear on recent history when revelations, and clearances time out.

CONCLUSION

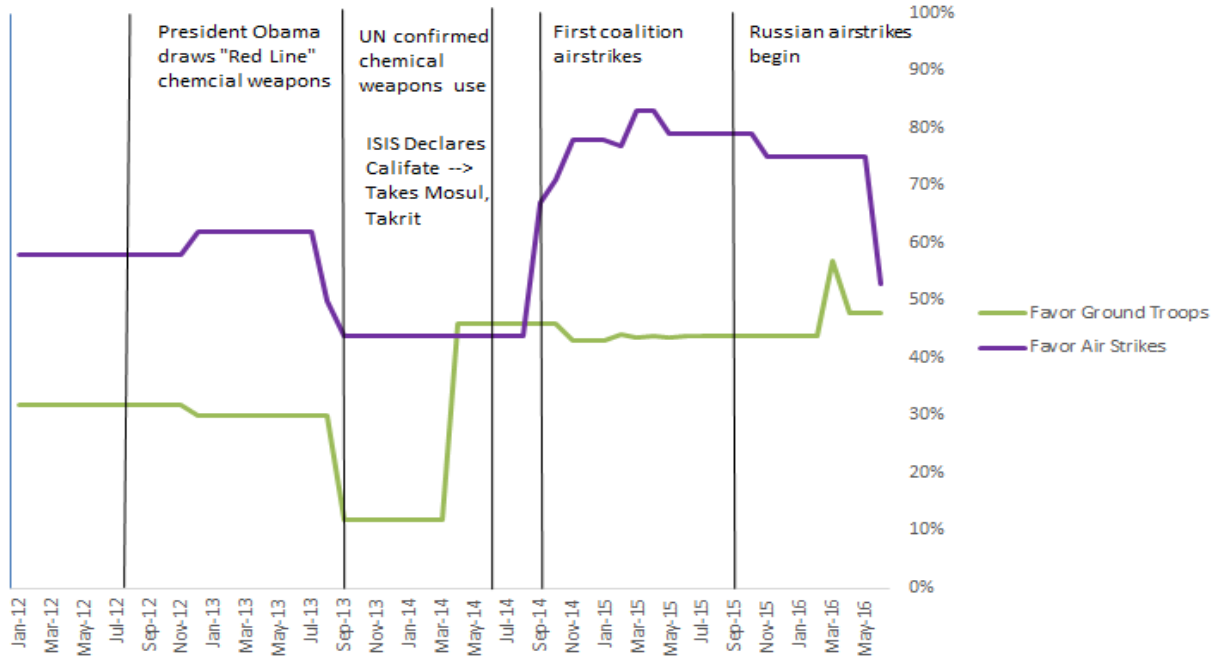
The government has the tremendous ability to shape public opinion and media through its policy. The government sets the agenda, and the media follows. The complex relationship between public opinion, government action, and the media provides the backbone of the similarities between cases, but the ultimate determiner of public opinion is the people themselves. The ideas and distillations of opinion leak out into not only polls and newspapers, but also into blogs and other social media. In fact, the media in all of its varying forms, acts as a conduit and catalyzer of public opinion, giving it a type of power. That power is far less than were it able to directly influence public opinion through specific frames. When all other variables are accounted for, it is the deaths of American servicemen in Kosovo that changed public opinion, summoning other frames of a similar helicopter crash just a few years prior.

Surely it is no secret to our government that American deaths bring both support and opposition to bear in international policies; it continues to be the government's job to justly protect and judiciously support. By extension, policies should never be made to sacrifice lives to change support for intervention. Though the media may focus attention like shining a flashlight on a vignette for a moment, it loses no lives, and sends no sons or daughters into harm's way.

Masked by sterile language and analysis, yet present throughout in the examples of Syria and Kosovo is another hideous truth: the morality of the public exists only until it is asked to sacrifice. For it is far easier to weep for the deaths of millions and call for intervention, knowing it will not happen, than it is to sacrifice your sons and daughters by the hundreds and thousands for an abstract ideal. Perhaps, this then is the difference between those who commit genocide and those who stand and do nothing. One side will kill for their ideal, but the other, though it weeps, will not be slain to promote their own.



Kosovo Support for Intervention



Syria Support for Intervention

Figure 1. Comparative public support for Kosovo and Syrian intervention.

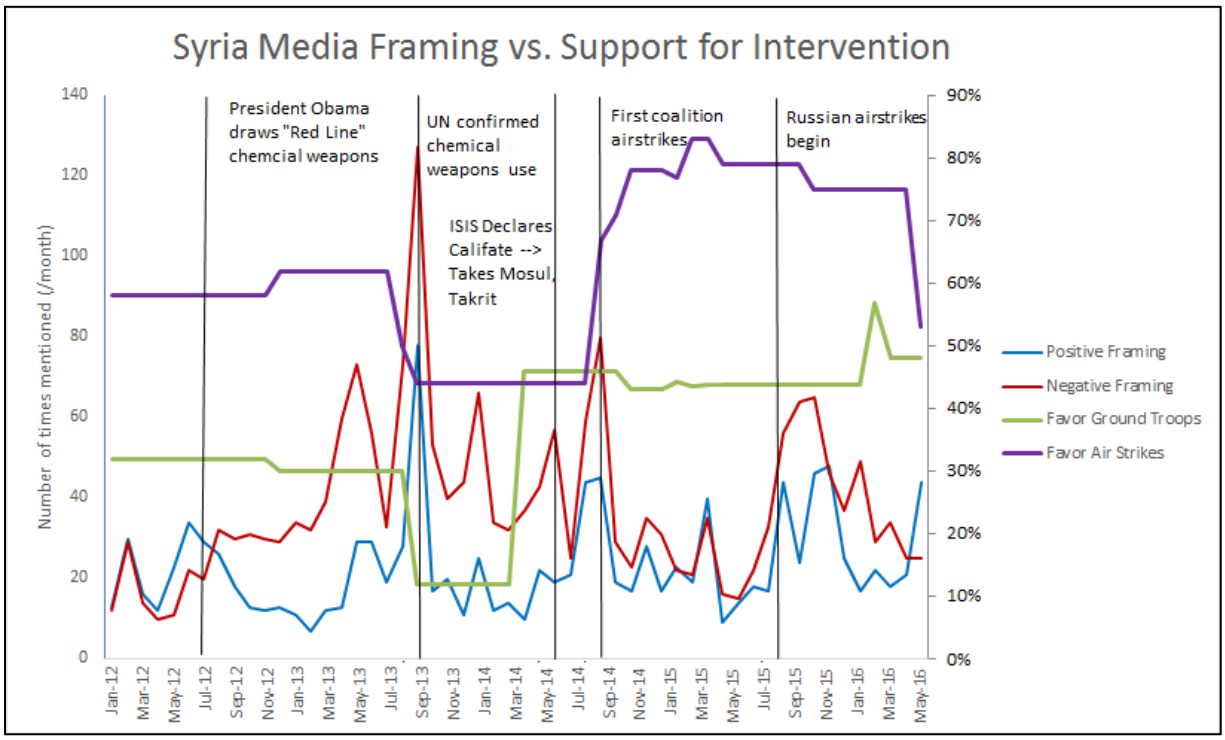


Figure 2. Positive and negative media framing for Syria versus support for military intervention.

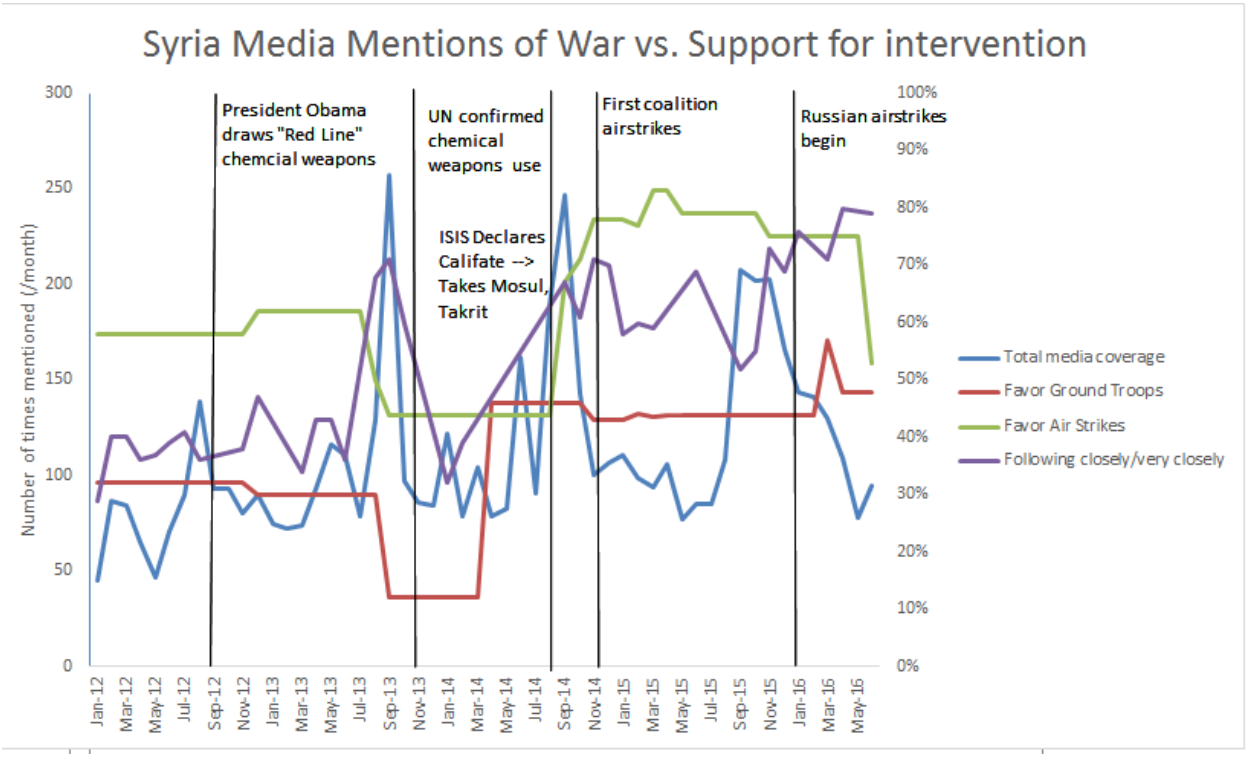


Figure 3. Aggregate media coverage, public support for intervention, with issue salience.

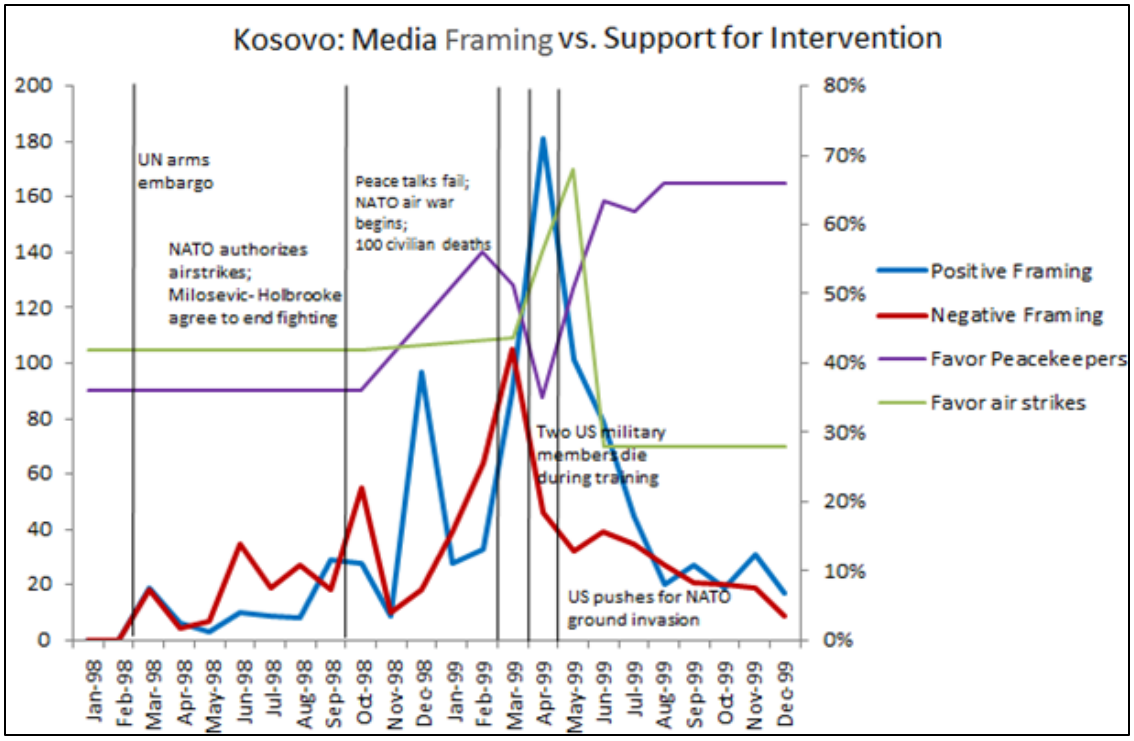


Figure 4. Overview of Kosovo media coverage and public support for military intervention.

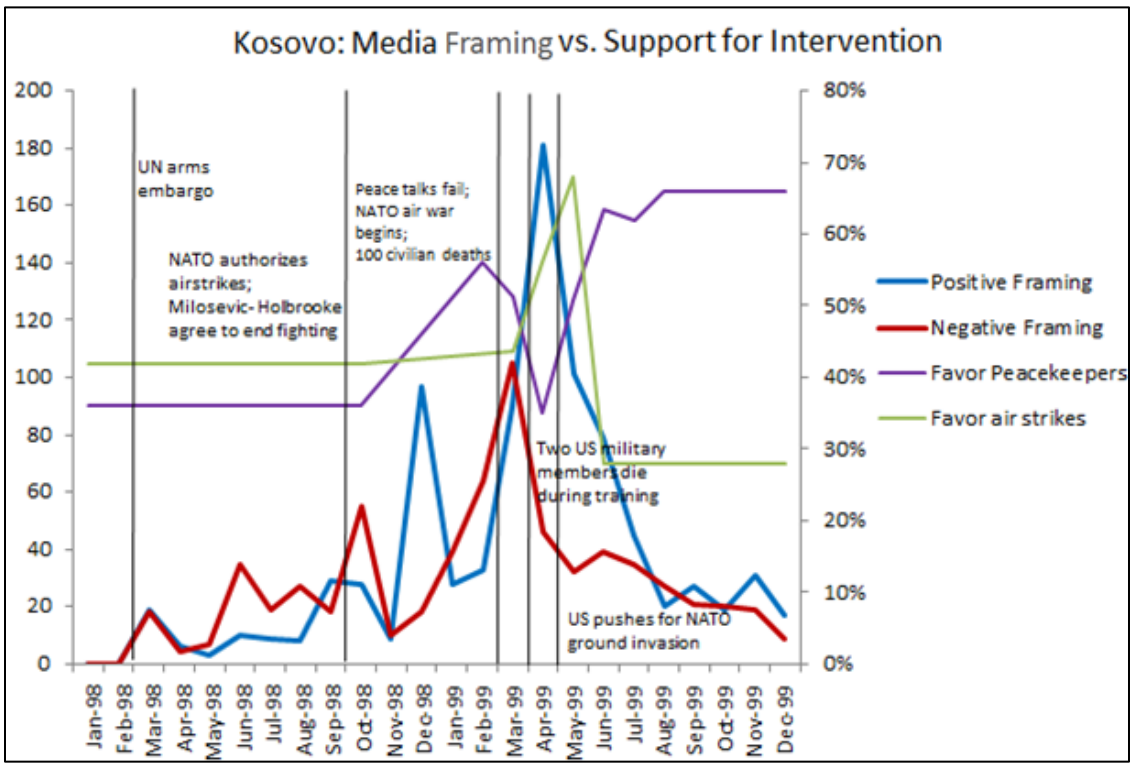


Figure 5. Positive and negative media framing for Syria versus support for military intervention.

BIBLIOGRAPHY

Almond, Gabriel A. "Public Opinion and National Security Policy." *Public Opinion Quarterly* 20.2 (1956): 371-78.

Bennett, Lance. "A View from the Academy." In *Taken by Storm: The Media, Public Opinion, and U.S. Foreign Policy in the Gulf War*, p. 10. Chicago: University of Chicago Press, 1994.

Chong, Dennis and Yael Wolinsky-Nahmias. “Green Fees: The Price of Open Space.” In *Ambivalence, Politics, and Public Policy*, eds. MD Martinez, SC Craig, pp. 103–25. New York: Palgrave, 2005.

Chong, Dennis, and James N. Druckman. "Framing Theory." *Annual Review of Political Science* 10.1 (2007): 103-26.

Chong, Dennis, and Yael Wolinsky-Nahmias. "Managing Voter Ambivalence in Growth and Conservation Campaigns." *Ambivalence, Politics and Public Policy* (2005): 103-25.

Cooper, John Milton. *The Vanity of Power; American Isolationism and the First World War*, 1914-1917. Westport, CT: Greenwood Pub. Corp., 1969.

Druckman, J. N. “Evaluating Framing Effects.” *Journal of Economic Psychology*, 22.1 (2001a): 91–101.

Garson, Robert. "Culture, Identity and International Relations." *Ordering the International: History, Change and Transformation*. London: Pluto Press, 2004, pp. 189-97.

Golan, Guy. "Inter-Media Agenda Setting and Global News Coverage." *Journalism Studies* 7.2 (2007): 323-33.

Holsti, Ole R. "Public Opinion and Foreign Policy: Challenges to the Almond-Lippmann Consensus.” Mershon Series: Research Programs and Debates. *International Studies Quarterly* 36.4 (1992): 439.

John, Tara. "This Timeline Shows the Rise of ISIS." Time. October 15, 2015. Accessed December 15, 2016. http://time.com/4030714/isis-timeline-islamic-state/.

Lippmann, Walter. *Essays in the Public Philosophy*. Boston: Little, Brown, 1951.

Lippmann, Walter. *Public Opinion*. London: Allen & Unwin, 1922.

Marshall, Monty. "Polity IV Project: Political Regime Characteristics and Transitions, 1800-2013." Polity IV Project. June 5, 2014.

Nelson, T.E. and D.R. Kinder. “Issue Frames and Group-Centrism in American Public Opinion. *J. Polit.* 58 (1996): 1055–78.

Nelson, Thomas E., and Donald R. Kinder. "Issue Frames and Group-Centrism in American Public Opinion." *The Journal of Politics* 58.4 (1996): 1055-1078.

News, BBC. "Syria profile - Timeline." BBC News. December 05, 2016. Accessed December 15, 2016. http://www.bbc.com/news/world-middle-east-14703995.

"Polls - Roper Center." Roper Center for Public Opinion Research. Accessed December 15, 2016. http://ropercenter.cornell.edu/polls/.

Shapiro, R. Y., and B. I. Page. "Foreign Policy and the Rational Public." *Journal of Conflict Resolution* 32.2 (1988): 211-47.

Sniderman, P.M. and S.M. Theriault. “The Structure of Political Argument and the Logic of Issue Framing.” In W.E. Saris & P.M. Sniderman, eds. *Studies in Public Opinion,* pp. 133–165. Princeton, NJ: Princeton University Press, 2004.

Western, Jon, and Joshua S. Goldstein. “Humanitarian Intervention Comes of Age: Lessons from Somalia to Libya.” *Foreign Affairs* 90.6 (2011): 48-59.

Zaller, John R. *The Nature and Origins of Mass Opinion*. Cambridge: Cambridge University Press, 2005.

WORKS REFERENCED

Brewer, P.R., J. Graf, and L. Willnat. “Priming or Framing: Media Influence on Attitudes toward Foreign Countries.” *Int. J. Commun. Stud.* 65 (2003): 493–508.

Druckman, J.N. “On the Limits of Framing Effects: Who Can Frame?” *The Journal of Politics*, 63 (2001b): 1041–1066.

Druckman, J.N. “The Implications of Framing Effects for Citizen Competence.” *Polit. Behav.* 23 (2001c): 225–56.

Gamson, W.A. and A. Modigliani. “The Changing Culture of Affirmative Action.” In R. D. Braungart, ed. *Research in Political Sociology,* Vol. 3, pp. 137–177. Greenwich, CT: JAI, 1987.

Keren, Gideon, James Druckman, and Payson Wild. *Perspectives on Framing*. New York: Psychology Press, 2011.

Kinder, D.R. and L.M. Sanders. *Divided By Color: Racial Politics and Democratic Ideals*. Chicago: Univ. Chicago Press, 1996.

Scheufele, D.A. “Framing as a Theory of Media Effects.” *J. Commun.* 49 (1999): 103–22.

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Indeed, the emergence of space as a unique and critical element in national security, economic security, homeland security, cyber security, environmental security, and even human security has persuaded us that this line of inquiry is vital to innovation for international security.

Contributions are welcome from academic scholars and policy analysts at think tanks and research institutes; senior management and policy officials from international and governmental agencies and departments relevant to space and security issues; senior management and policy officials from organizations responsible for critical national and international infrastructures that rely upon space; major aerospace corporations; scientists and engineers interested or involved in space and security policy issues; military officers and operators in relevant units, commands, and in staff colleges and service academies.

The journal welcomes submissions of scholarly, independent research articles and viewpoint essays. There is no standard length for articles, but 7,500 to 10,000 words, including notes and references, is a useful target for research articles, and viewpoint essays should be in the range of 2,500 to 5,000 words. The opinions, conclusions, and recommendations expressed or implied within *Space & Defense* are those of the contributors and do not reflect those of the Eisenhower Center for Space and Defense Studies, the Air Force Academy, the Air Force, the Department of Defense, or any other agency of the United States Government.

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Details of the author's institutional affiliation, full address, and other contact information should be included in a separate file or cover sheet.

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TABLES AND FIGURES

All maps, diagrams, charts, and graphs should be referred to as figures and consecutively numbered and given appropriate captions. Captions for each figure should be submitted on the same page as the figure to avoid confusion. Tables should be kept to a minimum and contain only essential data. Each figure and table must be given an Arabic numeral, followed by a heading, and be referred to in the text. Figures and tables are not to be embedded in the text. Each table and figure should be clearly labeled. In the text, make sure and clearly explain all aspects of any figures or tables used.

STYLE

Authors are responsible for ensuring that their manuscripts conform to the style of *Space & Defense*. The editors will not undertake retyping of manuscripts before publication. Please follow the Chicago Manual of Style.
Listed below are some additional style and writing guides:

- Dates in the form: 1 January 2009.
- Headings (bold, ALL CAPS, title case and centered).
- Subheadings (bold, italic, title case and centered).
- Acronyms/abbreviations should always be spelled out in full on first use in the text.
- The 24-hour clock is used for time, e.g., 0800, 1300, 1800.
- Use percent rather than % except in figures and tables.
- For numbers, spell out numbers less than 10.
- Make use of 21st style where appropriate.
- Keep capitalization to a minimum.
- Concise paragraphs and sentences are desirable.
- Avoid a paper that is just descriptive; rather engage the literature and provide analytical rigor and assessment.
- Avoid policy recommendations in the analysis part of paper; leave this, if applicable, for a separate section at the end of the paper.
- Define all new terms used in paper.
- Avoid hyphenated words when possible (e.g., low Earth orbit).
- Avoid the use of passive voice when possible.
- Footnotes, numbered consecutively with a raised numeral in the text, use the Insert-Preference-Footnote function of Word.