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FROM THE EDITOR

Dear Reader,

As of this writing, Russia's war in Ukraine continues, now halfway through its second year. Cities and countrysides, and the human lives within them, have been uprooted or destroyed, and changed forever. The suspected sabotage in early June by Russia of a major dam on the Dnipro River is only the most recent example of Russian leaders' persistent disregard for loss of life and international laws pertaining to noncombatants. This disregard for international conventions and for historical international norms is perhaps most clearly seen in Russian President Vladimir Putin's threats to employ nuclear weapons.

Accordingly, our summer issue leads with a *Special Commentary* by James McCue, Adam Lowther, and James Davis, who compare the effects of low-yield tactical nuclear weapons with conventional precision-guided munitions and conclude both contribute to deterrence in important ways. Our *Strategic Messaging* forum begins with Brandon Colas' analysis of the likelihood that Putin will rationalize the choice to deploy non-strategic nuclear weapons based on three propositions found in US strategic messaging and global beliefs about the implications for a Russian loss to Ukraine. Max Schreiber concludes the forum with a historical analysis that argues for clear, direct strategic messaging about America's goals in space, delivered by US senior leaders as well as by the US Space Force.

Russia's war in Ukraine, following the global pandemic, has only underscored the reality we are globally interconnected and thus interdependent across nation-state lines in countless ways. Phillip Meilinger leads our *War in an Era of Global Dependence* forum with a discussion of the application of lessons learned from North America's own history of tribal conflict to the challenge of promoting peace globally in places plagued by internecine cultural and tribal conflict today, a challenge that can be addressed using particular tools under international consensus. In the second part of the forum, Peter Layton proposes airpower thinkers must reconsider twentieth-century supply chain warfare, engaging a systems analysis of the contemporary supply chain, which is characterized by semi-openness, multiple causality, and dispersed nodes.

Our issue ends with our *Tech Challenges* forum. Ian Heffron, Mark Reith, and James Dean employ a DOTMLPF-P analysis framework to argue for the creation of a

separate cyber force, consistent with the historical models of separate forces for the doctrinal domains of warfare, seen most recently in the establishment of the US Space Force.

Thank you for taking the time to read this issue of *Æther*. As always, we welcome and encourage informed, scholarly responses, from 1,000 to 2,000 words including the notes, to our articles. These can be submitted to the journal via our email address. **Æ**

~ The Editor

A TACTICAL NUCLEAR MINDSET
DETERRING WITH CONVENTIONAL APPLES AND NUCLEAR ORANGES

James R. McCue

Adam Lowther

James Davis

Some suggest low-yield tactical nuclear weapons are obsolete because similar effects are achievable with conventional precision-guided munitions. For others, low-yield tactical nuclear weapons are more important than ever. Comparing and contrasting low-yield theater nuclear weapons with conventional precision-strike weapons offers a means to assess the strengths and weaknesses of both, leading to a nuanced conclusion that sees the utility of conventional precision-strike and low-yield theater nuclear weapons, with both contributing to deterrence.

With the defense community debating a potential North Atlantic Treaty Organization (NATO) response to Russia's use of low-yield tactical nuclear weapons, this article comes at a prescient time. Russian President Vladimir Putin's regular threats to use nuclear weapons and Russia's recent deployment of these weapons to Belarus are reason for significant concern and ample motivation to explore the topic.[1]

For some defense analysts, low-yield tactical nuclear weapons are obsolete because similar effects are achievable with conventional precision-guided munitions (PGM).[2] For others, low-yield tactical nuclear weapons are more important than ever.[3] This article compares and contrasts low-yield theater nuclear weapons with conventional

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Major James Davis, USA, is a Europe and Eurasia foreign area officer serving in security cooperation with US Central Command. He holds a master of arts degree in international relations from the University of Oklahoma.

1. Timothy H. J. Nerozzi, "Putin Issues Nuclear Warning to US, Threatens to Resume Weapons Tests," Fox News, February 21, 2023, https://www.foxnews.com/; and Guy Faulconbridge, "Russia Moves ahead with Deployment of Tactical Nukes in Belarus," Reuters, May 25, 2023, https://www.reuters.com/.

2. Hans M. Kristensen and Adam Mount, "Why NATO Should Eliminate Its Tactical Nukes, Despite Russian Belligerence," *Bulletin of the Atomic Scientists*, September 3, 2014, https://thebulletin.org/; and Parkha Durrani, "Precision Technologies: Replacement to Conventional Weapons?," *Modern Diplomacy*, July 21, 2020, https://moderndiplomacy.eu/.

3. Adam Lowther et al., "Just How Radioactive Are Low-Yield Nuclear Weapons?," The Drive, December 19, 2022, https://www.thedrive.com/.

precision-strike weapons as a means to assess the strengths and weaknesses of both. This comparison yields a nuanced conclusion that sees the utility of conventional precision-strike and low-yield theater nuclear weapons, with both contributing to deterrence.

Strategic Environment

At the height of the Cold War, Secretary of State Henry Kissinger posited a devastating theater nuclear war where hundreds of nonstrategic, often low-yield nuclear weapons were detonated without leading to nuclear Armageddon.[4] Fortunately, that war never came, and with the collapse of the Soviet Union, such uncomfortable conversations slid into distant memory.

Today, however, presidents and prime ministers in Europe and Asia are relearning forgotten lessons about theater nuclear war. Putin's repeated threats, China's nuclear breakout, and North Korea's recent tests are worrying the free world and presenting a clear challenge.[5]

While the United States, United Kingdom, and France spent the last three decades reducing their stockpiles of low-yield theater nuclear weapons, adversaries were developing new capabilities while increasing their arsenals.[6] In the case of Russia, its impressive array of low-yield options are specifically designed to shape conflict in Europe and are not limited by the New Strategic Arms Reduction Treaty (New START).[7]

Adversary investments in low-yield theater nuclear weapons are at odds with American values and contemporary warfighting philosophy, which prioritizes reduced collateral damage. Nuclear states without precision-strike capability or the stealth aircraft to deliver nuclear bombs fear America's exquisite conventional capabilities, which provide a lethal and usable threat. But the psychological effects and political ramifications of nuclear employment, especially with low-yield theater nuclear weapons, remain. In some cases, the primary, even sole purpose of a nuclear explosion might be nonphysical. Analyzing these implications requires first understanding the degree of difference in terms of military utility between the two options.

4. Henry Kissenger, *Nuclear Weapons and Foreign Policy* (New York: W. W. Norton, 1958) 114–44.

5. Guy Faulconbridge, "Russia's Putin Issues New Nuclear Warnings to West over Ukraine," Reuters, February 21, 2023, https://www.reuters.com/; Rebecca L. Heinrichs, "China's Destabilizing Nuclear Weapons 'Strategic Breakout,' " Hudson Institute (website), September 8, 2021, https://www.hudson.org/; and Nuclear Threat Initiative (NTI), "The CNS North Korea Missile Test Database," NTI, April 28, 2023, https://www.nti.org/.

6. Hans M. Kristensen and Matt Korda, "Tactical Nuclear Weapons, 2019," *Bulletin of the Atomic Scientists* 75, no. 5 (2019), https://doi.org/.

7. "New START Treaty," US Department of State, n.d., https://www.state.gov/.

Modern Battlefield Nuclear Effects: Certainty, Efficiency, and Convergence

The post-Cold War peace dividend reduced the focus on nuclear weapons, shifting attention to precision-guided munitions.[8] The financial and technical investment that underpinned the exceptional range, speed, and accuracy of nuclear weapons was turned toward conventional forces. These complements to the high-order destruction of nuclear weapons increased PGM attack efficiency. Better certainty and efficiency combined to reduce the outcome differences between a limited nuclear strike and that of precision-strike conventional weapons. This is partially because the most technologically advanced delivery platforms are often non-nuclear, resulting in non-nuclear precision-strike weapons that are sometimes better postured to defeat advanced air defenses. The air defense challenge would be particularly acute were the United States' small arsenal of low-yield theater nuclear weapons to come up against Russia's more than a dozen different types of theater nuclear weapon systems supporting at least 2,000 warheads.[9]

Although conventional weapons can never rival the pure destructive power of nuclear weapons, their military utility is converging with that of low-yield nuclear weapons because of the certainty and efficiency with which they strike discreet targets. This convergence is leading to a future where conventional-nuclear integration will play a critical role in American strategy.[10]

Certainty: Benefits and Challenges of Conventional and Low-Yield Nuclear Weapons

It is worth reiterating that nuclear fuels have a substantial advantage over conventional weapons regarding stored explosive energy. Uranium-235 produces 16 million times more energy than the equivalent weight of conventional TNT, which allows a nuclear weapon to pack a much larger punch.[11] Conventional weapons will never reach the capacity of nuclear weapons in this regard. For example, the GBU-43 Mother Of All Bombs (MOAB) is the highest yield conventional weapon in the American arsenal at 11 tons of TNT equivalent, or 0.011 kilotons. That weapon is so large it must be dropped from a cargo plane. By contrast, a fighter aircraft can deliver a B61 nuclear bomb, which offers a range of yields many times larger than the MOAB. Extraordinary energy density is just one of the unique characteristics nuclear weapons possess.

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8. N. R. Jenzen-Jones and Jack Shanley, "Precision Strike: A Brief Development History of PGMs," *RUSI Journal* 166, no. 5 (2021), https://doi.org/.

9. "Fact Sheet: Russia's Nuclear Inventory," Center for Arms Control and Nonproliferation, September 15, 2022, https://armscontrolcenter.org/.

10. Gregory Giles, "Conventional-Nuclear Integration: Avoiding Misconceptions and Mistakes," War on the Rocks, August 10, 2021, https://warontherocks.com/.

11. US Department of Energy, Office of History and Heritage Resources, "Yield/Efficiency," The Manhattan Project: An Interactive History, n.d., https://www.osti.gov/.

Yet the clearest area where current American nuclear weapons are losing their advantage over conventional weapons is in the realm of a strike's guaranteed success. Before a weapon can destroy its target, it must first possess the range, accuracy, and defense defeat measures to arrive at the target area. Much of the strategic nuclear modernization effort is designed to address these challenges. The same effort is not underway for the nation's remaining theater nuclear weapons.

Heavy investment during the early years of the nuclear arms race resulted in exquisite nuclear delivery capabilities. The Cold War pitted the most advanced American offenses against the world's best air and missile defenses. For these reasons nuclear weapons were the only option for certain destruction of the adversary's vital targets.

Today, however, state-of-the-art air defenses are two generations ahead of American theater nuclear weapons. Meanwhile, conventional weapons see high-frequency updates, and their low relative cost is leveraged to achieve high certainty of arrival and high target destruction through the sum of their collective efforts.[12] Now, conventional strike leads the way and is being used to modernize nuclear B61-12 gravity bombs.[13] Introducing precision to the B61 maximizes its variable-yield capability for employing lower yield to achieve the same effects against the same target while simultaneously posing lower collateral risks.

In addition to the slower upgrade cycle, challenges to promptness include special procedures for nuclear employment. For the United States, release authority resides solely, and rightly, with the president. For NATO, assigned weapons approval comes from the Nuclear Planning Group.[14] These two challenges mean that nuclear weapons employment is generally slower and the support package significantly larger than that of a purely conventional mission against a similar target. Thus, nuclear retaliation is so difficult that the B61 is primarily a political tool for holding the Alliance together.

Today, assured penetration relies as much on tactics as it does on technology. Concepts such as collaborative networking combined with low-cost acceptable attrition and dynamic off-board sensor-cueing or even dynamic routing and in-flight retargeting are necessary capabilities for successful strikes against peer adversaries.[15] The special nature of nuclear weapons, noted above, excludes them from leveraging such penetration

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12. Joseph Trevithick, "Here Is What Each of the Pentagon's Air-Launched Missiles and Bombs Actually Cost," The Drive, updated February 18, 2020, https://www.thedrive.com/; and AFResearchLab, "Networked Weapons," premiered on September 29, 2020, YouTube video, 1:50, https://youtu.be/.

13. "B61-12 Nuclear Bomb," Air Force Technology (website), November 6, 2020, https://www.airforce-technology.com/.

14. North Atlantic Treaty Organization (NATO), "NATO's Nuclear Deterrence Policy and Forces," NATO (website), May 23, 2023, https://www.nato.int/.

15. Shujang Tang et al., "The Searching Model and Strategy for Passive Sensor Cue of Phased Array Radar," *MATEC Web of Conferences* 31 (2015), https://doi.org/; "Maritime Systems & Solutions," Lockheed Martin (website), n.d., https://www.lockheedmartin.com/; and PR Newswire, "Raytheon Demonstrates Joint Standoff Weapon Data Link and Message Set," news release, Raytheon Technologies (website), January 31, 2006, https://raytheon.mediaroom.com/

tactics. Of course, this rosy picture of next-generation precision is not without its own shortcomings.

Precision targeting, whether applied to conventional or nuclear weapons, relies on highly accurate intelligence, surveillance, and reconnaissance (ISR) to find, fix, and strike a target. This part of the so-called kill chain has its limits. First, it is possible to deny or degrade the identification of targets, thus reducing the effectiveness of accurately hitting a location that corresponds to the target, or at least corresponded to it.

Additionally, it is possible to degrade guidance systems, such as by spoofing or jamming GPS signals to cause a weapon to miss by hundreds of feet or lose GPS guidance entirely.[16] Likewise, inclement weather, smoke generators, radar jammers, and other countermeasures are problematic for finding and fixing the mobile elements of a target set. Camouflage, concealment, and deception (CCD); active and passive defenses; and contested and/or degraded operations all make it difficult to achieve precision strike.

Regardless, the most advanced weapons, such as extreme-range cruise missiles, hypersonic glide vehicles (HGV), and even the now common Joint direct attack munitions (JDAMs) are unlikely to exist in sufficient quantities for a protracted war of attrition.[17] Magazine depth is a serious challenge for the United States. In short, the fog and friction of war are certain to challenge precision operations in a major theater war against a peer adversary, and there may still be a place for threatening certain destruction even if an adversary makes the United States miss. The simple solution for certain destruction of mobile missiles of uncertain location is to use a higher yield weapon. Moving from 5 to 50 kilotons allows a variable-yield, yet still plausibly low-yield weapon to more than double its kill range against most vehicles—from approximately 2,000 feet to well over 4,000 feet.[18]

Targeting countermeasures complicate precision, but there are reasons beyond simply extending miss distance where low-yield nuclear weapons possess enduring and unique military utility. Only nuclear weapons can threaten the most hardened point targets or produce an electromagnetic pulse (EMP). It goes without saying that the political and psychological effects of nuclear weapons, which are impossible to replicate with conventional weapons, can never be taken for granted. But conventional weapons technology is undoubtedly chipping away at the exclusive trade space of nuclear weapons in respect to providing certainty of destruction on the battlefield. Still, there is another physical consideration that could prove definitive for the choice of which weapon is most appropriate for a given situation.

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16. Kyle Mizokami, "GPS-Guided Bombs Should've Been Ukraine's Ace in the Hole. Then, Russian Jamming Stepped In," *Popular Mechanics*, April 20, 2023, https://www.popularmechanics.com/.

17. Center for Strategic and International Studies (CSIS), "JASSM / JASSM ER," Missile Threat: CSIS Missile Defense Project, updated July 30, 2021, https://missilethreat.csis.org/.

18. Jean M. Bele, "Blast Wave Effects Calculator," Nuclear Weapons Education Project (Massachusetts Institute of Technology), n.d., https://nuclearweaponsedproj.mit.edu/.

Efficiency: Nuclear Still Reigns Supreme

The *United States Strategic Bombing Surveys*, conducted immediately following World War II, provides a useful tool for comparing nuclear with conventional weapon utility.[19] Admittedly, this somewhat oversimplifies nuclear weapon effects to their destruction factor. Nevertheless it offers a useful starting point for a broader discussion.

The *Strategic Bombing Surveys* estimated that it would take 220 uncontested B-29 bombers dropping 17,600 unguided 500-pound gravity bombs—4,400,000 pounds of conventional explosives—on Hiroshima to achieve a similar scale of destruction as the Little Boy atomic bomb. Little Boy, the single 15-kiloton atomic weapon that was detonated approximately 1,900 feet above the ground, produced very little residual radiation but collapsed buildings a mile away.[20]

This means that one nuclear-armed B-29 was more than 200 times more destructive than its fully-armed conventional counterpart. Today this ratio differs for a number of reasons. For one, modern bombers can carry up to 20 variable-yield nuclear weapons. Meanwhile, conventionally armed aircraft carry precision-guided munitions that make the World War II versions of precision look ancient by comparison. While conventional explosives continue to decrease in size, a five-kiloton nuclear explosion has changed little. In other words, as conventional munitions become more lethal, the destruction of an airfield, for example, still requires a similar nuclear yield.

Evaluating the efficiency of conventional bombers in comparison to their nuclear counterparts should reveal the contrast between the efforts needed to achieve similar damage. This article uses the term "platform efficiency" to further the concept started with the *Strategic Bombing Surveys*. The platform efficiency method allows for considering unlike weapons carried on a variety of aircraft by grading in terms of the platform's ability to service a target. World War II precision bombing required hundreds of bombers in contested skies to service a single area target, such as an airfield, port, or industrial base.[21]

Modern precision means far fewer bombers are needed for a target set, or, in the case of nuclear weapons, a single bomber can now service several targets. Figure 1 shows how a single five-kiloton nuclear weapon exploded above a tactical airfield would disable aviation operations by destroying aircraft and infrastructure, but not

19. Air University, Center for Aerospace Doctrine, Research, and Education, *The United States Strategic Bombing Surveys: (European War), (Pacific War)* (Maxwell AFB, AL: Air University Press, 1987), https://archive.org/.
20. Editors of *Encyclopaedia Britannica*, "Atomic Bombings of Hiroshima and Nagasaki: World War II (1945)," Britannica (website), updated May 21, 2023, https://www.britannica.com/; Lowther et al., "Low-Yield Nuclear Weapons"; and Colin Innes, "Hiroshima Bomb: The Day Michiko Nearly Missed Her Train," BBC News, August 6, 2020, https://www.bbc.com/news/.
21. "Pearl Harbor Attack: Overview," Military.com, n.d., https://www.military.com/; and John M. Curatola, "'Black Thursday' October 14, 1943: The Second Schweinfurt Bombing Raid," National World War II Museum (website), October 17, 2022, https://www.nationalww2museum.org/.

the runway. It should be noted that the depiction artificially concentrates airfield assets, which creates a generous calculation.
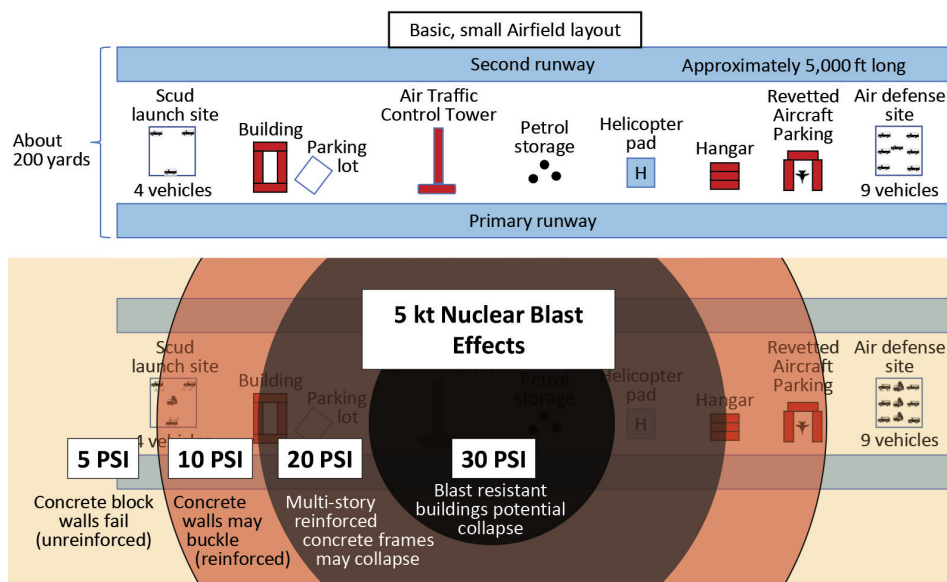
Figure 1. Blast effects of five-kiloton nuclear strike (fallout free height of burst)

Thanks to a Department of Defense video from a 2003 test at Dugway Proving Ground, it is possible to see a conventionally armed bomber strike a similar target.[22] A B-2 stealth bomber delivers GPS-guided 500-pound bombs in a single pass. Figure 2 makes it clear that the PGM-armed bomber provides virtually the same level of destruction.
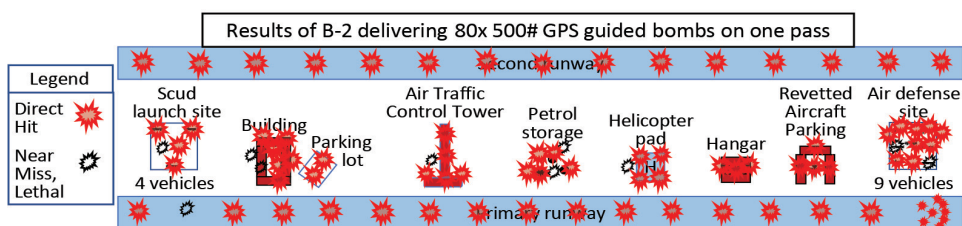
Figure 2. Diagram of B-2 test strike of 80 Joint direct attack munitions

The degree of precision available at the time of the Dugway test is highlighted by the video's narrator, who in describing the results of the test notes most hits were lethal near-misses or direct hits. Of key interest is the fact that basic airfield defense doctrine, dispersing air defenses offsite and adding aircraft revetments, does not

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22. sferrin2, "B-2 Drops 80 JDAMs," uploaded September 3, 2014, YouTube video, 3:48, https://youtu.be/.

mitigate the damage. Additionally, regularly spaced craters down the runway render it unusable far longer than a fallout free nuclear strike could. Within the context of this highly idealized scenario, it is possible to appreciate where conventional platform efficiency might stand today, after two decades of advancement since that test.

It is worth pointing out that the certainty and efficiency of American conventional airpower is one of the key factors driving China, North Korea, and Russia to develop low-yield theater-range nuclear arsenals.[23] These adversaries have yet to master the technologies of advanced conventional capabilities, which drives their renewed interest in tactical nuclear weapons.

Technological Convergence

Sensor miniaturization and integrated circuits are shrinking conventional munitions and increasing platform lethality. Bombs keep getting smaller while bomblets keep getting smarter. This trend expands the versatility of conventional weapons, allowing one weapon to service a wider variety of targets, all while reducing collateral damage. This technical and ethical evolution is traced from the Cold War through today by way of the cluster bomb unit (CBU).[24] This munition's birth, life, and likely near-term replacement offer a case study in the full arc of nuclear necessity followed by conventional replacement.

In the Cold War's darkest days, NATO was reliant on nuclear weapons to defend Germany. The Alliance needed wide-area anti-armor effects that only low-yield short-range nuclear weapons could fill. Yet before the Berlin Wall fell, these tactical nuclear weapons were superseded by the more usable CBU. This new weapon allowed just a handful of fighter aircraft to drop tens of thousands of unguided, sensor-fused, four-pound bomblets to rain devastation down on tank columns.

A single fighter attack on Soviet armor suddenly threatened to stop a major advance because this weapon offered sufficient platform efficiency to retain certainty without the need for fission. While several CBU variants remain in the American inventory, manufacturing stopped nearly a decade ago, and their overall contribution to high-tempo warfighting fell into question during the first Gulf War and for several years after.[25]

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23. Roy Boone et al., "Russia's Nonstrategic Nuclear Weapons and Western Air Supremacy," *Æther: A Journal of Strategic Airpower & Spacepower* 2, no. 1 (2023), https://www.airuniversity.af.edu/.

24. Joseph Trevithick, "Here's What You Need to Know about the US Military's New Cluster Munition Policy," The Drive, updated June 29, 2019, https://www.thedrive.com/.

25. Thomas Gibbons-Neff, "Why the Last U.S. Company Making Cluster Bombs Won't Produce Them Anymore," *Washington Post*, September 2, 2016, https://www.washingtonpost.com/; John Ismay, "America's Dark History of Killing Its Own Troops with Cluster Munitions," *New York Times*, December 4, 2019, https://www.nytimes.com/; Human Rights Watch (HRW), "What are Cluster Bombs?," in *Ticking Time Bombs: NATO's Use of Cluster Munitions in Yugoslavia* (New York: HRW, June 1999), https://www.hrw.org/; and US Department of Defense (DoD), "Explosive Ordnance Disposal Experts Prepare to Detonate an Unexploded Bomblet," photograph, DoD, n.d., https://www.defense.gov/.

State-of-the-art armor interdiction today is the stealthy F-35, carrying eight Storm-Breaker glide bombs touting all-weather multimode precision, capable of tracking vehicles on the move and through smoke.[26] In essence, current technology allows StormBreakers to reliably kill each individually targeted tank, versus the CBU-105, which releases all 40 of its projectiles that then use infrared sensors to target and kill up to 40 tanks before falling to the ground. In the near future the United States will deploy a variety of networked loitering weapons, some as small and lethal as the CBU's individual bomblets. These new weapons will provide a nearly one-to-one launch-to-kill ratio alongside vast safety improvements that outstrip the CBU's 99-percent safety standard.

One example of these soon-to-be-fielded munitions is the Hatchet, an six-pound glide bomb that turns the MQ-9, currently equipped to carry up to 16 Hellfire missiles, into an antivehicle devastator brandishing 216 all-weather jam-resistant mini-bombs.[27] Just a single squadron of MQ-9s armed with the Hatchet can theoretically destroy as many Russian fighting vehicles as the entire Ukrainian military has over the first year of Russia's war in Ukraine, and all in one sortie.[28] In the near term, miniaturization will afford the kind of certainty of destroying light-armored vehicles at a scale that allows completely replacing nuclear weapons as well as outdated semismart CBUs. But there are enduring limits to what can be done with just a couple pounds of TNT.

Cargo aircraft can now launch weapons with the Cargo Launch Expendable Air Vehicles with Extended Range (CLEAVER) system.[29] In recent tests, cruise missiles were strapped to a standard airlift pallet and successfully launched from 10,000 feet. Thus far, CLEAVER is a conventional capability that can massively increase strike capacity against fixed targets. Hypothetically, if America's entire cargo aircraft fleet was loaded with the CLEAVER system, the fleet could launch over 10,000 of these cruise missiles in a single sortie. Of course, neither cruise missile magazine depth nor preexisting mobility requirements allow for such a mission.[30]

The lack of sufficient quantities of conventional precision-strike weapons is another challenge when it comes to any effort to replace theater nuclear weapons with conven-

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26. "GBU-39B Small Diameter Bomb Weapon System," US Air Force (USAF) (website), n.d., https://www.af.mil/; and *Naval News* Staff, "F-35B Releases StormBreaker Smart Weapon in First-Ever Munition Drop," *Naval News*, https://www.navalnews.com/

27. Jonathan Yerushalmy, "MQ-9 Reaper: What Is the US Drone that Collided with a Russian Jet and How Is It Used?," *Guardian*, March 15, 2023, https://www.theguardian.com/.

28. Alexis Mracheck, "Assessing Threats to U.S. Vital Interests: Russia," Heritage Foundation, October 18, 2022, https://www.heritage.org/.

29. Whitney Wetsig, "AFRL, AFSOC Launch Palletized Weapons from Cargo Plane," USAF (website), May 28, 2020, https://www.af.mil/News/.

30. Frank Wolfe, "USAF Requests $711 Million for 525 'Max Production' of JASSM-ER," Defense Daily, June 7, 2021, https://www.defensedaily.com/.

tional weapons.[31] By way of example, the total inventory of the Joint air-to-surface standoff missile (JASSM) family of missiles (just over 3,000 in 2023) is expected to last as little as 30 days in a peer conflict.[32]

What may be the saving grace for conventional precision strike is the option to share it with Allies and partners or expand it into the nuclear realm. While a cargo plane is far less survivable than an F-35, it may be more realistically affordable to put the next-generation nuclear-armed cruise missile into a NATO partner's existing cargo plane. Perhaps the threat alone could prove a useful bargaining chip.[33]

Reduced munition size alongside improved accuracy has increased conventional platform efficiency such that non-nuclear weapons now threaten more targets with greater certainty of arrival, and therefore destruction, than do the few hundred theater nuclear weapons the United States fields—particularly in Europe. Conventional weapons are displacing more of the necessity cases where heretofore only low-yield nuclear weapons could satisfy a military need.

Even if conventional weapons were to attain equivalent platform efficiency to nuclear weapons, the psychological implications of nuclear employment endure. So long as any nuclear weapons exist, low-yield theater nuclear weapons will be valuable to disabuse potential adversaries of the notion that the United States cannot respond promptly, proportionately, and in-kind.

Second- and Third-Order Effects

The second- and third-order effects of a theater nuclear strike, including the socio-political implications, would be just as world-changing as when nuclear weapons were employed in war the first time. But the response options drastically transformed after the Cold War. The increasingly equivalent conventional alternatives bring new opportunities but also new vulnerabilities and risk.

Physical effects alone cannot explain America's adversaries' continued pursuit of low-yield theater nuclear weapons.[34] This investment is rational based on the varying objectives, values, and substitutes available. Regardless of yield, the use of any nuclear weapon has strong political and psychological consequences. China, North Korea, and

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31. Tyler Hacker, "Money Isn't Enough: Getting Serious about Precision Munitions," War on the Rocks, April 24, 2023, https://warontherocks.com/.

32. Rachel S. Cohen, "Congress Suggests JASSM-ER Bulk Buy," *Air and Space Forces Magazine*, December 18, 2019, https://www.airandspaceforces.com/; and Nathan J. Lucas, *Defense Primer: U.S. Precision-Guided Munitions*, IF 11353 (Washington, DC: Congressional Research Service [CRS], November 15, 2022), https://crsreports.congress.gov/.

33. Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles (INF Treaty), December 8, 1987, https://2009-2017.state.gov/.

34. Amy F. Woolf, *Nonstrategic Nuclear Weapons*, RL32572 (Washington, DC: CRS, updated March 7, 2022), https://crsreports.congress.gov/

Russia view nuclear employment costs and benefits differently, but they all share an expectation that low-yield weapons might deter US intervention.[35]

Eschewing low-yield nuclear weapons may be a valuable diplomatic move, but it removes the clearest escalation control measure and assurance tool. Potential adversaries have not followed the US lead in stockpile reductions, and Allies are publicly worrying about America's nuclear umbrella. South Korean President Yoon Suk Yeol's January 2023 comments concerning the possible need for South Korea to build its own nuclear arsenal are a case in point.[36] Even with President Joseph Biden and Yoon agreeing to the Washington Declaration, there are still voices in Korea calling for an independent Korean nuclear capability.[37]

American thinking about limited nuclear-strike scenarios bends toward restoring nuclear deterrence.[38] Since deterrence exists in the mind of the adversary, effective strategy seeks to shape the cost/benefit calculation of the adversary. Calibrating the response for reestablishing nuclear nonuse is exceedingly difficult. To this end, response planning often starts with a proportionate strike against a similarly important target in a tit-for-tat manner. The expectation is that this act will clearly signal will and confirm the ability to respond. For the United States, this is done in the hope of de-escalation.[39] Non-nuclear alternatives may appear preferable if they achieve similar physical effects—threaten the full scale of pain, but without any of the attendant nuclear risks.

It may be that very thing—the risk of further escalation—which is most needed to deter. Of course, this is the concept found in Thomas Schelling's seminal work, *The Strategy of Conflict*, where he asserts that a sound strategy employs a "threat that leaves something to chance."[40]

A purely conventional response to nuclear use might impose the appropriate level of pain but still fail to reestablish nuclear deterrence. Deep penetrating conventional precision strikes against strategic targets, previously believed to be secure, can lead to even greater desperation as adversary leadership wonders if they are next. This could be especially likely if neutralizing US conventional overmatch was the goal for the nuclear strike in the first place. Thus, there is a potential for unintentional escalation by not responding with a nuclear repost.

This issue is exacerbated by the convergence that blurs the formerly clear gap between nuclear and non-nuclear strike. Intra-war communication, trying to negotiate

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35. Jack L. Snyder, *The Soviet Strategic Culture: Implications for Limited Nuclear Operations* (Santa Monica, CA: RAND Corporation, September 1977), https://www.rand.org/.

36. Choe Sang-Hun, "In a First, South Korea Declares Nuclear Weapons a Policy Option," *New York Times*, January 12, 2023, https://www.nytimes.com/.

37. Mitch Shin, "Yoon and Biden Announce 'Washington Declaration' to Lock in Nuclear Deterrent," *Diplomat*, April 27, 2023, https://thediplomat.com/.

38. Sabine Siebold and Phil Stewart, "Russian Nuclear Strike Likely to Provoke 'Physical Response,' NATO Official Says," Reuters, October 12, 2022, https://www.reuters.com/.

39. Christine Leah, Adam McGiffin, and Adam Lowther, "Ending the Administration's Hopium Habit," RealClearDefense, March 17, 2023, https://www.realcleardefense.com/.

40. Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1981).

while fighting, is historically problematic and only becoming more challenging with the advent of multidomain warfare and cross-domain approaches to deterrence that increase the complexity of war by expanding the sheer volume of what is taking place and must be considered by military and political leaders at war.[41]

Conclusion

In the right circumstances conventional weapons offer greater certainty of destruction than tactical nuclear weapons. The West must examine what this means for warfighting, as well as what adversaries are signaling by investing in low-yield nuclear weapons. The best solution may be the development of a state-of-the-art nuclear capability that ensures certain, prompt, proportionate, and in-kind response options. The perception of a missing rung on the American escalation ladder could prove alluring to Russia or China in a conflict.

If adversaries view conventional precision strike as capable of generating strategic effects, it is understandable that this capability can lead to a nuclear response. This leaves no easy answers for American decisionmakers. Choosing among near-equivalent conventional retaliatory options or a low-yield nuclear strike option against a proportionate nonescalatory target that balances induced pain and the adversary's escalation threshold is a wicked problem. Assuring Allies of extended deterrence credibility with conventional precision strike—while preventing friendly nuclear proliferation—only adds to the difficulty of balancing theater nuclear weapons and conventional precision strike.

While some in the American defense and foreign policy community are certain to see conventional precision strike as a way to take the moral high ground, failing to adequately understand the role played by nuclear weapons may risk escalation and entice nuclear weapons use. In some instances, it is the very usability and certainty of conventional precision strike that has become destabilizing.

The seamless integration of nuclear, conventional, and whole-of-government capabilities is at the core of the Biden administration's deterrence posture, but it is not without risks, since it increases the complexity of deterrence messaging at a time when the implications of an effect in one domain may generate an unexpected response in another.[42] Understanding two of these domains—nuclear and conventional—requires knowing how interchangeable they are for achieving similar military outcomes.

Knowing whether a conventional precision strike is punishment enough or the appropriate messaging tool for deterring China, North Korea, or Russia requires an appreciation of the strategic implications of conventional dominance. This overview

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41. Bernard Brodie, *Strategy in the Missile Age* (Santa Monica, CA: RAND, 2007), https://www.rand.org/; Reja Younis and Rebecca Hersman, "The Adversary Gets a Vote," CSIS (website), September 21, 2021, https://www.csis.org/; and King Mallory, *New Challenges in Cross-Domain Deterrence* (Santa Monica, CA: RAND Corporation, 2018), https://doi.org/.

42. Justin Anderson and James R. McCue, "Deterring, Countering, and Defeating Conventional-Nuclear Integration," *Strategic Studies Quarterly* 15, no. 1 (Spring 2021), https://www.airuniversity.af.edu/.

of the conventional-nuclear effects gap draws out some of the nuances within the politics and messaging of a limited nuclear strike as well as the response to one. This approach enables a more accurate characterization of adversary objectives of limited first use and enhances theater nuclear deterrence strategy. **Æ**

A RATIONAL CHOICE?

RUSSIA'S POTENTIAL USE OF NONSTRATEGIC NUCLEAR WEAPONS

Brandon Colas

Limited employment of nonstrategic nuclear weapons (NSNW) is becoming an increasingly rational choice for Russian President Vladimir Putin in Russia's ongoing war against Ukraine. Three propositions have enabled the current situation. First, the United States and its NATO Allies have transmitted a message of strategic ambiguity regarding a kinetic Western response to Russian employment of NSNW. The second proposition, based on Western perceptions and his own belief, is that if Russia loses the war, Putin will fall from power. The final proposition is that due to the military, economic, and reputational degradation resulting from the war, Russia will lose its great power status. The United States should better scope its strategic messaging to convey firm resolve to deliver military consequences in the event Putin decides to break the nuclear taboo and deploy such weapons.

Limited employment of nonstrategic nuclear weapons (NSNW) is becoming an increasingly rational choice for Russia in its war against Ukraine. Although unlikely to turn the tide of battle or achieve the political objective of conquering Ukraine, limited NSNW use could still prove Russian mettle and allow it to maintain its place on the world stage.[1] As the long-awaited Ukrainian counteroffensive progresses, NSNWs could serve as a restorative shock of sorts, allowing President Vladimir Putin to signal to the United States, his greatest existential threat, that Russia remains a great power regardless of the outcome of the war in Ukraine.

This study examines three propositions that make Putin increasingly likely to use nonstrategic nuclear weapons in some manner: strategic ambiguity on the part of the United States and its NATO Allies' formal and informal messaging regarding punishment for nuclear use; a belief on the part of the West and of Putin himself that if Russia loses the war, he will lose power; and the proposition that because of the war's effects on the Russian military, economy and global reputation, Russia is no longer a great power. By employing prospect theory and its understanding of framing—which evaluates an actor's perceptions of alternative courses of action, the outcomes, and the probabilities of those outcomes—this article demonstrates that if Putin internalizes these propositions, his decision to use nonstrategic nuclear weapons becomes increasingly rational.

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How Possibilities of Loss Shape Perceptions of Risk

The tenets of prospect theory, developed from behavioral economics, are well known: in general, humans will risk more to avoid loss than to achieve positive gains.[2] Because people are "generally risk-averse with respect to gains and risk-acceptant with respect to losses," this can lead to instability in the international arena.[3]

A state which perceives itself to be in a deteriorating situation might be willing to take excessively risky actions in order to maintain the status quo against further deterioration, even if a standard probability calculus based on expected value would lead to a preference for restraint. This would be particularly likely if the state perceived that the further deterioration in its position were certain, or if its position had already deteriorated and the state wanted to recover those losses.[4]

Prospect theory has strong insights for international relations, particularly when states are treated as relatively unitary actors subject to a certain leader's will. Granted, even in the most autocratic states, a leader shares power with an elite group.[5] But those states still have a central leader with an outsized ability to shape that state's actions, particularly in the case of nonroutine, singular decisions.[6] Starting a war, regardless of it being called a "special military operation," and employing nuclear weapons are two examples of singular decisions in the Russian system that fall within Putin's responsibilities.[7]

The Specter of Nonstrategic Nuclear Weapons

Russian warnings about using nuclear weapons have directly shaped the battlefield in Ukraine. Russia's strategic nuclear exercises incorporating various missile launches, including ballistic missiles, concluded a few days prior to its invasion.[8] Then, in his speech announcing the "special military operation" on February 24, 2022, Putin stated, "No matter who tries to stand in our way or all the more so create threats for

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2. Amos Tversky and Daniel Kahneman, "Advances in Prospect Theory: Cumulative Representation of Uncertainty," *Journal of Risk and Uncertainty* 5, no. 4 (1992), https://www.jstor.org/.

3. Jack S. Levy, "An Introduction to Prospect Theory," *Political Psychology* 13, no. 2 (1992): 174, https://www.jstor.org/.

4. Jack S. Levy, "Prospect Theory and International Relations: Theoretical Applications and Analytical Problems," *Political Psychology* 13, no. 2 (1992): 286, https://www.jstor.org/.

5. Brandon J. Kinne, "Decision Making in Autocratic Regimes: A Poliheuristic Perspective," *International Studies Perspectives* 6, no. 1 (2005), http://www.jstor.org/.

6. Daniel L. Byman and Kenneth M. Pollack, "Let Us Now Praise Great Men: Bringing the Statesman Back In," *International Security* 25, no. 4 (2001), http://www.jstor.org/.

7. Kremlin, "Address by President of the Russian Federation," President of Russia, February 24, 2022, http://en.kremlin.ru/; and Kristin Ven Bruusgaard, "How Russia Decides to Go Nuclear," *Foreign Affairs*, February 6, 2023, https://www.foreignaffairs.com/.

8. Tom Balmforth and Maria Kiselyova, "Putin Leads Sweeping Nuclear Exercises and Tensions Soar," Reuters, February 19, 2022, https://www.reuters.com/.

our country and our people, they must know that Russia will respond immediately, and the consequences will be such as you have never seen in your entire history."[9]

Following the disastrous beginnings of the invasion, Putin announced that he had put Russia's nuclear forces on "high alert."[10] And nuclear posturing has continued since then: in October 2022, Russian news agency TASS reported Russia had warned the UN secretary-general that Ukraine was planning a "dirty bomb" attack, pleading for help in preventing this act of nuclear terrorism from taking place. These claims were repeated by Russian Minister of Defence Sergei Shoigu to his counterparts from the United States, United Kingdom, and France, among other countries.[11] These accusations, which many in the West interpreted as a possible cover for a Russian false-flag attack, took place alongside Russian annual nuclear drills involving intercontinental ballistic missiles, submarines, and strategic bombers.

In February 2023, shortly after the US State Department announced that Russia was in violation of the New Strategic Arms Reduction Treaty (New START), Putin suspended Russian participation in the treaty and announced that "new ground-based strategic systems" were going to be placed on combat duty.[12] About a month after withdrawing from New START, Putin stated he would be sending tactical nuclear weapons to Belarus, which Russia did in late May.[13]

Skeptics of these threats argue Russia's declarations are "primarily political posturing unrelated to any probable nuclear use," and claim Western overreaction is what renders the threats effective forms of intimidation.[14] After all, Russian actors have made such threats for years, such as in 2015, when warning Denmark it would become a nuclear target if it joined NATO's missile defense system, or in 2018, when in his state of the union address Putin boasted about Russia's new nuclear systems and shared a simulation showing a Sarmat intercontinental ballistic missile on its way to Florida, avoiding US missile defense systems.[15]

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9. Kremlin, "Address"; and Max Fisher, "Putin's Case for War, Annotated," *New York Times*, February 24, 2022, https://www.nytimes.com/.

10. Andrew Roth et al., "Putin Signals Escalation as He Puts Russia's Nuclear Forces on High Alert," *Guardian*, February 27, 2022, https://www.theguardian.com/.

11. "Russia Urging UN Chief to Prevent 'Dirty Bomb' Provocation," TASS, October 24, 2022, https://tass.com/.

12. Guy Faulconbridge, "Russia's Putin Issues New Nuclear Warnings to West over Ukraine," Reuters, February 21, 2023, https://www.reuters.com/; and Heather Williams, "Critical Questions: Russia Suspends New START and Increases Nuclear Risks," Center for Strategic and International Studies, February 23, 2023, https://www.csis.org/.

13. Guy Faulconbridge, "Russia Moves ahead with Deployment of Tactical Nukes in Belarus," Reuters, May 25, 2023, https://www.reuters.com/.

14. Valeriy Akimenko, "Myth 6: Russia's Nuclear Threats are Real and Should be Taken Literally," in "Myths and Misconceptions around Russian Military Intent," Chatham House (website), August 23, 2022, https://www.chathamhouse.org/.

15. Elisabeth Braw, "Behind Putin's Nuclear Threats," *Politico EU*, August 18, 2015, https://www.politico.eu/; and Steven Pifer, "Putin on the Nukes," Brookings, March 2, 2018, https://www.brookings.edu/.

If these threats are simply political posturing, even increasingly dramatic warnings from Russia should be ignored and played down in discussions of escalation.[16] Western observers expressed skepticism when, as Russian forces were thrown into disarray by the successful Ukrainian counteroffensive in September 2022, Putin stated to the West that those planning to use weapons of mass destruction against Russia needed to remember that Russia itself had such weapons and would use all means to protect itself. His caveat—"this is not a bluff"—only served to undermine his claim.[17]

Other analysts in the West are less sanguine and believe that nuclear threats from Russia may signal actual intent. At the popular level, sales of iodine—a prophylactic against harmful radiation—across Europe substantially increased beginning in February 2022.[18] As the war began, US intelligence community leaders assessed that providing certain military systems such as the MiG-29 would be "too escalatory."[19] Defense-related commentary included alarming claims. One foreign relations expert noted that Washington and Moscow "are locked in an escalatory cycle that, along current trends, will eventually bring them into direct conflict and then go nuclear, killing millions of people and destroying much of the world."[20] Adding to these concerns are studies suggesting that the nuclear taboo may be overstated and could be broken depending on political and material circumstances.[21] As one political analyst noted in 2022, "There is a whiff of nuclear forgetting in the air."[22]

Messaging as a Potential Trigger

This study is an attempt to better understand Russia's nuclear posturing vis-à-vis Ukraine by exploring specific messaging that makes the use of NSNW a rational choice for Putin. The United States and other Western states have, even from early in the war, heightened the stakes for Putin by explicitly discussing the threats to his own regime and himself if the war should be lost. As Russia's military performance has continued to stumble, prospect theory suggests a massive risk to avert losses will become

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16. Anya Loukianova Fink and Olga Oliker, "Russia's Nuclear Weapons in a Multipolar World," *Daedalus* 149, no. 2 (2020): 45, https://www.jstor.org/.

17. Keir Giles, "Putin is Admitting His Previous Threats Were Hollow by Saying 'This Is Not a Bluff'," *Guardian*, September 21, 2022, https://www.theguardian.com/; and see also Anne Applebaum, "Fear of Nuclear War Has Warped the West's Ukraine Strategy," November 7, 2022, https://www.theatlantic.com/.

18. Karel Kostev, Susanne Abeler, and Ai Koyanagi, "Research Letter: Sales of Iodine-Containing Drugs in Europe following the Beginning of the War between Russia and Ukraine," *JAMA Network Open* 5, no. 10 (October 27, 2022), https://jamanetwork.com/.

19. *Open Hearing: 2022 Annual Worldwide Threat Assessment of the U.S. Intelligence Community*, S. Hrg. 117-307 (video recording, 02:56), March 10, 2022, https://www.intelligence.senate.gov/.

20. Jeremy Shapiro, "We Are on a Path to Nuclear War," War on the Rocks, October 12, 2022, https://warontherocks.com/.

21. T. V. Paul, "Taboo or Tradition? The Non-Use of Nuclear Weapons in World Politics," *Review of International Studies* 36, no. 4 (2010), https://www.jstor.org/.

22. Nina Tannenwald, "Is Using Nuclear Weapons Still Taboo?," *Foreign Policy*, July 1, 2022, https://foreignpolicy.com/.

increasingly appealing to Putin.[23] If the war is about to be lost, with all its attendant dire consequences, why not overturn the chessboard and see what happens?

Putin may be bluffing with his nuclear hand, but if not, the strategic planning approach of backcasting will help contextualize events that could lead to his employment of nuclear weapons. In backcasting, one begins with a future state—in this case, from the point of an undesirable future—and then traces backward to see how such a situation could develop.[24] The backcasting method applied in this article is not concerned with battlefield developments that might lead Putin to use NSNW in Ukraine, but rather what messages or signals could have encouraged Russian nuclear use in the imagined future state, and thus, how to avoid sending them today.

According to prospect theory—which determines how people choose among options that involve probability and uncertainty—the framing of decisions is linked to three elements of a choice: how an actor perceives courses of action, the outcomes that can be associated with those alternatives, and the probabilities associated with each particular outcome.[25] In this case, prospect theory suggests explicit US messaging to Russia as well as the implicit messages from battlefield results have placed Putin in a situation in which, despite the risks, the costs of using NSNW have been lowered, while the possibility of a positive outcome following NSNW use has been increased.

Russia's employment of NSNW could allow the country to potentially regain its status as an unpredictable actor to be feared and respected by other states, despite its military's poor performance in Ukraine. Three propositions in the form of two explicit messages and one implicit message have forged Russian perceptions about NSNW use: first, that there may or may not be serious consequences if Putin employs them; second, that the consequences for losing the war in Ukraine will be threatening for Putin; and finally, the implicit message that if matters continue their current trajectory Russia will lose its great power status.

Predicting NSNW Use

Russian Nuclear Doctrine

One potential Russian use of NSNW might not come as a series of nuclear strikes on Kyiv, but rather a scenario in which a single NSNW is employed in a nonconventional manner, thus complicating how the United States should respond. Based on

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23. Jack S. Levy, "Prospect Theory, Rational Choice, and International Relations," *International Studies Quarterly* 41, no. 1 (1997), http://www.jstor.org/.

24. Emily Sylak-Glassman, Sharon R. Williams, and Nayanee Gupta, "Appendix C.: Technology Forecasting Tools, Techniques, and Aids," *Current and Potential Use of Technology Forecasting Tools in the Federal Government* (Alexandria, VA: Institute for Defense Analyses, 2016), Appendix C-1, http://www.jstor.org/.

25. William A. Boettcher III, "The Prospects for Prospect Theory: An Empirical Evaluation of International Relations Applications of Framing and Loss Aversion," *Political Psychology* 25, no. 3 (2004): 333, http://www.jstor.org/.

Russian doctrine, general triggers for nuclear use could include strikes on critical Russian targets, significant losses across forces in theater, or the inability to defend against an imminent invasion.[26]

In the case of the Ukraine conflict, the typical explanation for Russia choosing to employ NSNW would be the doctrinal conditions of major losses: to stop Ukrainian forces from inflicting a crushing battlefield defeat.[27] Yet relying on Russian doctrine to assess the likelihood of NSNW use is problematic, in part because published doctrine that has over time shown a decreasing threshold for use "could have been a part of Russian messaging to Western counterparts."[28] Assessments such as significant losses or critical Russian targets are qualitative in their nature.[29] If Russian nuclear doctrine cannot necessarily be predictive of real-world behavior, implicit signals and incentives to Russia from America and its Allies provide more useful insights.

Messaging, Explicit and Implicit

In a constructivist view, states define their identities in socially constructed relationships with other states.[30] According to this view, Russia relies on other states, most notably the United States, to help define itself. The terms by which the United States uses to define Russia—specifically perceiving Russia as a threat and treating it accordingly—will affect Russia's view of itself and by implication its possible desire to employ nuclear weapons.

In Russia's ongoing process of self-identification, American and Western messaging leading up to, and during Russia's war in Ukraine about the consequences for nuclear use has been a complicating factor. These messages have been decidedly mixed, with inconsistent remarks emerging between the United States and some NATO Allies.[31] At the same time, American officials have consistently warned that if Putin loses the war, his reign is at risk.[32] Central Intelligence Agency Director William Burns has noted that Putin himself believes he "cannot afford to lose" the war.[33]

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26. Michael Kofman, Anya Fink, and Jeffrey Edmonds, *Russian Strategy for Escalation Management: Evolution of Key Concepts* (Arlington, VA: Center for Naval Analysis, April 2020), 51, https://www.cna.org/.

27. See Sidharth Kaushal and Sam Cranny-Evans, "Russia's Nonstrategic Nuclear Weapons and Its Views of Limited Nuclear War," Royal United Services Institute (RUSI) (website), June 21, 2022, https://rusi.org/.

28. Kofman, Fink, and Edmonds, *Russian Strategy*, 44.

29. Kofman, Fink, and Edmonds, 45, 51.

30. Alexander Wendt, "Anarchy is What States Make of It: The Social Construction of Power Politics," *International Organization* 46, no. 2 (1992), https://www.jstor.org/; and Ted Hopf, "The Promise of Constructivism in International Relations Theory," *International Security* 23, no. 1 (1998), https://www.jstor.org/.

31. Elisa Vincent, "Macron Comment Raises Doubts on French Position in Case of Russian Nuclear Strike in Ukraine," *Le Monde,* October 15, 2022, https://www.lemonde.fr/; and Gesine Weber, "How to Save French Credibility from Macron," War on the Rocks, May 16, 2023, https://warontherocks.com/.

32. Office of the Director of National Intelligence (ODNI), *Annual Threat Assessment of the U.S. Intelligence Community* (Washington, DC: ODNI, February 6, 2023), https://www.armed-services.senate.gov/.

33. Edward Luce and William Burns, "Transcript: Vladimir Putin 'Doesn't Believe He Can Afford to Lose' — William Burns, CIA Director," *Financial Times*, May 8, 2022, https://www.ft.com/.

Furthermore, sanctions against Russia and battlefield losses that have dealt significant blows to its military have also eroded Russia's status as a great-power state. This material fact has resulted in an implicit message that Russia has lost its prestige and capability to defend itself in the future. The combination of mixed messaging, the risk to state leadership, and Russia's sapped capabilities has backed Putin in a dangerous corner, where he may be compelled to resort to nuclear weapon use to shore up his country's receding reputation in the world.

Messages: How Russia Should Think of Itself

Message I: Threats . . . and Off-Script Comments

Direct communications by US officials to Russia have been consistent about the serious consequences should Russia employ nuclear weapons in Ukraine, but indirect messages have been mixed, indicating some dissension within NATO itself. In both private and public messaging, National Security Advisor Jake Sullivan has warned of "catastrophic consequences" to Russia.[34] In the fall of 2022, the *Washington Post* published a report that stressed the volume and level of private messaging by President Joseph Biden's administration.[35] Other than Biden, those who have warned about the gravity and possible consequences of nuclear use include Burns and Chairman of the Joint Chiefs of Staff General Mark Milley.[36]

To some extent, it seems that Russia has responded to the messaging. Even after Russia withdrew from New START, NATO has kept some communication channels open with Moscow.[37] Although the US-Russian "deconfliction" hotline—a communication line established by the nations' militaries to prevent miscalculation and possible escalation during the conflict—has been used only once since the invasion of Ukraine, Russia has still received direct and indirect messages from the United States, in both media comments and private messages from officials.[38]

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34. Edward Helmore, "Jake Sullivan: US Will Act 'Decisively' If Russia Uses Nuclear Weapons in Ukraine," *Guardian*, September 25, 2022, https://www.theguardian.com/; and Vivian Salama and Michael R. Gordon, "Senior White House Official Involved in Undisclosed Talks with Top Putin Aides," *Wall Street Journal*, November 7, 2022, https://www.wsj.com/.

35. Paul Sonne and John Hudson, "U.S. Has Sent Private Warnings to Russia against Using a Nuclear Weapon," *Washington Post*, September 22, 2022, https://www.washingtonpost.com/.

36. Jordan Fabian, "CIA Chief Warns Russian Counterpart against Using Nuclear Weapons in Ukraine," Bloomberg, November 14, 2022, https://www.bloomberg.com/; Kevin Liptak, "Biden Warns Russia Not to Use a Tactical Nuclear Weapon," CNN Politics, October 25, 2022, https://edition.cnn.com/; and Bevan Hurley, "Top US General Says Russia Is 'Irresponsible' for 'Rattling Nuclear Sabre,'" *Independent*, April 26, 2022, https://www.independent.co.uk/.

37. North Atlantic Treaty Organization (NATO), "NATO-Russia Relations: The Facts," NATO (website), April 20, 2023, https://www.nato.int/.

38. Phil Stewart and Idrees Ali, "Exclusive: U.S., Russia Have Used Their Military Hotline Once So Far during Ukraine War," Reuters, November 29, 2022, https://www.reuters.com/.

Despite US efforts to convey the gravity of the situation, NATO Allies have not always sent the same message, at times presenting Russia with a nonunified front on the part of the Alliance. NATO infighting, ranging from Germany hesitating to donate its Leopard tanks to the war effort to Turkey and Hungary blocking Finland's and Sweden's admittance to NATO, show an Alliance that is not speaking with a unified voice and implicitly suggest that NATO might not be able to agree on how to respond to serious Russian provocations.[39] France's President Emmanuel Macron in particular has provided a number of remarks that have suggested NATO may or may not respond to Russian NSNW use.[40]

In an early October 2022 interview, Macron mentioned France would not consider nuclear retaliation against Russia should it choose to attack Ukraine with nuclear weapons because vital national interests "would not be at stake if there was a nuclear ballistic attack in Ukraine or in the region."[41] Macron's subsequent criticism of remarks made by Biden in early October warning of a potential nuclear disaster has likely suggested to Russia that NATO may not follow the United States in retaliating against a Russian nuclear attack, whether with nuclear weapons from the United States, the United Kingdom, and France, or from various NATO conventional forces.[42] If NATO does retaliate against Russian NSNW use in Ukraine, Macron's statements indicate it will only do so after contentious discussions.[43]

This mixed message impacts the probability factor in Russia's decision-making. The United States has communicated publicly and privately that NSNW use will lead to grave consequences, but with Allies that might not be on board, Putin could conclude that America is bluffing about such consequences.

Message II: Putin Cannot Afford to Lose

Besides the confusing messages about how seriously the United States and its Allies would take Russian nuclear use in Ukraine, Putin has received Western messages about his own dire fate if he loses the war. Off-ramps are hard to envision for Putin—

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39. Hans Von Der Burchard and Cory Bennett, "Germany Snubs Ukraine's Tank Request," *Politico EU*, January 20, 2023, https://www.politico.eu/; and Patrick Wintour, "Turkish President Lifts Veto on Finland's Nato Application," *Guardian*, March 7, 2023, https://www.theguardian.com/.

40. Patrick Wintour, "Emmanuel Macron's Remarks on Russia Set Alarm Bells Ringing," *Guardian*, February 8, 2022, https://www.theguardian.com/; Clea Caulcutt, "What the Hell Does Emmanuel Macron Think He's Playing at with Vladimir Putin?," *Politico EU*, March 13, 2022, https://www.politico.eu/; and "Russia Must Not Be Humiliated Despite Putin's 'Historic' Mistake, Macron Says," Reuters, June 4, 2022, https://www.reuters.com/.

41. Clea Caulcutt, "Macron under Fire for Saying France Wouldn't Respond in Kind If Russia Launched Nuclear Attack on Ukraine," *Politico EU*, October 13, 2022, https://www.politico.eu/.

42. Haisten Willis, " 'Political Fiction': Macron Takes Aim at Biden's Nuclear Armageddon Remarks," *Washington Examiner*, October 8, 2022, https://www.washingtonexaminer.com/.

43. Willis.

views range from Macron's "we must not humiliate Russia" to former UK Prime Minister Boris Johnson's statement that finding de-escalation is Putin's own responsibility.[44]

The primary assumption is that "Putin cannot afford to lose."[45] As the 2023 *Annual Threat Assessment of the U.S. Intelligence Community* states, "there is real potential for Russia's military failures in the war to hurt Russian President Vladimir Putin's domestic standing."[46] Implicitly, if Putin cannot afford to lose, an off-ramp to the conflict is understood to be an outcome that must be less than a defeat for Russia. This rules out scenarios such as a stalemate leading to exhaustion for both sides, but also a scenario in which Putin's off-ramp comes from defeat.[47]

The presupposition from US and Western officials is that Russia must be treated as exceptional, as if Russia and Putin somehow "cannot" lose this war. States lose wars on a routine basis, without necessarily seeing a subsequent regime change. If a war is lost, the stakes may be higher for autocrats than democratically elected leaders, since defeat in war can diminish a leader's grip on power and galvanize the opposition.[48] Putin has staked his reputation on being a tough leader who has rebuilt Russia and restored its position, which is why the humiliation of a Russian loss could threaten his position.

Yet even with a Russian defeat, a Kremlin coup is far from certain. Putin's years of coup-proofing, including instilling a culture of mistrust among the agencies that could in theory have the power to force political change, mean that a change from within the system is unlikely.[49] The lack of a clear potential challenger to Putin comes from the way in which power is shared in complex circles of Russian business and military elites. Putin is not simply the leader but also the embodiment of a complex system of governance that may well outlast him.[50]

Recent research finds leaders that launch wars can be differentiated by their culpability and vulnerability, and that these factors affect the leaders' vulnerability to replacement post war. "Nonvulnerable" leaders of authoritarian regimes have tenures that are mostly unaffected by war outcomes.[51] If correct, even a clear defeat in Ukraine

44. "Boris Johnson: Putin's 'Only Instinct' Is to 'Double Down and Grozny-fy Kyiv,'" ITV News, March 1, 2022, YouTube video, 6:01, https://youtu.be/.

45. Agence France Presse (AFP), "Putin 'Doesn't Believe He Can Afford to Lose' in Ukraine: CIA Chief," France24, May 7, 2022, https://www.france24.com/.

46. ODNI, *Annual Threat Assessment*, 12.

47. Shashank Joshi, "Three Scenarios for How the War in Ukraine Could Play Out," *Economist*, November 14, 2022, https://www.economist.com/; and "The Ukraine Scenarios," *Foreign Affairs,* April 20, 2022, https://www.foreignaffairs.com/.

48. Alexandre Debs and H. E. Goemans, "Regime Type, the Fate of Leaders, and War," *American Political Science Review* 104, no. 3 (2010): 432, 435, https://www.jstor.org/.

49. Daniel Treisman, "What Could Bring Putin Down? Regime Collapse Is More Likely Than a Coup," *Foreign Affairs*, November 2, 2022, https://www.foreignaffairs.com/.

50. Bruce Bueno de Mesquita et al., *The Logic of Political Survival* (Cambridge, MA: MIT Press, 2005); and Gleb Pavlovsky, "Russian Politics under Putin: The System Will Outlast the Master," *Foreign Affairs* 95, no. 3 (May/June 2016), http://www.jstor.org/.

51. Sarah E. Croco and Jessica L. P. Weeks, "War Outcomes and Leader Tenure," *World Politics* 68, no. 4 (2016), https://www.jstor.org/.

might not lead to a putsch in Moscow.[52] It is too early to tell whether Wagner Group leader Yevgeny Prigozhin's brief march to Moscow in June 2023 will prove to weaken Putin's power or help him by identifying a threat to target and neutralize. Regardless of the long-term implications, in the current environment such an event will surely make Putin feel more threatened, something US officials tacitly recognized in their decision not to tip him off to Prigozhin's plans and risk being accused of sponsoring such actions.[53]

Since Putin's overthrow, even in the event of a loss in Ukraine, is not a foregone conclusion, Western suggestions to the contrary are not only empirically suspect but also likely to raise his own threat perception in dangerous ways, including the possibility of justifying NSNW use as a last gamble that might overturn the chessboard and allow some sort of victory in Ukraine. As mentioned previously, prospect theory argues that leaders will take greater risks to avoid loss.[54] Public messaging to Putin that if he loses this war, he will lose his position, could make employing NSNW worth the risk and a more rational choice.

Message III: Great Power No More

Messaging to Russia has been inconsistent about the possible consequences for NSNW use but consistent about the consequences for Putin if he should lose the war. Unfortunately, another consistent message that has been sent to Russia is that its war in Ukraine has shown Russia is no longer a great power. A state's ability to issue threats to its adversaries derives from four characteristics: aggregate power, geographic proximity, offensive capability, and offensive intentions.[55]

At the same time, a state's own identity is not formed in isolation, but as part of a complex network of connections with other states: in other words, a state perceiving that the international system is hostile will act accordingly, shaping its own identity in opposition to other threatening states.[56] These characteristics of threat, blended with the way in which states form their own identity, show the difficulty of Russia's current position. If Russia loses its ability to threaten, it could lose its ability to deter—not necessarily its ability to deter a US nuclear strike on Moscow, but its ability to deter, for instance, new weapons systems and munitions being provided to Ukraine, or to deter Ukrainian forces from retaking Crimea.

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52. Adam E. Casey, "Putin Has Coup-Proofed His Regime," *Foreign Policy,* March 23, 2022, https://foreignpolicy.com/; and see also "A Beginner's Guide to Russia's Fragmented Opposition," *Moscow Times*, March 6, 2023, https://www.themoscowtimes.com/.

53. David E. Sanger and Julian E. Barnes, "U.S. Knew Prigozhin Was Preparing to Take Military Action against Russia," *New York Times*, June 23, 2023, https://www.nytimes.com/.

54. Robert Jervis, "Political Implications of Loss Aversion," *Political Psychology* 13, no. 2 (1992), https://doi.org/.

55. Stephen M. Walt, "Alliance Formation and the Balance of World Power," *International Security* 9, no. 4 (Spring 1985), https://doi.org/.

56. Wendt, "Anarchy."

Since February 2022, Russia has seen a steady loss of some elements of national power. Its aggregate power has decreased, with its battered economy, unprecedented military causalities, and major losses of military equipment.[57] In terms of Russia's proximate power—its ability to threaten states that are geographically nearby—it is arguably in a worse position now than before. Russia's proximity to states through NATO expansion to Finland or other alliances and security guarantees, such as the British guarantee to defend Sweden, now threaten it more than before the war began.[58]

Russia's disastrous military performance indicates a clear loss of offensive capability.[59] This is in stark contrast with the steady increase in the size of NATO forces along its borders and the 2023 claims by Biden that "NATO is stronger than it's ever been."[60] Russia has displayed its offensive intentions, but a case could be made that NATO has as well—after all, in April 2022, US Secretary of Defense Lloyd Austin stated that the United States and its Allies wanted to see Russia "weakened to the degree that it can't do the kinds of things that it has done in invading Ukraine." Even though these comments were reportedly walked back, it seems likely that Russia will still believe this is NATO's stance.[61] Statements such as those of NATO Secretary General Jan Stoltenberg, who has committed NATO to stand with Ukraine "as long as it takes," are also likely to increase Russia's threat perceptions.[62]

Considering Russia's loss of capability to threaten, if the odds of military success continue to decrease, Russia's use of NSNWs becomes more plausible. Regardless of the US response, NSNW employment would secure the reputation of Russia as an unpredictable and dangerous actor: a foe that commands respect on the world stage, even if it loses on the battlefield. This need to command respect comes in part from how Russian identity has become defined partly by the threat from NATO, the West, and above all, the United States.

As noted constructivist Alexander Wendt observed in the early 1990s, state identity formation is concerned with security—but security is understood in different ways at

57. UK Foreign Commonwealth and Development Office and Ian Stubbs, "Russia's Military and Its Defence Industry Are Failing in Ukraine: UK Statement to the OSCE," GOV.UK, March 15, 2023, https://www.gov.uk/; Jack Watling and Nick Reynolds, *Meatgrinder: Russian Tactics in the Second Year of Its Invasion of Ukraine* (London: RUSI, May 19, 2023), https://static.rusi.org/; and Georgi Kantchev and Evan Greshkovich, "Russia's Economy Is Starting to Come Undone," *Wall Street Journal*, March 28, 2023, https://www.wsj.com/.

58. Prime Minister's Office, and Rt Hon Boris Johnson, MP, "News Story: Prime Minister Signs New Assurances to Bolster European Security: 11 May 2022," GOV.UK, May 11, 2022, https://www.gov.uk/.

59. leedrake5, "Russia-Ukraine War: Equipment Loss Tracking," GitHub repository, https://github.com/; and Alexander Smith, "The 'Stunning' Scale of Russian Deaths in Ukraine Signals Trouble Ahead for Putin," NBC News, May 2, 2023, https://www.nbcnews.com/.

60. Kelly Hooper, "In Poland, Biden Says 'NATO is Stronger Than It's Ever Been,'" *Politico*, February 21, 2023, https://www.politico.com/.

61. Ellen Mitchell, "Biden Told Austin, Blinken to Tone Down Remarks Supporting Ukraine: Report," *The Hill*, June 16, 2022, https://thehill.com/.

62. Natasha Bertrand et al., "Austin's Assertion That US Wants to 'Weaken' Russia Underlines Biden Strategy Shift," CNN Politics, April 26, 2022, https://edition.cnn.com/; and "Secretary General in Kyiv: NATO Stands with Ukraine," NATO (website), April 20, 2023, https://www.nato.int/.

different times and is shaped in part by other states, and by the distribution of power in the international system.[63] The war in Ukraine has changed Russian conceptions of its security. Its military has proved to be ineffective and its adversaries resolute.[64] In fact, its adversaries are not only resolute, but they are also willing to fight a proxy war in or through Ukraine and willing to expand the geographic reach of their threat and the proximate military power on Russia's borders.[65]

The long-term devastation that sanctions will have on Russia's economy, despite the economy doing better than conventional wisdom expected, must also be considered.[66] As a result, Russia may see itself in a position with little leverage left—as discussed above, a problematic position for Putin that could lead to a rational decision to use NSNW. Although Russia has not lost its ability to hurt, still has room to escalate, and still is trying to wear down Ukrainian will, a path to Putin's maximalist aims at the beginning of the war has vanished—if it ever existed. But a loss of the war, or even a pyrrhic victory, however celebrated by Kremlin propagandists, will come with the baggage of a Russian state with heightened threat perceptions and virtually no conventional means to threaten.

Conclusion

Russia's primary deterrent, a powerful conventional military, has failed. The use of nonstrategic nuclear weapons will not change this fact. But NSNW use—a massive gamble—could, in Putin's view, reshape the world's view of Russia, shatter assumptions about the international order, and above all, force the world to take him seriously. The use of Russian NSNW, even only one, would signal to America that despite its defeat in Ukraine, Russia is still a great power. If it is willing to break the nuclear taboo, what might it do next?

The conflict in Ukraine has taken place on the world stage, with all of Russia's forces involved. Russia's status in the international system and future security considerations are at stake in part because of the signals that the United States and some Western states have sent to Russia. These explicit messages convey (1) strategic ambiguity about a US or Western response to the Russian use of NSNW, (2) Russia's loss in the war will mean the end of Putin's regime, and (3) Russia's status as a great power will be eliminated. For Russia, the combination of these messages suggests that NSNW use now is

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63. Wendt, "Anarchy."

64. Kateryna Stepanenko et al., "Russian Offensive Campaign Assessment, November 1," Institute for the Study of War, November 1, 2022, https://understandingwar.org/; and Pjotr Sauer, " 'We Have Already Lost': Far-Right Russian Bloggers Slam Military Failures," *Guardian*, September 8, 2022, https://www.the guardian.com/.

65. Ted Galen Carpenter, "The NATO vs. Russia Proxy War in Ukraine Could Become a Real War," Cato Institute (website), October 12, 2022, https://www.cato.org/; and Hal Brands, "Russia Is Right: The U.S. Is Waging a Proxy War in Ukraine," Bloomberg, May 10, 2022, https://www.bloomberg.com/.

66. "As Europe Falls into Recession, Russia Climbs Out," *Economist*, October 13, 2022, https://www .economist.com/; and "Why the Russian Economy Keeps Beating Expectations," *Economist*, August 23, 2022, https://www.economist.com/.

more rational than ever before. It might or might not lead to military victory, but it could ensure Russian security after the war.

American deterrence has been undermined by the three messages that the United States and other Western states have communicated to Russia since the beginning of the conflict. The implicit messages behind these explicit messages include (1) a potentially lower risk than in the past for Russia if they employ NSNW, (2) using NSNW might be worth the gamble for Putin if he wishes to remain in power, and (3) NSNW use could change a narrative of loss of great-power status. These messages collectively are dangerous because they may lower Russia's threshold for nuclear use.

The interplay of these three messages with changing battlefield conditions means that each day risks Russia deciding to employ nuclear weapons. Perhaps, as some suggest, the nuclear taboo has become a self-sustaining tradition; moral and humanitarian concerns and the weight of decades of nonuse have led to a universal conclusion that nuclear weapons employment really has become unthinkable.[67] On the other hand, the longer that circumstances that could foster nuclear use last—such as the current situation in Ukraine—the greater the risk of its occurrence.

Although democracies struggle to be consistent in strategic messaging, and Russia will interpret any American action in the worst possible light, this does not mean that American signaling cannot become more cautious, deliberate, and intentional. The United States should be more cognizant of how Russia will interpret formal and informal signals from the international community to better anticipate Russia's potential employment of nonstrategic nuclear weapons. Æ

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67. Thomas Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 2008), 301.

TALKING SPACE

HISTORY, STRATEGIC COMMUNICATIONS, AND SPACE SECURITY

Max Schreiber

Achieving US objectives in space requires the United States to focus on strategic messaging—in particular, public affairs and information operations. The Space Race of the 1960s and the Strategic Defense Initiative of the 1980s serve as critical case studies demonstrating the efficacy of strategic messaging in America's persistent endeavors to ensure global peaceful uses of space and to secure its defense and that of its Allies and partners.

To achieve US objectives in space, strategic messaging—especially public affairs (PA) and information operations (IO) like deterrence campaigns—is crucial.[1] With China and Russia ramping up their space militarization efforts, two American space initiatives—the 1960s-era Space Race and President Ronald Reagan's 1983 Strategic Defense Initiative (SDI)—offer guidance for how strategic messaging on Earth can help the United States win in space.[2]

Background

Space programs venture beyond accomplishing security objectives. They are essential to "the construction of a national identity."[3] Originally, space exploration emerged out of the competition between the democratic United States and communist Soviet Russia after World War II. Today, both nations tout their early successes from this 1960s-era "Space Race." While the Russians invoke Sputnik I's pioneering launch and Yuri Gagarin's orbiting the earth in the early '60s, the Americans acclaim the Apollo project and Neil Armstrong's legendary "small step" on the moon in 1969.[4] The elevation of these accomplishments to near mythical status within each nation's strategic

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1. The author wishes to thank Major Kaleigh Sides, Captain Robert Freeman, First Lieutenant Joseph Cheung, Second Lieutenant Robert Bartkowiak, Second Lieutenant Emily George, USSF, and Technical Sergeant Mike George, USAF, for their many edits and suggestions.

2. Jack Detsch and Robbie Gramer, "China and Russia Are Catching Up to U.S. in Space Capabilities, Pentagon Warns," *Foreign Policy*, April 14, 2022, https://foreignpolicy.com/.

3. Asif A. Siddiqi, "Competing Technologies, National(ist) Narratives, and Universal Claims," *Technology & Culture* 51, no. 2 (2010): 427, https://www.jstor.org/.

4. Siddiqi, 426.

narrative demonstrates the Space Race embodied more than scientific achievement—it held "ideological, national, social, and psychological implications" that publicly tested each nation's unique "vision of humanity."[5] New York Congressman Victor Anfuso recognized this in his 1960 speech, when he described the Space Race as part of "a struggle for men's minds."[6]

America dominated space after the Cold War, but today China and Russia are aggressively contesting its space superiority. After the September 11, 2001, attacks, "space became a secondary priority for Washington and the two main elements of US spacepower—civil and military space—both struggled, allowing China and Russia to make relative gains," mainly by investing in commercial exploration, antisatellite weaponry, and launch technology.[7] Other nations—ally, neutral, and adversary alike—now have modern and competent space programs conducting operations.[8] But while the US military, as well as the Chinese and Russian militaries, see spacepower as "catastrophically decisive" for war, the American public remains unconvinced as to why US space superiority is so important.[9]

The United States' strategic messaging on space engages both international and domestic audiences and involves both public affairs functions and information operations such as deterrence campaigns.[10] Information operations aim to directly influence and manipulate foreign behavior; whereas, public affairs educates and informs the community—whether American or foreign—on US interests.[11] For example, the US military uses PA to teach the American people about why space is a national security issue, with the idea being that an informed public will support space operations given their strategic importance.[12] In contrast, IO is used to induce desired outcomes

5. David W. Reynolds, *Apollo: The Epic Journey to the Moon* (New York: Harcourt, 2002), 257; and Siddiqi, "Competing Technologies," 430.

6. Victor L. Anfuso, "Is Space a Way to Peace or War?" (speech, National Secretaries Association, Washington, DC, February 16, 1960).

7. James C. Moltz, "The Changing Dynamics of Twenty-First-Century Space Power," *Journal of Strategic Security* 12, no. 1 (2019): 21, https://www.jstor.org/.

8. Moltz.

9. United States Space Force (USSF), *Spacepower: Doctrine for Space Forces* (Washington, DC: USSF, June 2020), 26, https://www.spaceforce.mil/; JoAnna Wendel, "Not Enough Americans Understand the Need for Space Force, a Top Commander Says," Space.com, March 26, 2020, https://www.space.com/; and Thomas Novelly, "'Space Force? Is that Real?' Guardians Still Struggling with an Unconvinced Public," *Military.com*, January 28, 2022, https://www.military.com/.

10. James V. Keifer, "The Psychological Operations of the Military Element of National Power," in *Psychological Operations: Principles and Case Studies*, ed. Frank L. Goldstein (Maxwell AFB, AL: Air University Press [AUP], 1996); and Duane A. Opperman, *Information Operations and Public Affairs: A Union of Influence* (Carlisle Barracks, PA: US Army War College, March 22, 2012), https://apps.dtic.mil/.

11. Opperman, *Information Operations*.

12. Lloyd Free, "The Role of Public Opinion," in *Psychological Operations: Principles and Case Studies*, ed. Frank L. Goldstein (Maxwell AFB, AL: AUP, 1996); and Chairman of the Joint Chiefs of Staff (CJCS), *Public Affairs*, Joint Publication Note (JPN) 3-61 (Washington, DC: CJCS, November 2015), https://www.jcs.mil/.

from adversaries and others.[13] Deterrence is a type of information operation that, through credible actions or words, compels "potential enemies [to] perceive the cost of attack to be far greater than any possible gains."[14] The line between PA and IO sometimes blurs, given both rely on the use of information to achieve security goals, so strict laws and policies are set to delineate between the functions.[15]

Both the Space Race and the Strategic Defense Initiative used IO and PA to further national space objectives.[16] Applied to modern times, lessons from these endeavors can strengthen the prospect of space stability and help reignite American enthusiasm and support for space security initiatives.

Space Race

The Space Race set the standard for how information operations and public affairs could influence American space security. When the Russians launched Sputnik into orbit on October 4, 1957, American leadership persuaded their citizens of space's strategic value while convincing the world a Russian-dominated space was unacceptable. This period, spanning more than a decade and culminating in Armstrong being the first man to walk the moon, is aptly remembered as "thrilling, mind-boggling, [and] even magnificent."[17]

Sputnik struck a direct blow to the American psyche, overturning the post-World War II American perception of US scientific and military invincibility and causing a "crisis of confidence."[18] Ironically, Sputnik presented no immediate threat. It was a "simple sphere weighing just 184 pounds," intended to showcase Russian scientific literacy.[19] But in 1957, Sputnik jeopardized the period of peace sustained by the Cold War. To Americans, Sputnik foreshadowed ominous threats from Russia—scientific superiority, spy satellites, and, at worst, nuclear weapons orbiting above. Just 12 years before, America's Manhattan Project forever integrated technology, propaganda, and war by creating the atomic bomb. And while the United States still maintained a considerable scientific advantage, Sputnik made it feel illusory.[20]

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13. Edwin L. Armistead, ed., *Information Operations: The Hard Reality of Soft Power* (Washington, DC: Potomac Books, 2004), https://web.stanford.edu/.

14. Keifer, "Psychological Operations," 335.

15. Opperman, *Information Operations*.

16. Peter J. Westwick, "'Space-Strike Weapons' and the Soviet Response to SDI," *Diplomatic History* 32, no. 5 (2008), https://www.jstor.org/.

17. John N. Wilford, "With Fear and Wonder in Its Wake, Sputnik Lifted Us into the Future," *New York Times*, September 25, 2007, https://www.nytimes.com/ .

18. Siddiqi, "Competing Technologies," 428; and see also Douglas S. Anderson and Christopher R. Dooley, "Information Operations in the Space Law Arena: Science Fiction Becomes Reality," *International Law Studies* 76 (2002): 269, https://digital-commons.usnwc.edu/.

19. Wilford, "Fear and Wonder."

20. Karsten Werth, "A Surrogate for War—The U.S. Space Program in the 1960s," *Amerikastudien* 49, no. 4 (2004), https://www.jstor.org/.

President Dwight D. Eisenhower initially doubted Sputnik's military implications, dismissing the event as of only "scientific interest," but quickly realized Russia seized a substantial IO victory.[21] Virtually every American newspaper covered Sputnik with obsessive, alarmist, and detailed zeal, and the public outcry was substantial.[22] As the elected commander-in-chief, Eisenhower had a duty to respond to the widespread public concerns over Sputnik. Separately, Eisenhower also came to recognize space was the future of communications, giving Russia's Sputnik program direct and invaluable military application the United States lacked.

In response, Eisenhower and Congress created the National Aeronautics and Space Administration (NASA) to be the public face of American space initiatives.[23] NASA gave the government credibility that the United States would compete in space and prevent Russian dominance there. That NASA was a civilian agency was important, as it publicly implied America wanted space to have utility beyond war.[24] The new agency released nationwide campaigns employing nationalism, romanticism, and pragmatism to "consolidate political support" for space exploration.[25] NASA also actively dissociated itself from partisan issues, so it could communicate to all Americans and avoid the politicization of space.

At the same time, the Eisenhower administration elevated math and science in schools, which communicated the national need for technological achievement. Congress devoted substantial funds for research initiatives at universities while advanced technological courses were added to secondary school curricula.[26] To young adults, these changes underscored the modern intersection between science and national security.[27] War was no longer just about heart and muscle, but brains as well.

Most importantly, Eisenhower forged a vision for space that appealed to American values and confronted Soviet intent. Eisenhower marketed a "space for peace" and a "space for all mankind," secured by America, that contrasted with Soviet hypermilitarized space.[28] This appealed to Americans' elevated sense of global purpose after victory in World War II. Eisenhower's vision also gave America credibility within the international community. Future achievements like the UN's 1967 Outer Space

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21. Wilford, "Fear and Wonder"; and Armistead, *Information Operations,* 35–36.

22. Walter McDougall, *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985), 142.

23. McDougall.

24. Clayton R. Koppes, "The Militarization of the American Space Program: An Historical Perspective," *Virginia Quarterly Review* 60, no. 1 (1984), https://www.jstor.org/.

25. Siddiqi, "Competing Technologies," 429.

26. Siddiqi, 428.

27. Alvin Powell, "How Sputnik Changed U.S. Education," *Harvard Gazette*, October 11, 2007, https://news.harvard.edu/.

28. McDougall, *Heavens*, 194, 206–07.

Treaty—which banned nuclear weapons in space—plus post-Apollo collaboration with Russia on space exploration were a direct result of the American vision.[29.]

John F. Kennedy's 1960 election to the presidency elevated the US space campaign onto the national political stage. No issue better embodied the New Frontier Americans voted for than space exploration.[30] For Kennedy, space was the key to twenty-first-century global leadership just as naval power and air superiority had sustained previous empires. He proclaimed that "control of space will be decided in the next decade" and stated that "if the Soviets control space, they can control the earth, as in past centuries the nation that controlled the seas has dominated the continents."[31]

After the Russians launched Gagarin into orbit for the first human spaceflight in 1961, Kennedy recognized the psychological toll on the American public from "losing" again to the Soviets and smartly raised the urgency to compete, declaring "there's nothing more important."[32] He called on the United States to land a man on the moon by the end of the decade. This created a concrete and clear goal for the Cold War, which otherwise lacked tangible outcomes for victory beyond the defeat of communism. To Kennedy, a victory for America over Russia in the race to the moon would accomplish what all the proxy wars on Earth could not: to "demonstrate the superiority of the US political system and American way of life," and to "keep the communist system in check, and in the long run, help to bring about its downfall."[33]

Kennedy and President Lyndon B. Johnson spent the substantial political capital that Eisenhower's vision for space had earned the United States to lead on space policy, both at home and abroad. For example, the 1967 Outer Space Treaty was ratified unanimously by the Senate and then the UN, a victory enabled by US international credibility on space exploration. That treaty "denuclearized outer space and demilitarized the moon," but permitted military satellites and other weaponry to be used in orbit.[34] Conceding some militarization of space—something the Eisenhower administration did not want to do—ironically prompted peace on Earth.[35] Because the Outer Space Treaty made spy satellites legal, the Russians and Americans could police one another's actions from orbit.[36]

29. McDougall, *Heavens*; and Jeffrey Kluger, "The U.S. and Russia Signal Continued Cooperation—In Space, At Least," *Time*, October 7, 2022, https://time.com/.

30. McDougall, *Heavens*.

31. Werth, "Surrogate for War," 567.

32. Hugh Sidey, *John F. Kennedy: President* (Cambridge, MA: Athenaeum Press, 1963), 123.

33. Werth, "Surrogate for War," 572–73.

34. McDougall, *Heavens*, 419.

35. Jeremy Grunert, "The 'Peaceful Use' of Outer Space?," War on the Rocks, June 22, 2021, https://warontherocks.com/.

36. McDougall, *Heavens*.

The Space Race as an Information Operation

Because the Space Race was "primarily executed through the media," it was an information war that successfully utilized modern public affairs and information operations concepts.[37] The American press' patriotic and concerned reporting of Sputnik convinced the Eisenhower administration to move aggressively on space exploration and then facilitated the White House's national political response. Journalists exercised their ethical discretion to protect diplomatic negotiations on space, and the nations learned about each other's space programs primarily by studying public reporting.[38]

Through it all, Americans tuned to front pages and evening news bulletins plastered with Space Race updates—neither the Vietnam War nor Martin Luther King Jr.'s assassination received the same media attention as Apollo. And while the Soviets heavily regulated reporting on their space programs, the American media had substantial access to critical space projects.[39] Launches and experiments were broadcast live, like sportscasts of American major league games, generating a unifying level of excitement the Soviet networks could not duplicate.

Strategic Defense Initiative

Throughout the Space Race, the US nuclear arsenal was a strong deterrent to Russian military aggression, as Soviet leaders believed their lack of reliable intercontinental ballistic missile defense was a significant problem.[40] They invested substantial resources into antiballistic missile (ABM) defense systems and—while America landed on the moon—developed ABM weaponry so sophisticated that the United States could no longer launch a sufficiently disarming preemptive strike against the Soviet Union.[41] Thus, in 1970 both sides were again vulnerable to complete annihilation from a retaliatory strike—maintaining the world's period of peace due to fear of nuclear war.

Due to the prospect of ABM systems, the United States and Russia stockpiled nuclear weapons that could overwhelm the new defensive technology. This was a precarious development. Consequently, President Richard Nixon believed limiting ABM defenses would end the ongoing arms race and convinced the Soviets the world was more secure without them. Both nations signed the ABM Treaty in 1972, drastically reducing deployment of these systems. That treaty "codified a situation in which the [powers] were [again] equally vulnerable to a retaliatory strike, no matter who struck first."[42]

Yet the Russians continued to covertly research ABM technologies and circumvented the treaty by deploying illicit ABM defenses and installing prohibited warning

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37. Werth, "Surrogate for War," 577; and see also Reynolds, *Apollo*, 257.

38. McDougall, *Heavens*; and Werth, "Surrogate for War."

39. Werth, "Surrogate for War."

40. David Halloway, "The Strategic Defense Initiative and the Soviet Response," *Daedalus* 114, no. 3 (1985): 258, https://www.jstor.org/.

41. Halloway, 259.

42. Halloway, 261.

radar.[43] When Reagan was elected president in 1980, the Soviets had the world's only operational ABM system, and American officials considered rescinding the treaty to use the technology on US soil.[44]

Reagan recognized that a serious and clear American demonstration of strength to Russia could peacefully deter the Soviet Union's malfeasance, including its noncompliance with the ABM Treaty. Reagan announced the Strategic Defense Initiative on March 23, 1983. Known colloquially as the Star Wars program, SDI would counter the Soviet threat by developing space-based lasers that could "intercept and destroy strategic ballistic missiles before they reached [US] soil or that of [US] allies," although Reagan's version only envisioned it as a research program.[45] SDI's functional focus was exclusively missile defense, eschewing the same technology for offensive purposes.

Although packaged as scientific research, the initiative was designed specifically to deter the Russian missile program while maintaining American righteousness and credibility. SDI would only address prefatory technological questions about space-based missile defense while deployment of any such technology was for a future government to decide on. Unlike Russia's ongoing ABM operations, SDI was legal: because the program only sponsored research, it bypassed otherwise applicable prohibitions addressing testing and usage in both the Outer Space and ABM treaties.[46]

Also, timing was critically important to SDI's strategic value. The Russian economy cratered in the 1980s, so support of the communist government was teetering. To compete with SDI, the Russians needed vast amounts of money they did not have for a new research initiative, after already falling behind in other areas of scientific development.[47]

As a deterrent, the Strategic Defense Initiative complied with international law while simultaneously communicating to the Soviets an implicit threat of game-changing weaponry. Offensive ballistic missiles and any defensive weapons like the SDI system were inextricably linked; if the Americans developed a space-based laser that could reliably destroy nuclear weapons, Russia's stockpile was effectively worthless.[48] Further, Soviet diplomats believed SDI would inevitably culminate with offensive US weapons in space, including space-to-earth weapons.[49] Thus, SDI instilled military fear into a destabilizing Russia while remaining within the bounds of international norms, putting the Soviets in a precarious strategic position.

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43. Halloway.

44. Richard N. Perle, "The Strategic Defense Initiative: Addressing Some Misconceptions," *Journal of International Affairs* 39, no. 1 (1985), https://www.jstor.org/.

45. Ronald Reagan, "Address to the Nation on Defense and National Security" (Oval Office address, Washington, DC, March 23, 1983), https://www.reaganlibrary.gov/; and see also Perle, "Strategic Defense Initiative," 27–28.

46. Perle, "Strategic Defense Initiative."

47. Paul Podvig, "Did Star Wars Help End the Cold War? Soviet Response to the SDI Program," *Science & Global Security* 25, no. 1 (2017), https://doi.org/.

48. Perle, "Strategic Defense Initiative."

49. Westwick, "Space-Strike Weapons."

The deterrence scheme made diplomatic headway with the Russians possible.[50] The Soviets "harped on [the Strategic Defense Initiative] at every opportunity" even as their scientists pointed out such technology would be extremely difficult to develop.[51] Six months after Reagan announced SDI, the Soviets proposed a treaty banning all space weapons and paused further tests of its antisatellite weaponry. That new proposal did not materialize, but the Soviets kept returning to the negotiating table, always insisting on including the initiative in any treaty discussions. Simultaneously, the Russians launched a national effort to compete with SDI.[52] But the Russian economy could not sustain such an expensive project and political support for it was insufficient. There would be no 1980s Space Race due to the Strategic Defense Initiative.

Scholars disagree on the extent to which the initiative contributed to the Soviet Union's fall, but the possibilities it posed deterred Soviet aggression and materially affected the bargaining position of Soviet diplomats.[53] SDI as a deterrence message was more valuable to American security than it ever was as potential weaponry.

The Space Race, SDI, and Modern Space Objectives

Today, the federal government recognizes space as "vital to [the] Nation's security, prosperity, and scientific achievement," and acknowledges US space capabilities are indispensable to contemporary US military power.[54] The Department of Defense emphasizes three objectives in space: (1) maintaining superiority, (2) improving joint operations, and (3) ensuring stability.[55] President Joseph Biden's *National Security Strategy* and related documents focus on tangible goals, such as establishing a space traffic coordination system as well as new defense research opportunities, to achieve these objectives.[56] But the US experience with the Space Race and SDI, especially the lessons related to deterrence, also offer compelling reasons to engage in strategic messaging about US space achievements via public affairs and information operations.

Today's Global Space Competition

Since Sputnik, space has evolved into a distinct warfighting domain where the United States must aggressively compete with world powers, including in space-related messaging contests on Earth.[57] The rise of China and revival of Russia in space

50. Keifer, "Psychological Operations."

51. Westwick, "Space-Strike Weapons," 956.

52. Podvig, "Star Wars."

53. Podvig.

54. Department of Defense (DoD), *Defense Space Strategy Summary* (Washington, DC: DoD, June 2020), 1, https://media.defense.gov/.

55. *Defense Space Strategy*, 6–9.

56. Joseph R. Biden, *National Security Strategy* (Washington, DC: White House, October 2022), 45, https://www.whitehouse.gov/ .

57. *Defense Space Strategy*, 1; and Moltz, "Changing Dynamics," 21.

have made today a military inflection point, so US strategic messaging must be at its best.[58]

Space operations in America, China, and Russia are locked in an action-reaction model of increasing militarization, driven by a shared ambivalence about each nation's intentions and capabilities.[59] This ambivalence encourages a more prominent role for IO and PA. Both Russian and Chinese leadership "tend toward confirmation bias" for American space operations, whereby any space activities viewed as "plausibly 'aggressive'" automatically reinforce their perception of hostile US intent.[60]

Accordingly, China is moving aggressively to dominate space, with enthusiastic support from President Xi Jinping.[61] The nation rapidly fielded effective antisatellite missiles that can hit low-earth-orbit targets and plans to reach geosynchronous earth orbit assets next.[62] China also boasts a robotic arm attached to a satellite that can likely disable orbiting assets, and for the last three years, it has led the world in rockets fired into space.[63]

Similarly, Russian leadership still perceives space as foundational to national excellence, while President Vladimir Putin accuses the United States of trying to militarize outer space—a situation that then requires a countervailing Russian response.[64] Russia reorganized its space programs to be more agile and creative, investing heavily to build some of the world's most capable intelligence satellites. The nation made significant strides in orbital warfare assets and antisatellite weaponry, such as its "nesting doll" satellite that releases subsatellites in orbit as kamikaze-style missiles.[65] Russia's space ambitions are more limited than China's—due largely to financial constraints—but the nation nevertheless remains a persistent US competitor.

Messaging Clarity on Space

China and Russia used America's longstanding space superiority to justify their continued weaponization of space, citing fear of US space operations.[66] Now, all three

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58. Moltz, "Changing Dynamics."

59. Alexis A. Blanc et al., *Chinese and Russian Perceptions of and Responses to U.S. Military Activities in the Space Domain* (Santa Monica, CA: RAND Corporation, 2022), https://doi.org/.

60. Blanc et al., iv–v.

61. Moltz, "Changing Dynamics," 16; and see also Christian Shepherd and James Kynge, "China's Ambitions in Space: National Pride or Taking On the Americans?," *Financial Times*, May 8, 2021, https://www.ft.com/.

62. Defense Intelligence Agency (DIA), *Challenges to Security in Space: Space Reliance on an Era of Space Competition and Expansion* (Washington, DC: DIA, 2022), https://www.dia.mil/.

63. Moltz, "Changing Dynamics."

64. DIA, *Challenges to Security*, 21; see also Damien Sharkov, "Russia Fears U.S. Is Planning for Space War," *Newsweek*, January 16, 2018, https://www.newsweek.com/; and Holly Ellyat, "Putin Fears the US and NATO Are Militarizing Space and Russia Is Right to Worry, Experts Say," *CNBC*, December 5, 2019, https://www.cnbc.com/ .

65. DIA, *Challenges to Security*; and Dan Robitzski, "Russia Just Tested a Military Satellite That Kills Other Satellites," Byte (website), July 23, 2020, https://futurism.com/.

66. Baohui Zhang, "The Security Dilemma in the U.S.-China Military Space Relationship," *Asian Survey* 51, no. 2 (March/April 2011); and Sharkov, "Russia Fears."

nations spar over who is leading this modern space contest while each pours more resources into it. This limbo represents a security dilemma, with China and Russia challenging American hegemony, and the United States responding in kind to maintain the status quo.[67]

Departing from US leaders in the Space Race and the Strategic Defense Initiative eras, modern US leadership embraces a more covert approach to space operations—especially where national security is implicated—that limits IO opportunities. The Space Race was executed primarily through the media, with the Americans and Russians foregoing some secrecy to foment nationalism while engaging the world and one another. With the SDI, Reagan announced the project in a nationally televised address from the Oval Office, the most public stage in American politics.[68]

Today, unlike the late 1980s, US military operations, commercial research, and the entire societal infrastructure are inoperable without space. Thus Space Force operations are almost entirely highly classified to protect these functions.[69] This secrecy is intended to "maintain [the US] competitive edge in space," but China and Russia are now similarly clandestine—manifesting a space competition that discourages public diplomacy and communication.[70]

Yet the Space Race and SDI demonstrate that bold public messaging can positively affect space outcomes, especially when the United States has a credible and strong diplomatic position. China and Russia react to what the United States does and wants to do in space. With the Space Force being a young and nimble service, there is opportunity to conduct strategic IO—through actions and words—directed at China and Russia to help achieve national space goals.[71]

At times, American space IO can serve as a metaphorical carrot designed to incentivize cooperation.[72] In the Space Race, Eisenhower and Kennedy insisted on peaceful space, and US actions gave their words immense credibility. The decision to have a civilian agency, NASA, lead space efforts successfully communicated these intentions, while open press access to important US space events proved the US space program served all humankind.[73]

American public leadership on the peaceful use of space—juxtaposed with existing US technological advantages—led to space treaties and even collaboration with Russia on civilian space research.[74] Today, an American government that signals an intent

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67. Zhang, "Security Dilemma"; and Kenneth N. Waltz, *Theory of International Politics* (Longrove, IL: Waveland Press, 1979), 191.

68. Reagan, "Address to the Nation."

69. Wendel, "Not Enough Americans"; and Joseph Trevithick, "Secret Space Force Capabilities Could Be Declassified if New Bill Becomes Law," The Drive, December 8, 2021, https://www.thedrive.com/.

70. Trevithick, "Secret Space Force."

71. Zhang, "Security Dilemma," 330.

72. Joseph S. Nye Jr., "Public Diplomacy and Soft Power," *Annals of the American Academy of Political and Social Science* 616 (2008), https://www.jstor.org/.

73. Koppes, "Militarization of American Space"; and Werth, "Surrogate for War."

74. Kluger, "Continued Cooperation."

to compromise or cooperate—just when Russia and China expect the opposite—could help bring détente to existing space tensions.

In other instances, US space posture represents a stick, designed to deter or coerce.[75] For example, SDI's announcement sought to directly exploit Soviet Russia's weaker space capabilities and existing economic troubles.[76] Some US Air Force and US Space Force leaders today actively question why the Space Force has not publicly demonstrated its best warfighting capabilities.[77] China and Russia already complete antisatellite weaponry tests that communicate their space ambitions, and US hesitancy to do so could be interpreted as weakness.[78] If US technology can deter this aggression—or America can announce a military effort, in the style of SDI, with the same effect—boldly broadcasting that to China and Russia may also de-escalate space conflict.

American space initiatives would benefit from the specific and clear public posture the United States once took with the Space Race and SDI. Today, American leaders affirm rhetoric used in international policy that the peaceful use of space is a "goal, if not an unwritten requirement, of space activities."[79] In addition, the Space Force's warfighting doctrine establishes as one of its guiding principles that the United States "desires a peaceful, secure, stable, and accessible space domain."[80] This philosophy has been maintained by US presidents since Eisenhower first expressed it.[81]

The problem, however, is that peaceful space now is paradoxical. The Space Force is a military service that guards US interests in space as a warfighting domain, and "today, no state relies more on spacepower for its national security . . . than the United States," with China and Russia close behind.[82] Such unclear messages on modern American intentions in space—which China and Russia now mirror—frustrate international relations regarding the domain.[83]

Accordingly, ongoing diplomatic negotiations over space law have stalled due to distrust amongst the major players and an inability to separate mutual interests from strategic competition.[84] When diplomats meet to develop law and policy, they attempt to "construct a network of reasonable behavioral expectations" about their nations

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75. Nye, "Public Diplomacy," 94–95.

76. Perle, "Strategic Defense Initiative."

77. Joseph Trevithick, "USAF Secretary Gives Ominous Warning that Show of Force Needed to Deter Space Attacks," The Drive, April 12, 2019, https://www.thedrive.com/.

78. Moltz, "Changing Dynamics"; and Robitzski, "Russia Just Tested."

79. Grunert, "Peaceful Use."

80. USSF, *Spacepower*, vi.

81. McDougall, *Heavens*; and Grunert, "Peaceful Use."

82. Everett C. Dolman, "Space is a Warfighting Domain," *Æther: A Journal of Strategic Airpower & Spacepower* 1, no. 1 (2022): 82, https://www.airuniversity.af.edu/.

83. Mari K. Eder, "Strategic Communications and the Battle of Ideas," *International Law Studies* 83 (2007): 236, https://digital-commons.usnwc.edu/; and Blanc et al., *Chinese and Russian Perceptions*.

84. Ryo Nakamura and Tomoyo Ogawa, "US, China and Russia Lock Horns over Weaponization of Space," *Nikkei Asia*, July 29, 2020, https://asia.nikkei.com/.

"that yield[s] stability and predictability" in space.[85] This exercise pits the "practical national security objectives [in space] against the desire to maintain at least one environmental realm free from military conflict."[86]

The behavior of China, Russia, and the United States signals an intent to further militarize space and test the bounds of the Outer Space Treaty, and thus US public negotiating demands on space should reflect this. Without a "competitors' understanding of U.S. intent and capabilities," America's deterrence powers are handicapped, which weakens US leverage in international discussions.[87] This is why Reagan's Oval Office address on SDI was so critical to affecting Russian behavior: his announcement—from America's most serious stage—made the program a legitimate threat.[88] Separately, Eisenhower's peaceful vision for space succeeded because it explicitly contrasted with the Russian threat of space dominance and aligned with actual US government action on the Apollo project.[89]

Russia and China pay close attention to ongoing US operations in space, so deterrence and downstream negotiations fail if messages are transmitted unclearly or without credibility.[90] The United States has already struggled to bargain in other domains of diplomacy because of its mixed messages, which can frustrate adversaries and confuse Allies. The public US wavering between peaceful and warfighting space likely exacerbates these responses, which is why China and Russia view US space operations with intense concern regardless of their hostility.[91]

Space as a Military Domain

By resetting discussions with the understanding that space is a military domain, America can lead the space powers to sort out more important questions for "stability and predictability," such as what responsible military operations in space look like.[92] Framing US space negotiations to account for existing realities and the nation's long-term vision is critical to their success. For example, Reagan received political and international cover for SDI through his explanation of Russia's ongoing ABM Treaty violations, and Eisenhower's peaceful vision for space earned the United States significant international cooperation in the Space Race.[93]

Thus, a clear and practical vision for space would free American diplomats to negotiate rules that address and anticipate military activity. This is akin to international law

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85. Martin Feinrider, "The Strategic Defense Initiative and International Law," *Fletcher Forum* 10, no.1 (1986): 20, https://www.jstor.org/.

86. Anderson and Dooley, "Information Operations," 272.

87. DoD, *2022 National Defense Strategy of the United States of America* (Washington, DC: DoD, 2022), 9, https://media.defense.gov/.

88. Ronald Reagan, "Address to the Nation"; and Perle, "Strategic Defense Initiative."

89. McDougall, *Heavens*.

90. DoD, *National Defense Strategy*, 9.

91. USSF, *Spacepower;* Dolman, "Warfighting Domain"; and Blanc et al., *Chinese and Russian Perceptions*.

92. Feinrider, "Strategic Defense Initiative."

93. McDougall, *Heavens*.

on Earth, where certain military operations are justified and permitted, while others are not.[94] Because this communications approach reflects that space is already militarized, international negotiators can target the more obtainable goal of space stability.

Of course, a bolder public posture by the United States, if misinterpreted, could lead to what the Defense Department warns against: "unknowingly driving competition to aggression."[95] How the United States communicates its space intentions and the risks embedded in such decisions are concerns primarily reserved for the president.[96] Some factors the president would likely account for include whether China or Russia would respond to US overtures in good faith, alter their own space programs, or change their understanding of space policy. Yet for both ongoing messaging campaigns abroad and future ones, the United States would benefit from being bold, clear, and practical. The Space Race and SDI highlight the benefits of such language.

National Vision for Space

On the public affairs side, the United States needs an updated national vision for space that inspires national unity while effectively courting political and professional support. Americans remain unsure about space's national security significance. This situation counteracts the ability to manifest consistent and national support for the Space Force and other national space objectives. At the Satellite 2020 conference in Washington, DC, then-Lieutenant General David Thompson, the Space Force's vice chief of space operations, noted that "not enough people innately understand what we already do in space in a military sense."[97]

The press—which so passionately reported on the Space Race in the 1960s—does not maintain the same coverage and interest about space security now, even though the stakes in space are much higher.[98] This has allowed other media, like the Netflix satire series *Space Force*, to overshadow Space Force's already paltry news coverage and further distance Americans from space's strategic importance.

Meanwhile, US space dominance is waning, with some critics already declaring this modern space race iteration lost as NASA and the Space Force struggle to compete with Chinese and Russian technology.[99] For example, rudimentary tasks for the Apollo program are onerous today, as NASA's Artemis program has been delayed for years because of an inability to manufacture adequate space suits.[100] And as one aerospace expert argues, "very little of [the] future backbone of space utility is

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94. Emmerich de Vattel, *Law of Nations* (1758), Joseph Chitty edition (Philadelphia: T & J. W. Johnson & Co, 1883); and UN Charter, ch. 1, art. II., https://www.un.org/.

95. DoD, *National Defense Strategy*, 9.

96. Youngstown Sheet & Tube Co. v. Sawyer, 343 U.S. 579, 635–38 (1952).

97. Wendel, "Not Enough Americans."

98. McDougall, *Heavens*.

99. Charles Beames, "The Second Space Race Is Underway. America Is Already Losing It," *CNN Business*, July 18, 2019, https://www.cnn.com/.

100. Jake Dean, "Spacesuits and Other Issues Mean NASA Isn't Landing on the Moon in 2024," *Slate*, August 13, 2021, https://slate.com/.

American-owned," which will hinder space-focused manufacturing and commercial viability if left unchanged.[101]

The United States needs an improved sales pitch to reinvigorate the American people's interest in space and ensure it is adequately invested in and protected. Yet the challenge lies in making space significant enough to American everyday life that people care about it. In 2021, Chief of Space Operations General John Raymond noted the difficulty in establishing a "connection" between US activities in space and the American public: "Space doesn't have a mother. . . . You can't reach out and hug a satellite. You can't see it. You can't touch it."[102]

Yet Kennedy's romanticization of the Apollo program demonstrates real power in using pathos to craft a unifying national narrative on space. Kennedy sold the American people on not only the military and strategic significance of going to space as part of the Cold War, but also the emotional reward this transcendent adventure would provide. Working together, Americans could settle the New Frontier and swim in the "new ocean."[103] As NASA led operations throughout the Space Race, it mimicked themes Kennedy versified in day-to-day communications. Today's PA approach should use a similar emotional appeal given space is still a relatively unknown and exciting frontier whose exploration—if appropriately explained—can excite the public's interest.

Relatedly, military leadership should look for opportunities to incorporate the space mission with more public-facing and tangible projects to further inspire American enthusiasm for space and demonstrate its importance. National Security Adviser Jake Sullivan describes the current administration's vision as a "foreign policy for the middle class."[104] Accordingly, US leadership can market space's role in delivering for everyday Americans. This might include, for example, prioritizing asteroid mining, which can provide blue-collar jobs and raw materials to energize American industry. Domesticizing the metals supply chain is already a national security imperative; a central role in achieving this could excite the nation about space.[105]

Or, US political leadership could expand Space Force's limited geopolitical footprint into specific areas like Appalachia that need commercial investment, which would ignite legions of patriotic towns that were left behind by trade globalization. A plan like this would effectuate the themes of purpose, patriotism, and persistence characterized in the biographical film *October Sky* (1999), which centered on the son of a coal miner and his dream of becoming a rocket scientist, much like NASA designed its messaging to evoke similar feelings during the Space Race.

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101. Beames, "Second Space Race."

102. Miriam Kramer, "The Space Force's PR Problem," *Axios*, February 9, 2021, https://www.axios.com/; and Werth, "Surrogate for War," 568.

103. John W. Jordan, "Kennedy's Romantic Moon and Its Rhetorical Legacy for Space Exploration," *Rhetoric and Public Affairs* 6, no. 2 (Summer 2003), 209; and McDougall, *Heavens*.

104. Elyse Labbot, "The Sullivan Model," *Foreign Policy*, November 24, 2020, https://foreignpolicy.com/.

105. "FACT SHEET: Securing a Made in America Supply Chain for Critical Minerals," press release, White House, February 22, 2022, https://www.whitehouse.gov/.

Success in space requires public buy-in from the American people and their leaders, which means space operations must be promoted nationally and in a manner befitting their significance. The Space Race and the Strategic Defense Initiative were high-profile, national stories with direct presidential involvement—including from the Oval Office.[106] But today, both the Space Force and NASA often take a political back-seat to ongoing military theaters on Earth, like in Ukraine, and international responses to rogue states like Iran and North Korea.

Space Force needs messaging campaigns that carve out a clear public lane among America's competitive and crowded national interests. Accordingly, the Space Force must implement PA campaigns that engage broader political support, so that US leadership invests more resources in and attention on space. This is a fine line to navigate, but one a nimble, innovative, and mission-critical service like the Space Force should try to fulfill.

Conclusion

The Space Race and the Strategic Defense Initiative offer insight into achieving space objectives today using strategic communications, specifically through public affairs functions and information operations focused on deterrence. A bolder, clearer, and more pragmatic approach to strategic messaging with Russia and China could buy the United States negotiating leverage and credibility on space policy, and even deter these nations' ongoing space weaponization. Separately, to achieve national goals in space, America needs an inspiring and broad vision to excite its citizens about spacepower. **Æ**

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106. Reagan, "Address to the Nation."

VIOLENCE, CULTURE, AND A PATH TO PEACE

Phillip S. Meilinger

As in centuries past, tribal and religious wars continue to plague the world today. An analysis of US westward expansion, including military activity that resulted in a significant reduction of internecine tribal violence by the nineteenth century, provides insights to contemporary conflicts. Recent experiences in the Balkans, North Africa, and the Middle East suggest a successful path toward peace employing airpower, indigenous forces, special operations forces, and intelligence, surveillance, and reconnaissance tools, in a carefully calibrated manner under international consensus.

With their overwhelming collective power, coupled with a unique capability to apply force accurately and discriminately, the United States and its Allies have an opportunity to impose peace on aggressive nations and rogue rulers. It is a Western belief that democracy is an intrinsic good that leads to freedom, and this in turn to peace. Paradoxically, peace must often be gained by force. This phenomenon was apparent worldwide and in the Americas during the sixteenth through nineteenth centuries. Undoubtedly, imperialism was extremely brutal, causing the deaths of millions. Yet there was a remarkable byproduct that was beneficial and long-lasting: wars between native tribes that had been ongoing for centuries suddenly ceased. These endemic wars had seen a high lethality rate among both sexes and all age groups. Peace was then imposed by the conquerors. Can such peace now be obtained without the horrors accompanying past imperial efforts?

Tribal and religious wars continue to rage in the world. American history, in addition to recent experiences in the Balkans, the Middle East, and Africa, point to a possible formula for successful intervention to end these wars that includes the use of precise, limited, and effective force. Such operations will not be cost free, but the goal of peace is worth the effort. This article suggests a method for using carefully calibrated and internationally sanctioned force to impose peace on areas worldwide.

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Intervention for the Sake of Democracy

Political scientists argue that democracies seldom fight other democracies.[1] Although that statement can hinge on definitions—Was 1914 Germany an autocracy led by the kaiser or a democracy with an elected reichstag?—it is still largely valid.[2] It has thus been a tenet of US diplomacy to spread democracy to foster peace. Former Deputy Secretary of State Richard L. Armitage noted "every President except John Quincy Adams has been involved in the belief that the world is made better by a U.S. that is involved in the protection of human freedoms and human rights across the board." He added that "every postwar President has believed we have a duty to spread democracy."[3] At times that "duty" has been a major factor in foreign policy.

Following World War II, President Harry Truman wrote that the American way of life was based upon the will of the majority "and [was] distinguished by free institutions, representative government, free elections, guarantees of individual liberty, freedom of speech, and religion and freedom from political oppression."[4] Yet, it would often take active intervention to achieve these ends. Truman took the country into war over the freedom of South Korea.

In 1961, John F. Kennedy announced, "Let every nation know, whether it wishes us well or ill, that we shall pay any price, bear any burden, meet any hardship, support any friend, oppose any foe to assure the survival and the success of liberty."[5] The burden of Vietnam came soon after.

When the United States invaded Iraq in 2003, President George W. Bush stated "freedom and democracy will always and everywhere have greater appeal than the slogans of hatred."[6] This proposition is unquestioned in the United States, and many presidents have believed that force was sometimes necessary to produce such freedom.

In 2009, President Barack Obama accepted the Nobel Peace Prize, arguing like Truman, Kennedy, and Bush that peaceful democracy was the goal, but words would not induce terrorists to stop; rather, "force may sometimes be necessary [and that] is not a call to cynicism—it is a recognition of history." He asserted that "the instruments of war do have a role to play in preserving the peace" and that "force can be justified on humanitarian grounds, as it was in the Balkans, or in other places that have been scarred by war. . . . That's why all responsible nations must embrace the role that

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1. Phillip S. Meilinger, *Thoughts on War* (Lexington: University Press of Kentucky, 2020), chap. 14; Quincy Wright, *A Study of War*, 2 vols. (Chicago: University of Chicago Press, 1942); and Edward D. Mansfield and Jack L. Snyder, *Electing to Fight: Why Emerging Democracies Go to War* (Cambridge, MA: MIT University Press, 2005).

2. Bruce M. Russett, *Grasping the Democratic Peace: Principles for a Post-Cold War World* (Princeton, NJ: Princeton University Press, 1993).

3. "An Interview with Richard L. Armitage," *Prism* 1, no. 1 (December 2009): 107.

4. Harry S. Truman, *Memoirs by Harry S. Truman, Volume II: Years of Trial and Hope, 1946–1952* (Garden City, NY: Doubleday & Company, 1956), 106.

5. John F. Kennedy, "Inaugural Address," January 20, 1961, Washington, DC, John F. Kennedy Presidential Library and Museum, transcript and sound recording, https://www.nationalgeographic.com/.

6. Amy Chua, *Political Tribes: Group Instinct and the Fate of Nations* (New York: Penguin, 2018), 3.

militaries with a clear mandate can play to keep the peace."[7] The key point was the requirement for "a clear mandate"—force can no longer be used without international approval, even if the motives for intervention are humanitarian concerns.

Democracy is not a panacea that automatically carries peace and prosperity in its wake. Democratic nations can still be violent and warlike. Ironically, the United States has been engaged in war more than any other nation since World War II, even if such conflicts have aimed to enforce peace. Nevertheless, the presence of democracy has proven to be a major factor in limiting conflict. When thinking how to enforce peace around the world, it is useful to look to the past. The tribal and culturally driven nations the United States is dealing with today—such as those in the Middle East where religious sects and clans play such a large role in societal cohesion—are not unlike those it once confronted in the Americas.

Depictions of Indigenous Tribes in the Americas

Historians write in cycles, reinterpreting events and sometimes reversing conclusions of previous generations. One such topic concerns American Indians. They were once largely portrayed in history books and fiction as savages who routinely massacred white women and children. That view changed, and Native Americans were depicted in books and in movies like *Dances with Wolves* (1990), *Bury My Heart at Wounded Knee* (2007), and Disney's *Pocahontas* (1995) as nature-loving hunters at peace with themselves, each other, and the environment. The white man then arrived to destroy their way of life, turning them into reluctant warriors forced to defend themselves from those stealing ancestral lands and killing off the game.

This latter view was held by some natives themselves, including Russell Means of the American Indian Movement: "Before the whites came, our conflicts were brief and almost bloodless, resembling far more a professional football game than the lethal annihilations of European conquest."[8] Such views are no longer viable. Archaeologists examining events before European contact have discovered that most indigenous peoples were violent, intertribal war was frequent, and villages all over the Americas were surrounded by defensive fortifications—an unmistakable sign of recurring conflict.[9]

By 1300, for example, Indians on the Missouri River built villages along steep riverbanks protected by moats, stockades, and bastions. "Defensive towers were situated on

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7. Barack H. Obama, "A Just and Lasting Peace" (Nobel lecture), Oslo City Hall, Norway, December 10, 2009, Nobel Prize (website), transcript and video recording, https://www.nobelprize.org/.

8. Russell Means and Marvin Wolf, *Where White Men Fear to Tread: The Autobiography of Russell Means* (New York: St. Martin's Press, 1995), 16, qtd. in Richard J. Chacon and Rubén G. Mendoza, eds., *North American Indigenous Warfare and Ritual Violence* (Tucson: University of Arizona Press, 2007), 6.

9. Elizabeth N. Arkush and Mark W. Allen, eds., *The Archaeology of Warfare: Prehistories of Raiding and Conquest* (Gainesville: University Press of Florida, 2006), 7; Steven A. Le Blanc and Katherine E. Register, *Constant Battles: The Myth of the Peaceful, Noble Savage* (New York: St. Martin's Press, 2003), 1–3, 161–62; and Lawrence H. Keeley, *War before Civilization: The Myth of the Peaceful Savage* (New York: Oxford University Press, 1996), 34, 67–69, 83–91.

the corners and at intervals along walls and could extend 20 to 30 feet beyond the plane of the walls."[10] Such construction allowed defenders to use enfilading fire against attackers. In the northeast, Indian fortifications were so formidable that Europeans referred to them as castles. These structures incorporated palisades 20 feet high with catwalks along the top so mobile sentinels could fire down upon an enemy. In front of the palisades were either moats or abatis.[11] Clearly, tribes feared their native neighbors and expended much effort in preparing defenses against them.

Osteologists studying bones from centuries past have found that an unusually high number of skeletons bore signs of violence: embedded arrowheads, smashed skulls, scalping, and decapitations. In some locations, the percentage of bones exhibiting such wounds exceeded 40 percent of all remains found.[12] At Crow Creek, South Dakota, in a massacre occurring around 1300, nearly 500 people were killed—men, women, and children—"their noses, hands, and feet were sometimes cut off, teeth smashed, and heads and limbs cut from the body. All the victims, from babies to elders, were scalped and mutilated."[13]

At Sacred Ridge, Colorado, archaeologists uncovered nearly 15,000 bone fragments that were intentionally crushed to pieces—premortem. It was the largest collection of mutilated human bones ever found in the American Southwest. One expert examined all 15,000 fragments and stated there was evidence of violence "from the top of the head to the tips of the toes."[14]

Around 1780 Lakota warriors attacked an Arikara settlement—in what is now North Dakota—on the Missouri River. Although protected by ditches and a palisade, the town was quickly overwhelmed. Bodies found at the site ranged in age from four years to fifty and included males and females: "The victorious attackers systematically mutilated the bodies of their victims, with these mutilations including scalping, decapitation, crushing of the skull and face, removal of hands and feet, and disembowelment."[15] That hardly sounds like a football game.

Conditions were even worse to the south. Native life prior to the arrival of the Europeans is a tale of persistent warfare marked by massacres, heart extraction, and human sacrifice. In the Chimú Empire located in present-day Peru, archaeologists found a child sacrifice site. Dated to 1450, the remains discovered were of 140 juvenile

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10. David E. Jones, *Native North American Armor, Shields, and Fortifications* (Austin, TX: University Press of Texas, 2004), 3.

11. Jones, *North American Armor*, 52–57.

12. Patricia M. Lambert, "The Osteological Evidence for Indigenous Warfare in North America," in Chacon and Mendoza, *Indigenous Warfare*; Jill Lepore, *The Name of War: King Philip's War and the Origins of American Identity* (New York: Knopf, 1998), 179; LeBlanc and Register, *Constant Battles*, 59, 125; and Keeley, *War before Civilization*, 99–103.

13. Douglas B. Bamforth, "Climate, Chronology, and the Course of War in the Middle Missouri Region of the North American Great Plains," in Arkush and Allen, *Archaeology of Warfare*, 74–76.

14. Blake de Pastino, "Evidence of Hobbling, Torture Discovered at Ancient Massacre Site in Colorado," Western Digs, June 28, 2014, http://www.westerndigs.org/.

15. Jones, *North American Armor*, 7.

boys and girls ranging in age from five to fourteen. All were killed with a slash across the sternum to remove their hearts.[16]

Radiocarbon dates showed that mass child sacrifices had started around 1050 and continued for the next 400 years: "This was a series of ritual events performed as a way to communicate with the gods and mediate between people and supernatural forces."[17] The Incas replaced the Chimú, and at the site of one massacre, of 106 individuals, 94 percent were killed by blows to the head and face with a stone mace. Over half of the victims were women and children.[18] As at Sacred Ridge, those slaughtered were not collateral damage—they were targeted.

The Aztecs warred to secure prisoners for sacrifice to the gods.[19] Captured enemies were brought to the capital where priests cut out each prisoner's heart—while they were still alive. The bodies were flayed and the skin used by the priests for clothing. The corpses were then returned to the captors to eat. Afterwards, the skulls of the victims were set into a "skull rack" at a temple or in the home of the captor to indicate prestige.[20] Not only males were sacrificed and their skulls displayed, but women and children as well.[21]

Sacrifices were intended to appease the gods, who needed fresh blood. The Aztecs believed that if their blood lusts were not satisfied, the gods would die and the world would end. To supply this insatiable need, the Aztecs were almost constantly at war, and thousands of captives were slaughtered every year. At the dedication of a temple to the god Huītzilōpōchtli, 80,400 people were ritually sacrificed.[22]

Anthropologists have interviewed present-day Indian elders regarding oral traditions that stretch back centuries. These stories confirm the physical evidence, speaking often of massacres and revenge-taking on neighboring tribes.[23] Notably, the warrior culture is central to Indian lore, in virtually all tribes across the Americas. These traditions stressed the nobility and importance of warriors, so Kachina dolls, painted buffalo skins, and skull racks were made to perpetuate their memory.[24] Hunkpapa

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16. Kristin Romey, "Ancient Mass Child Sacrifice May Be World's Largest," *National Geographic*, April 26, 2018, https://www.nationalgeographic.com/.

17. Jarrett A. Lobell, "Peru's Great Urban Experiment," *Archaeology* (May/June 2023): 41–42.

18. Andrew K. Scherer and John W. Verano, eds., *Embattled Bodies, Embattled Places: War in Pre-Columbian Mesoamerica and the Andes* (Washington, DC: Dumbarton Oaks Research Library, 2014); and see also J. Marla Toyne and L. Alfredo Narváez Vargas, "The Fall of Kuelap: Bioarchaeological Analysis of Death and Destruction on the Eastern Slopes of the Andes," in Scherer and Verano, *Embattled Bodies*, 346–54.

19. Eric Carlton, *War and Ideology* (Savage, MD: Barnes and Noble, 1990), 32.

20. Carlton, 136–37; and Ross Hassig, *Aztec Warfare: Imperial Expansion and Political Control* (Norman: University of Oklahoma Press, 1988), 36, 114–16.

21. Cleve R. Wootson Jr., "Scientists Flesh Out Theories for an Aztec Tower of Skulls," *Chicago Tribune*, July 5, 2017, 14.

22. Hassig, *Aztec Warfare*, 121; and Carlton, *War and Ideology*, 33.

23. John R. Johnson, "Ethnohistoric Descriptions of Chumash Warfare," in Chacon and Mendoza, *Indigenous Warfare*.

24. Polly Schaafsma, "Documenting Conflict in the Prehistoric Pueblo Southwest," in Chacon and Mendoza, *Indigenous Warfare*, 119.

chief Bear Ribs said of Lakota warriors, "war with them was not only a necessity but a pastime."[25] War was thus a way of life.

Firearms were a powerful symbol and practical instrument to foster the warrior spirit and were a decisive factor in wars between Indians and Euro-Americans. The tribes realized this and wanted such weapons for themselves. Although colonial governments questioned the wisdom of providing them guns, such trade was inevitable. Euro-Americans needed pelts such as beaver, fox, and otter, supplied by the Indians to sell to Europe. This was a huge business, but in return the Indians demanded guns, ammunition, powder, and parts to repair damaged weapons.

Over the decades, a "gun frontier" spread across the continent from east to west as the Indians gained firearms and became expert marksmen. Although usually outnumbered, Indians employed their new weapons to fight the whites to a standstill on many occasions.[26] Eventually, white superiority in numbers spelled the difference.

Intertribal warfare continued after the whites arrived: Iroquois continued to fight Hurons, Seminoles raided the Creeks, Apaches warred against Comanche, Osage fought the Blackfeet and Crows, the Navaho battled the Zunis, and the Lakota fought anyone that threatened their dominance.[27] Throughout the Americas the result was an arms race among the tribes "that ultimately became a race to the bottom as the people exhausted their natural resources and turned their weapons against each other."[28]

The depletion of beaver, otter, and buffalo heightened tensions among tribes, leading to more conflict. It was a paradox of Indian life that as much as they feared and resented white encroachment, they were dependent on them for guns, ammunition and weapons of iron. In sum, life was nasty, brutish and short for most American Indians in both hemispheres before 1500 and the arrival of the whites and for centuries thereafter: "Warfare was ubiquitous; every major cultural area of native North America reviewed herein has produced archaeological, ethnohistorical, osteological, or ethnographic evidence of armed conflict and ritual violence."[29]

Motives for War Today

What is the relevance of these facts to a modern defense analyst or decisionmaker? Several issues are interesting, including war causation. Common motivations for tribes making war against neighbors for generations included revenge, religion,

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25. Pekka Hämäläinen, *Lakota America* (New Haven, CT: Yale University Press, 2019), 235.

26. David J. Silverman, *Thundersticks: Firearms and the Violent Transformation of Native America* (Cambridge, MA: Belknap, 2016), 25.

27. Charles A. Bishop and Victor P. Lytwyn, "Barbarism and Ardour of War from the Tenderest Years," in Chacon and Mendoza, *Indigenous Warfare*, 37, 40; George P. Milner, "Warfare, Population, and Food Production in Prehistoric Eastern North America," in Chacon and Mendoza, 185; LeBlanc and Register, *Constant Battles*, 68–71; and Keeley, *War before Civilization*, 67–69, 83–88.

28. Silverman, *Thundersticks*, 189.

29. Chacon and Mendoza, *Indigenous Warfare*, 4; and see also George Franklin Feldman, *Cannibalism, Headhunting and Human Sacrifice in North America: A History Forgotten* (Chambersburg, PA: Alan C. Hood, 2008).

prestige, slavery, and resource accumulation.[30] Although wars were sometimes fought over hunting grounds, maize fields, and precious objects made from metal or shells, in most cases cultural and revenge motives dominated: feuding was constant, and a tribe simply hated another and wished its destruction.

Cultural, religious, and societal motives still exist, driving conflict worldwide. Wars based on tribal differences and ancient grudges are currently raging in Chad, Mali, Somalia, Nigeria, and elsewhere in Africa. At the same time, the reasons for strife between Muslims and Jews transcend traditional notions of justice, land, wealth, or logic. The religious leaders of Iran hate Israel, as evidenced when its Supreme Leader Ayatollah Ali Khamenei called Israel a "cancerous tumor" that must be eradicated.[31] The two countries have never been at war, they share no borders, and in fact are hundreds of miles distant and do not covet each other's territory or wealth. There are other factors involved, but religion is crucial and must be understood to devise a peaceful solution to problems.

Furthermore, a civil war is now being waged among Muslims. On one side are fundamentalists who desire a caliphate that governs by Sharia law. Moderate Muslims, on the other hand, see the Koran as a book of peace. World stability requires that moderates win this battle.[32] How can the United States help and assist peaceful Muslims to coexist with other ethnic groups and religions? History in the Americas offers an interesting perspective.

Decreases in Tribal Conflict

Warfare between Indian tribes in the Americas virtually ceased by the middle of the nineteeth century—similar trends were noted among native cultures overrun by Europeans elsewhere around the world at the same time.[33] This is a touchy subject many historians are loath to discuss, fearing that referring to the great peace of the nineteeth century would be construed as a justification for colonialism. They have a point: one must not ignore the exploitation, aggression, and genocide that too often characterized white-native relations. Even so, the fact that native warfare decreased so dramatically worldwide in such a short period of time—relative to the centuries it had been ongoing—needs to be addressed. Several factors came into play during this period.

Enemy of My Enemy

The severity of war initially increased as Europeans contacted natives. The whites came to conquer, and their superior weapons, numbers, technology, and political

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30. See Gat, *War in Civilization*.

31. Amir Vahdat and Jon Gambrell, "Iran Leader Says Israel a 'Cancerous Tumor' to Be Destroyed," *Yahoo! News*, May 21, 2020, https://news.yahoo.com/.

32. See David Armitage, *Civil Wars: A History in Ideas* (New York: Knopf, 2017), 5–11.

33. LeBlanc and Register, *Constant Battles*, 201–2; Burch, "Traditional Warfare," 29; Bishop and Lytwyn, "Barbarism and Ardour," 54; and Gat, *War in Civilization*, 15.

solidarity were compelling advantages. In some areas, tribes united in opposition to the newcomers. This alliance model—as practiced by the Iroquois Confederation, the Catawbas in South Carolina, and the Sioux in the Dakotas—reduced warfare between tribes that had been ongoing for generations. Tribes began to forget old enmities and grew accustomed to living at peace with neighbors, even if only to unite against a common foe.[34]

Religion

Europeans brought missionaries who preached a message of pacifism. Their agenda was self-serving: the clerics, who lived alongside the colonial governments, had a vested interest in lowering native resistance. If absorption could be aided with a message stressing peace and acceptance, the results would assist white rule, but the decreased level of warfare would also benefit the Indians.[35] As one historian put it, "The recognition of a common set of religious ideas might serve to appease recalcitrants and malcontents."[36]

Economy

Economics limited violence, and a major role was played by trading companies. The Hudson's Bay Company, a fur trader, had its own army for policing Canada.[37] Private armies were used because it was bad for business if the gathering of pelts was disrupted by raiding parties, or if their transport was halted by tribal warfare. Although some industry profits from strife, war is usually bad for commerce: trade is disrupted, the labor force goes off to war, insurance rates rise, and governments impose price controls and resource allocation procedures. Economic interests, then and now, push for tranquility and order.

National Militaries

A policing role was played by the US Army throughout the nineteenth century.[38] Governments seek a monopoly of violence within their territory and form police forces to keep the peace. Weapons are often forbidden and criminals are caught and punished. Initially, the policing mission of the US Army was to prevent Indians from attacking white settlers, but keeping the peace was soon extended to protect Indians from white encroachments and between tribes as well.

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34. Frederick E. Hoxie, *Encyclopedia of North American Indians* (Boston: Houghton Mifflin, 1998), 102–03, 298–302; and Hämäläinen, *Lakota America*, passim.

35. Gat, *War in Civilization*, 55; and Steele, *Warpaths*, 31.

36. Eric Carlton, *Occupation: The Politics and Practices of Military Conquerors* (Savage, MD: Barnes & Noble, 1992), 5.

37. Peter C. Newman, *Company of Adventurers: The Hudson's Bay Company*, vol. 1 (Toronto, CA: Viking, 1985).

38. William C. Banks and Stephen Dycus, *Soldiers on the Home Front: The Domestic Role of the American Military* (Cambridge, MA: Harvard University Press, 2016).

All violence, regardless of who were the perpetrators, was condemned and punished. One historical analysis notes these results: "From the mid-1800s on, the United States Army enforced peace in the Southwest. From that time, the Hopi were not allowed to, nor did they need to, engage in intense warfare to survive. By the late 1800s, this was the case all over North America."[39] This same phenomenon occurred in South America and Mexico after the Spanish took control, and elsewhere around the world in areas colonized by the British and French.

Imposing peace on controlled territories meant that crops were no longer burned or looted, fields no longer stood untended because the population was off at war or had been killed, and trading was not brought to a complete standstill. There were more resources available and these were more equitably distributed, thus removing a cause for the tribes to go to war in the first place.

One revealing account exemplifying the trend toward peace among indigenous peoples during the nineteenth century concerns the Sioux Nation, composed of seven major tribes, the largest and most aggressive being the Lakota. Initially living near Lake Superior, the Lakota began moving west around 1700 as their homeland was being overrun by tribes fleeing from white settlement pressure, and for the next 150 years they waged wars of conquest against other tribes as they migrated westward and formed what became the most powerful native empire in North America.

The Lakota fought, conquered, assimilated, or drove out dozens of native tribes, including Cree, Omaha, Assiniboine, Shoshone, Arikara, Pawnee, and Otoe. Around 1850 the Lakota encountered the US Army, bent on pacifying the northern great plains to make room for white settlers. After a few sharp battles, the two sides broke contact and the Lakota moved farther north and west. Within two decades they were lords of virtually the entire territory between the Missouri River and the Rocky Mountains, and from the Canadian border to present-day Kansas. It was a huge empire smack in the center of the United States.

To control this empire, the Lakota continued to war against Crow, Kiowa, Ute, Arapaho, Flathead, Blackfeet, and several other tribes. Then gold was discovered in the Black Hills—the heart of Lakota land—and railroad companies appeared to lay rails through this area. The Lakota resisted these incursions and fighting was constant. The US government sent an army to stop the bloodshed, push back the Lakota, and ensure the safety of white settlers and miners wishing to move into the area. The result was the Battles of the Rosebud and the Little Bighorn in 1876.

The humiliation felt by Washington and the Army over these disasters called for immediate and massive retaliation. Within two years the Lakota were overwhelmed and their empire destroyed. The Army was avenged, but the biggest winners were the countless tribes who had served as Lakota prey for the previous two centuries. Intertribal warfare largely ceased.[40] One historian looking at violence between natives and

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39. LeBlanc and Register, *Constant Battles*, 201.
40. Hämäläinen, *Lakota America*.

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whites noted statistically that there was a very sharp decline in both "fights" and deaths between 1850 and 1900.[41]

The suggestion that colonialism benefits humanity by bringing peace to natives can be easily twisted and must be approached with caution. It was seldom the purpose of imperialists to aid indigenous peoples: if that occurred as a side effect of conquest and exploitation, it was a bonus. And yet, the statistics are compelling.

One study of primitive warfare found that male mortality rates due to war often exceeded 20 percent in tribes in New Guinea, the Amazon Basin, the Arctic, and during the nineteenth century in North America—the Blackfeet tribe was 50 percent deficient in adult males due to intertribal warfare.[42] These horrendous figures dropped precipitously when peace was enforced by outside powers. "Civilized" warfare has also been deadly, and some of the highest mortality rates in modern times were suffered by Germany and Russia in the World Wars. Even so, death rates were one-seventh that of the tribes in the areas noted above. Counting all deaths in war during the twentieth century, the mortality rate was "*twenty times smaller* than the losses that might have resulted if the world's population were still organized into bands, tribes, and chiefdoms [emphasis in original]."[43]

Strong central governments have imposed peace on their realms since ancient times. When those states crumbled, ethnic hatreds held in check often resurfaced. The collapse of the Roman Empire during the fifth century led to fragmentation and warfare—the descent into the Dark Ages. More recently, the end of colonial empires in Africa have often led to intertribal wars. Similarly, the death of Yugoslav leader Josip Broz Tito and his strong-armed rule eventually plunged Yugoslavia into fragmentation, ethnic cleansing, and bloodshed as the provinces of Slovenia, Croatia, Bosnia, Kosovo, Macedonia, and Serbia rediscovered their distaste for each other. Peace was only restored by the military intervention of NATO. Likewise, the ousting of Saddam Hussein led to two decades of internecine violence. How can such fragmentation be prevented under democracy?

Toward Peace

History has shown that peace can be imposed on peoples with a history of recurrent strife. Warlike tendencies can be curbed, and populations can be coerced into living in harmony with neighbors. Obviously, the excessive policies used in the past by colonial powers are unacceptable, but the resulting peace is so important that perhaps it is acceptable to impose such a modern-day Pax Romana.

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41. Bill O'Neal, *Fighting Men of the Indian Wars* (Stillwater, OK: Barbed Wire Press, 1991), 4–6.
42. Keeley, *War before Civilization*, 91–95.
43. Keeley, 93, 195; and Gat, *War in Civilization*, 131–32.

Support for Military Interventions for Peace

Nongovernmental organizations. A 2003 Refugees International report contended that the military capability of the West allowed it to intervene in civil wars or to counter aggression with low risk to all involved. In fact, the report argued the West had a responsibility to intervene in internal conflicts in order to save lives:[44]

> Our hypothesis is that new military technology and tactics can be used to increase the effectiveness and reduce the costs and risks of forcible humanitarian interventions. If such operations can be made more effective and less costly, the political barriers to undertaking them should be lower, making it easier for individual countries and the UN to fulfill their responsibility to protect.

More recently, Human Rights Watch condemned the civil rights abuses in Ukraine, and issued a statement that there be "principled support for accountability [that] should be replicated in other situations where civilians suffer widespread abuses, such as in Yemen, Ethiopia, and Palestine. To do otherwise would undermine the international justice system as a whole."[45]

Conflict scholars. Noted Just War theorist Michael Walzer has endorsed such views, writing that "nonintervention is not an absolute moral rule: sometimes, what is going on locally cannot be tolerated. Hence the practice of 'humanitarian intervention'—much abused, no doubt, but morally necessary whenever cruelty and suffering are extreme and no local forces seem capable of putting an end to them."[46] Referring specifically to NATO's intervention in Kosovo to stop the ethnic cleansing by Serbia in 1999, Walzer states that such intervention was "entirely justified, even obligatory."[47]

UN precedents as models. In 2011 the Libyan situation had deteriorated and the United Nations decided to act.[48] "In approving a no-fly zone over Libya to be enforced by NATO airpower"—outlined in Council Resolution 1973—"Secretary-General Ban Ki-moon said the international community must 'act with speed and decision . . . to avert a potential large-scale crisis.' " He added, "In all my meetings, public and private, I took special care to stress that action under resolution 1973 is governed by an overriding objective—to save the lives of innocent civilians."[49]

According to one expert, the UN Security Council reinterpreted the law as it pertained to the use of force. Muammar Gaddafi's brutality had reached an unacceptable level. "The League of Arab States, however, rejected an invasion of Libya as a violation

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44. Clifford H. Bernath and David C. Gompert, Refugees International, *The Power to Protect: Using New Military Capabilities to Stop Mass Killings* (Oxford, UK: Refugees Studies Centre, 2003), 3.

45. Human Rights Watch, "Human Rights Council Special Session on Ukraine," 34th Special Session of the UN Human Rights Council, May 12, 2022, https://www.hrw.org/.

46. Michael Walzer, *Arguing about War* (New Haven, CT: Yale University Press, 2004), 69.

47. Walzer, 99.

48. Meilinger, *Thoughts on War*, 221.

49. Department of Public Information, Security Council, "Secretary-General, Briefing Security Council, Says International Community Must 'Continue to Act with Speed and Decision' for Sake of Libyan Civilians," press release, United Nations (website), March 24, 2011, https://www.un.org/.

of the country's territorial integrity and therefore against the UN Charter."[50] Yet, the League agreed to an air intervention. "The initiating argument of the League of Arab States was that an air-only operation in the form of an enforceable no-fly zone would be lawful (and thus legitimate) because it preserved Libyan territorial integrity."[51]

The analysis notes air intervention was no different legally than a land invasion, but it was perceived differently by the world. The UN Security Council shared this view, and when air intervention escalated from enforcing a no-fly zone to permitting air strikes to help topple the regime, it continued to grant it legitimacy.[52] Another observer stated, "never before was aerial intervention pursued so intentionally as a strategy—introducing ground forces into the Libyan civil war was proscribed not only by the desire to avoid another quagmire in the region, but explicitly by the very U.N. resolution that the operations were conducted to enforce."[53]

In 2015, the UN unanimously adopted resolution 2170 condemning the Islamic State in Iraq and al Sham (ISIS) terrorist organization and called on all UN members to "join the fight against [the] Islamic State in Syria and Iraq and redouble efforts to prevent further attacks by the militant group."[54] The Security Council specifically authorized nations to combat ISIS groups in whatever territory they were located. In December 2018, the UN announced an investigation into the "heinous" war crimes committed by ISIS and asked all member states to assist in bringing the culprits to justice.[55]

Twenty-first century US administrations. It was a goal of George W. Bush to "establish democratic governments in Afghanistan and Iraq to encourage the spread of democracy throughout the region. This 'inverse domino theory' imagined that nascent democracies would bring peace to a troubled area of the world" which was "a useful vision, even if so badly implemented."[56] This is an important precedent for the legitimization of force to achieve humane objectives.

Given former President Donald Trump's proactive strategy against ISIS, he too believed peace should sometimes be imposed on lawless areas.[57] President Joseph Biden also believes in the use of force to compel peace: the United States, and the West in general, now support and supply Ukraine in order to halt Russian aggression.

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50. Meilinger, *Thoughts on War*, 221.

51. Angeline Lewis, "Air Power in the Rules-Based Global Order," Air Power Development Centre Paper No. 44 (Canberra, Australia, March 2018).

52. Lewis, 7–14.

53. Karl P. Mueller, "Examining the Air Campaign in Libya," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica, CA: RAND Corporation, 2015), 8.

54. "Security Council Unanimously Calls on UN Members to Fight ISIS," *Guardian*, November 20, 2015, https://www.theguardian.com/.

55. "UN Will Start to Investigate War Crimes Committed by ISIS from Early 2019," Al Shaid, December 7, 2018.

56. Meilinger, *Thoughts on War*, 222.

57. Benjamin S. Lambeth, *Airpower in the War against ISIS* (Annapolis, MD: Naval Institute Press, 2021).

The Question of Promoting Democracy

As I discuss in my book, *Thoughts on War*, notwithstanding the position of recent administrations, the United States needs to think through such a strategy and its implementation. Is democracy a realistic goal in places such as Afghanistan, Syria, Iraq, tribal Africa, or former Soviet possessions? If so, how can it be achieved, keeping in mind that freedom and democracy have different meanings there than they do in the West? Indeed, these notions are antithetical to Muslims who believe in Sharia law. Are the interventions in Libya and against ISIS, including UN mandates that did not include occupying the countries in question, a model for the future?

There are dangers in such a policy. Such intervention, despite the claims of humanity and noble purpose, might lead to a renewed imperialistic urge. Once a country involves itself in the internal affairs of another, mission creep might occur, and the interventionist might seize control and exploit the situation. In truth, however, that seems no longer a concern regarding Western countries. Territorial aggrandizement has not resulted where the West has intervened over the past six decades. Did nations hope to gain from the peace and stability that would follow their actions? Certainly. Perhaps these benefits would redound in economic terms, such as favorable trade agreements with oil-rich countries. But the hope was that world prosperity would be enhanced by the spread of democracy and peace. That was the payoff sought.

Then-Secretary of State Colin Powell once remarked that the United States had sent many of its sons and daughters abroad to fight wars to achieve the liberation of oppressed people over the past century, and the only territory it asked for in return was enough ground to bury its dead.[58] Colonialism seems now to be an obsolete practice in the West. Cultural imperialism—a desire for the world to be just like Western nations—still exists, but that is far different from the exploitive policies in centuries past.

There is another danger to humanitarian interventions. One analysis traces the history of Western liberal ideology over the past few centuries, an ideology which takes as a postulate that freedom leads to democracy which then leads to world prosperity.[59] Peace is a necessary prerequisite in this formula. Yet numerous factors led to war, and various culprits were identified: aristocracies, militaries, imperialists, capitalists, fascists, communists, and so on. "There seemed an endless supply of such wreckers, but one by one they were forcibly confronted and pushed aside."[60]

Still, global peace seemed always just out of reach. This presented a dangerous paradox. Enemies of peace were persistent, and to overcome them, force had to be employed. It was a dilemma President Barack Obama noted in his 2009 Nobel Peace Prize speech: two months later he deployed 34,000 combat troops into Afghanistan to enforce peace there.[61]

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58. Colin Powell, "Dialogue with the U.S. Secretary of State" (remarks made at the World Economic Forum, Davos, Switzerland, January 26, 2003), https://2001-2009.state.gov/.
59. Michael Howard, *War and the Liberal Conscience* (New Brunswick, NJ: Rutgers University Press, 1978).
60. Meilinger, *Thoughts on War*, 223.
61. Meilinger.

Inherent in these ideals is the assumption that people everywhere and in every culture thirst for freedom, and that democracy is intrinsically viewed as good. That is not always the case. The 2021 debacle in Afghanistan showed that despite 20 years of military, financial, technical, and moral support, much of the population—and especially its army—were unwilling to defend themselves from what United States officials thought were their hated enemies. The US government was dramatically wrong in its assessment of what the Afghan people wanted. The result was an Afghan army trained and equipped by the US Army—with high-tech weapons and sensors worth tens of millions of dollars—that collapsed like a house of cards in a matter of weeks.

The analysis of Western liberal ideology mentioned above has an underlying theme—the cultural insensitivity to those one seeks to help. To put it bluntly, the world does not always accept the goals, desires, and aspirations of the West. Moreover, it is important to realize that democracy, by itself, is not a nostrum that will magically dispense peace and prosperity. Yet the history of the past two centuries, worldwide, illustrates that democracy has often been a necessary prerequisite for peace. Is there a solution to these dilemmas?

Recommended Strategy

To enforce peace in the future, the United States should employ a combination of airpower, special operations forces (SOF), indigenous forces, and pervasive intelligence sources. Precision weapons allow a more discrete application of force. In Libya, 100 percent of all air munitions delivered by NATO were precision-guided.[62] Military operations now plan to minimize casualties and collateral damage. Avoiding risk to US forces is also a factor in the increasing use of unmanned air vehicles.

Besides precision weapons, networked operations and instantaneous global communications and intelligence have revolutionized how the United States and its Allies fight. Planners must focus on past successes and failures to craft strategies maximizing the chances of political success at the least cost. For example, in 2001 in Afghanistan, US Special Operations Forces teamed with the Northern Alliance and, backed by airpower, executed a rapid, though as it turned out temporary, victory.[63] In Libya in 2011, NATO airpower teamed with indigenous ground forces to overthrow Gaddafi. In 2017 airpower combined with SOF and indigenous ground forces to defeat ISIS.[64]

During the opening stages of Operation Iraqi Freedom there were 13 Iraqi divisions in the north to defend against an invasion from Turkey. Only 600 US SOF were in the north—plus the 173rd Airborne Brigade air-dropped into Bashur, minus its heavy equipment. Nonetheless, the entire northern front collapsed on April 10 with the 5th Iraqi Corps surrendering and Kirkuk falling to coalition troops. In the words of one observer,

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62. Mueller, *Precision and Purpose*, 4.

63. Richard B. Andres, Craig Wills, and Thomas E. Griffith Jr., "Winning with Allies: The Strategic Value of the Afghan Model," *International Security*, 30 (Winter 2005/06), 139.

64. Lambeth, *Airpower*.

> In short, against all prewar expectations, SOF operations in northern Iraq were fantastically successful. Despite numerous logistical and political obstacles, a small SOF group working with unskilled indigenous allies and highly constrained airpower defeated a significant portion of Iraq's army. Moreover, it did so without suffering a single American death.[65]

The use of indigenous forces in military operations has a long tradition in American history. During the French and Indian War, the French, British, and colonials allied with tribes that had a far better feel for fighting in dense woods.[66] A century later, Brigadier General George Crook used Indian allies because he believed it would have a "civilizing" effect and would "break up tribal loyalties."[67] His policy was extremely successful. Indigenous troops were essential in these operations—as they would later be in the Balkans when Croats and Kosovars benefitted from NATO airpower. These forces were not considered of high quality prior to hostilities: the Kosovars, Kurds, and the Northern Alliance, for example, were deficient in quantity, training, and weapons—they had been unsuccessful in fighting the Serbs or Taliban previously. Yet, when stiffened with SOF and airpower, they were successful. In Libya, the same formula brought down the long-standing Gaddafi regime—with zero NATO casualties.[68]

Of importance, the use of indigenous ground forces does not mean that people will not die. Rather, it means that US ground forces will not. A nation fighting for its freedom must be prepared to face risk. If its people are not willing to take such risks, then how can they expect others to do so for them? Attempts to impose peace by using force may be a Western urge, but it must come at an acceptable cost.

Legitimate Use of Force for Peace

The vital interests of the United States and the West in general are now seldom at stake; instead, they intervene to punish aggressors or topple vicious dictators to bring peace to troubled regions. This goal of imposing security and democracy on foreign peoples remains as desirable today as it was in the nineteenth century. Notions previously useful, such as collective security, religion/morality, economics, and intervention, may again be in order.

To achieve success, public support must be maintained, but the surest ways to lose that is to suffer high casualties or, worse, to inflict them on the societies the United States is attempting to help. The goal of limiting cost and casualties is hindered by the introduction of large numbers of foreign ground troops—especially in the societies of the Middle East. General John Abizaid, then heading US Central Command, noted

65. Richard Andres, "The Afghan Model in Northern Iraq," *Journal of Strategic Studies*, 29 (June 2006), 412.

66. Fred Anderson, *Crucible of War: The Seven Years' War and Fate of Empire in British North America, 1754–1766* (New York: Knopf, 2000).

67. Martin F. Schmitt, ed., *General George Crook: His Autobiography* (Norman: University of Oklahoma Press, 1960), 213–14.

68. Mueller, *Precision and Purpose*.

tellingly in 2005 that "US troops were an antibody in Iraqi society."[69] The question then becomes, How can the West compel peace without flooding an area with antibodies?

As in the nineteenth century, peace can be enforced on areas where violence has been endemic. But those interventions must be based on humanitarian ideals and not naked aggrandizement. As Obama suggested in his Nobel Prize speech, religious, cultural, and ethnic differences can be bridged by the correct and discreet use of military force. But discovering the correct balance for achieving such results requires a delicate and deft strategy, and it must include the legitimacy provided by the UN or a similar international body. The United States must not create a situation where the cure is worse than the disease.

The Afghanistan disaster will likely sour American leaders on the efficacy of mounting humanitarian efforts. Yet, it is American policy to support Ukraine with money and weapons. It is thus unlikely that the American innate belief of the responsibility to enforce peace and foster democracy will end. There seem very few isolationists left in American political life. Although one can certainly debate the wisdom of intervention, the fact is the United States is likely to continue to view spreading freedom around the world as its duty.

Assuming that is the case and America decides to engage again in such activities, then US officials must think it through more soberly than they have in the past. The combination of airpower, SOF, indigenous forces, and pervasive intelligence sources seems to be a winner, and although it will probably not work in all cases, it deserves to be considered as a favored strategy to bring peace to habitually troubled areas of the world. Æ

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69. David Fitzgerald, *Learning to Forget: US Army Counterinsurgency Doctrine and Practice from Vietnam to Iraq* (Stanford, CA: Stanford Security Studies, 2013), 145.

SYSTEMATIZING SUPPLY CHAIN WARFARE

Peter Layton

Airpower thinkers must reconsider attacks on the logistics support of modern military forces using a systems perspective centered on the operations and dynamics of an adversary's supply chain. Such a reassessment has become increasingly important, given the return of major war, the realization a protracted great power war may be possible, the Ukrainian war experience in terms of economic warfare and interdiction, the rise of heterogenous airpower, and the potential of affordable mass airpower. This analysis focuses on the target system—the contemporary supply chain—understood as a restricted complexity system type characterized by semi-openness, multiple causality, and dispersion. Incorporating key twentieth-century airpower theories including interdiction, industrial web, and economic warfare into a twenty-first-century systems theory approach can advance thinking about the contemporary application of airpower at the operational, strategic, and grand strategic levels.

There is an apocryphal saying that amateurs talk about strategy but professionals talk about logistics, the art of moving armies and keeping them supplied.[1] Unsurprisingly, when airpower first allowed military force to be easily applied beyond an enemy's front line, aircraft attacked an army's logistics. Since World War I though, the concept of logistics has changed.

For most of the twentieth century, businesses sought to keep their activities in-house; through vertical integration they could firmly control all aspects of their industrial processes. In the 1990s, however, many companies began shifting to horizontal integration, using extensive outsourcing and keeping only core functions in-house. The new concept of supply chains arose while logistics as an idea retreated to being a subset, mainly about activity administration within a company.[2] Today, modern supply chains are vast, complex, and global, and can be best understood using a systems perspective. Such supply chains are systems with a purpose that have a certain operating logic, which in itself creates sensitivities and vulnerabilities.

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1. Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge, MA: Cambridge University Press, 1977), 1.
2. Ronald H. Ballou, "The Evolution and Future of Logistics and Supply Chain Management," *European Business Review* 19, no. 4 (July 2007): 341, https://doi.org/.

These susceptibilities to deliberate interference have attracted increasing attention in recent years as geostrategic tensions have emerged. Sanctions to cut supply chains that quarrelsome states rely on for their military forces, technological advancement, or financial strength are now often used.[3] While Iran and North Korea have long been subject to purposeful supply-line obstructions, Russia's war in Ukraine now sees Russia having its supply chains for military equipment components being cut, requiring the country to seek ever more complex smuggling approaches and different, less-capable suppliers.[4] As a result, Russia's combat forces are impacted both quantitatively in being able to field less military equipment and qualitatively in needing to revert to using older, less effective military hardware.[5]

Ukraine, with the assistance of the West, has integrated economic warfare with the traditional method of interdiction, albeit constrained by political restrictions on taking the conflict deep into Russian territory. Ukraine has used high-mobility artillery rocket system (HIMARS) rockets, attack drones, and Storm Shadow cruise missiles to damage Russian military supply chains running through Ukrainian-occupied territory.[6] On the other hand Russia has been less constrained and has attacked defense industry sites, transport infrastructure, and supply depots across all of Ukraine.[7]

Applying Airpower in the Twenty-First Century

While the Ukraine war has reemphasized the importance to combat operations of constraining supplies, the conflict has also highlighted that airpower is now much

3. US Department of the Treasury (Treasury), "Treasury Sanctions Procurement Network Supporting Iran's UAV and Military Programs," press release, Treasury, April 19, 2023, https://home.treasury.gov/; Coco Feng, "China's Big Tech Firms Scramble for Advanced Chips amid US Sanctions and ChatGPT Craze, *South China Morning Post*, June 14, 2023, https://www.scmp.com/; and Treasury, "With over 300 Sanctions, U.S. Targets Russia's Circumvention and Evasion, Military-Industrial Supply Chains, and Future Energy Revenues, press release, Treasury, May 19, 2023, https://home.treasury.gov/.

4. Bohdan Miroshnychenko, "Contraband Tumor: How Russia Steals Military Technology and What To Do about It," Економічна правда, May 17, 2022. https://www.epravda.com.ua/; and Jeanne Whalen, "Sanctions Forcing Russia to Use Appliance Parts in Military Gear, U.S. Says," *Washington Post*, May 5, 2022. https://www.washingtonpost.com/.

5. Max Bergmann et al., *Out of Stock? Assessing the Impact of Sanctions on Russia's Defense Industry* (Washington, DC: Center for Strategic and International Studies, 2023), 3.

6. Isabel Coles and Daniel Michaels, "The Offensive before the Offensive: Ukraine Strikes behind Russian Lines," *Wall Street Journal*, May 17, 2023, https://www.wsj.com/; "Ukraine Rockets 'Significantly' Reducing Russian Attack Potential," Aljazeera, July 15, 2022, https://www.aljazeera.com/; Howard Altman, "Multiple Russian Fuel Depots Hit by Suspected Drone Attacks, Tempo Increasing," The Drive, May 4, 2023, https://www.thedrive.com/; and Jack Watling, "Putting Russia's Army in the Shadow of the Storm," Royal United Services Institute for Defence and Security Studies (RUSI) (website), May 15, 2023, https://rusi.org/.

7. Alistair MacDonald, "Ukraine's Arms Industry Survives Russian Onslaught to Hit Back, *Wall Street Journal*, May 1, 2023, https://www.wsj.com/; Jake Epstein, "How Ukraine's 'Lifeline' Runs Even as Russia Bombs It, According to a Man Fighting to Keep the Trains on Time," *Business Insider*, February 26, 2023, https://www.businessinsider.com/; and "Russia Says It Has Destroyed 70,000-Tonne Fuel Depot near Zaporizhzhia," Reuters, April 9, 2023, https://www.reuters.com/.

more heterogenous than in the last century. In wars today, air attacks can be carried out not just by crewed aircraft but also by short- and long-range cruise missiles, ballistic missiles, and uncrewed drones. The latter in particular are being used in significantly large numbers in Ukraine, reinforcing an emerging concept of uncrewed aerial systems returning a mass to air warfare lost as crewed aircraft become more costly and difficult to build. Incidentally, the emerging prospect of "affordable mass" airpower raises the question of how this could be used.[8]

The Ukraine war has further added to a growing belief that future wars might be protracted, perhaps by several years.[9] The longer a war lasts the greater the reliance on replacing equipment, as that employed at the start is lost through attrition or use. Looking to the future, the greatest geostrategic worry is a major war with China. Many suggest such a war would inevitably be prolonged, lasting well beyond the initial engagements.[10] There have long been arguments that supply chain warfare would play a significant role in such a conflict, with a particular focus on cutting China's globe-spanning supply chains.[11]

These various factors all combine to prompt an urgent reconsideration of supply chain warfare. Airpower has been used in such warfare before, especially in the great power wars of the first half of the twentieth century. These earlier concepts and experiences offer useful insights into what has and has not succeeded in previous conflicts. Collectively, they represent a body of work on which to build a reassessment, but this involves some significant changes to take account of contemporary supply chain concepts and a shift in the underlying paradigm about how the world operates.

Early twentieth-century airpower thinking often took a fairly reductionist approach, seeing the world as an analog, clockwork-like machine composed of many individual parts.[12] Since then, systems thinking has advanced and matured; such an approach takes a holistic view and examines a system's internal relationships rather than focusing on the constituent parts as standalone items. It is not that reductionist thinking has been replaced but that systems thinking offers another way to see the

8. Joseph Trevithick, "Affordable Mass Concept Driving Air Force's New Advanced Drone Initiative," The Drive, March 10, 2023, https://www.thedrive.com/.

9. Andrew F. Krepinevich, *Protracted Great-Power War: A Preliminary Assessment* (Washington, DC: Center for a New American Security, 2020).

10. Timothy R. Heath, Kristen Gunness, and Tristan Finazzo, *The Return of Great Power War: Scenarios of Systemic Conflict between the United States and China* (Santa Monica, CA: RAND Corporation, 2022); and Hal Brands, *Getting Ready for a Long War with China: Dynamics of Protracted Conflict in the Western Pacific* (Washington, DC: American Enterprise Institute, 2022).

11. Fiona S. Cunningham, "The Maritime Rung on the Escalation Ladder: Naval Blockades in a US-China Conflict," *Security Studies* 29, no. 4 (August 2020); Sean Mirski, "Stranglehold: The Context, Conduct and Consequences of an American Naval Blockade of China," *Journal of Strategic Studies* 36, no. 3 (June 2013); and Gabriel B. Collins and William S. Murray, "No Oil for the Lamps of China?," *Naval War College Review* 61, no. 2 (Spring 2008).

12. Steven M. Rinaldi, "Complexity Theory and Air Power," in *Complexity, Global Politics, and National Security*, ed. David S. Alberts and Thomas J. Czerwinski (Washington, DC: National Defense University, 2002).

world and especially those matters with significant human involvement. Modern US Air Force targeting concepts stress using target systems analysis.[13] Such an analysis involves identifying, describing, and evaluating the composition of an adversary target system to determine its capabilities, requirements, and vulnerabilities.[14]

Importantly, systems thinking has now shifted from being an abstract idea into a more tangible reality. Recent advances in artificial intelligence, including machine learning techniques, make it possible to create and run in near-real time large dynamic models of complicated systems able to provide useful insights into how these systems may react to various interventions.[15] This new tool is now available to help people reach optimum solutions to certain difficult problems. Airpower planners could use these to inform their supply chain warfare thinking when considering attack options.

Rather than examining emerging technologies or geostrategy, this article instead adopts a systems perspective focused on the target set. The target, rather than the means of attack or the context, forms the core of the discussion. The modern supply chain process of planning, sourcing, making, and delivering is encompassed within three disparate but related types of warfare—interdiction, the industrial web, and economic warfare. Moreover, these three approaches are each most useful at a different level of strategic thinking—operational, strategic, and grand strategic—when considering adversary supply chains as a target system set.[16]

Examining the issues at these different levels of war indicates that for supply chain warfare to be most effective and efficient, it may need to be conceptualized and waged more deeply than perhaps initially envisaged.[17] A decisive impact on supply chains may require interdiction, industrial web attacks, and economic warfare to be waged simultaneously in a coordinated manner.

Paradoxically, new supply chain technologies also suggest taking a comprehensive view. For example, additive manufacturing, the process of growing three-dimensional (3D) objects one layer at a time—colloquially termed 3D printing—offers the tantalizing possibility of manufacturing close to the front line, providing certain necessary items quickly without traversing long supply lines. But 3D printing still requires appropriate machines, facilities, and raw materials, and its proximity to the battlefield makes it much more vulnerable to air attack than distant supply sources. Ideas about

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13. US Air Force, *Targeting*, Air Force Doctrine Publication (AFDP) 3-60 (Maxwell AFB, AL: Curtis LeMay Center for Doctrine Development and Education [LeMay Center], November 12, 2021), 42–43, https://www.doctrine.af.mil/.
14. Curtis E. Pinnix Jr., "Specialized Analytic and Targeting Study: A Methodology and Approach for Conducting Faster Full-Spectrum Targeting," *Joint Forces Quarterly* 103, no. 4 (4th Quarter 2021), https://ndupress.ndu.edu/.
15. Jennifer McArdle and Caitlin Dohrmann, "From Legos to Modular Simulation Architectures: Enabling the Power of Future (War) Play," *Mad Scientist Laboratory*, January 25, 2021, https://madsciblog.tradoc.army.mil/; and Lauren Speranza and Jennifer McArdle, "Five Ways Synthetic Environments Can Benefit NATO," *Defense News*, February 3, 2022, https://www.defensenews.com/.
16. Edward Luttwak, *Strategy: The Logic of War and Peace* (Cambridge, MA: Belknap Press, 1987), 69–71.
17. The author is indebted to an unknown reviewer regarding this reflection.

interdiction, the industrial web, and economic warfare then remain important but overlap and are drastically compressed.

Twentieth-Century Airpower

Interdiction

In 1917, then Major General Hugh Trenchard detailed an air campaign that focused on key targets: railways, railroad marshalling yards, bridges, supply depots, and road networks that moved men and materiel to the front lines.[18] The concept, known as interdiction, was developed further in a seminal book written by British Royal Air Force Wing Commander John Slessor, *Air Power and Armies*, which examined the operational level of war.[19]

Slessor, an instructor at the British Army War College at the time, argued airpower could seal off an enemy's forces, strangling them into capitulation.[20] In this, Slessor preferred supply interdiction of materiel and equipment over force interdiction, known in modern parlance as battlefield air interdiction. He argued airpower should maintain continuous air attacks as far to the rear of the army as possible, aiming not to destroy but instead to paralyze supply efforts and communication lines.

The practice of air interdiction in World War II revealed that interdiction needed to be a sustained operation requiring persistence and continual pressure. The characteristics of the enemy's lines of communication (LOC) greatly influenced the overall impact of an interdiction campaign. The length and type of the LOCs, the presence of enemy choke points, and concentration of supplies all determined the availability of high-payoff targets.

An outstanding example of World War II interdiction by Allied forces involved the lengthy LOCs connecting Japan to the Solomon Islands in 1942–43. The Solomons were on the very edge of the greatly extended Japanese wartime empire, more than 3,000 miles from Tokyo. When the US Marines landed on Guadalcanal to capture the airfield, the Japanese opted to make a major defensive effort that required sending additional troops and extensive resupply by ships. In the end, it was the Allied interdiction of shipping and not the actual fighting on the island that proved decisive in thwarting the invasion. Interrogated post-war, Lieutenant General Shuichi Miyazaki, chief of staff to the Japanese 17th Army at the time of the invasion, observed this:

> The biggest problem was the loss of ships. Actually the bombing of troops and troop concentrations on the ground were not much of a hindrance because,

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18. Phillip S. Meilinger, "Trenchard, Slessor, and Royal Air Force [RAF] Doctrine before World War II," in *The Paths of Heaven: The Evolution of Airpower Theory*, ed. Phillip S. Meilinger (Maxwell AFB, AL: Air University Press [AUP], 1997), 45.

19. John Cotesworth Slessor, *Air Power and Armies* (London: Oxford University Press, 1936); and Michael Howard, "Marshal of the Royal Air Force Sir John Slessor and the Prevention of War," Medium, Royal Air Force Centre for Air and Space Power Studies (RAF CASPS), May 4, 2018, https://medium.com/.

20. Meilinger, "Trenchard, Slessor, and RAF," 62.

although the bombing scared everybody and made lots of noise and had an effect on morale, the actual destruction was not very great. The biggest problem was the loss of our capacity to move these troops to the fighting areas.[21]

The scale of the interdiction's impact is well illustrated in the fate of Japan's 38th Division which was attacked in transit: of the division's 12,000 men, only 2,000 made it to Guadalcanal.

Similar problems beset Japanese forces fighting in Papua New Guinea. In the Battle of the Bismarck Sea, an eight-ship convoy transporting troops to Lae was attacked by Allied airpower; of the 6,900 troops on board only 1,200 were rescued from the sea by warships and only 850 made it to Lae. The interdiction campaign was so successful because it leveraged the structural factors of geography and the Japanese need to continue resupply efforts given their decision to keep fighting and not withdraw.

Interdiction today. The contemporary understanding of interdiction is that it is "an action to divert, disrupt, delay, or destroy the enemy's military surface capability before it can be used effectively against friendly forces or to achieve enemy objectives."[22] Hostile forces can be diverted away from critically important operational areas. Disruption can damage an adversary force's information flows, operational tempo, combined arms coordination, and cohesion. Delays can prevent the timely arrival of enemy forces on the battlefield and impact an adversary's ability to project power. Destruction harms the structure, function, or condition of a targeted entity, making it operationally useless.

Interdiction planning is important precampaign and then during the campaign as it is implemented and the adversary responds. An adversary will often change their intent, plans, and force posture to try to reduce the impact of interdiction efforts. Campaign plans need to be continually reassessed in terms of a particular operational context and the relative timing of actions within that context.

Industrial Web

In the 1930s, a different concept was developed concerning attacking adversary supply systems. The US Army Air Corps Tactical School proposed attacking a nation's industrial web. This was not an indiscriminate attack but rather a focused one against identified "key nodes" that "would unravel the intricate web of a modern industrial economy."[23] A 1938 textbook used for the school's Air Force course explained this concept:

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21. Headquarters US Army, *United States Strategic Bombing Survey*, "Effect of Allied Air Activity," Serial No. 497, Report No. 2-o(48), USSBS Index Section 8 (San Francisco, CA: Military Analysis Division, December 1945): 4, https://dl.ndl.go.jp/.

22. Chairman of the Joint Chiefs of Staff (CJCS), *Joint Interdiction*, Joint Publication (JP) 3-03 (Washington, DC: CJCS, September 9, 2016), ix.

23. Tami Davis Biddle, "British and American Approaches to Strategic Bombing: Their Origins and Implementation in the World War II Combined Bomber Offensive," *Journal of Strategic Studies* 18, no. 1 (March 1995): 111, https://doi.org/.

> The economic structure of a modern highly industrialized nation is characterized by the great degree of interdependence of its various elements. Certain of these elements are vital to the continued functioning of the modern nation. If one of these elements is destroyed the whole of the economic machine ceases to function. . . . Against a highly industrialized nation, such action may produce immediate and decisive results.[24]

In 1939, the British Air Ministry directed a series of "bottleneck" studies to determine the crucial elements within important sectors of the German economy. Bottleneck target sets were considered those of major importance to a nation's military, with most production concentrated in only a small number of facilities and with very limited spare production capacity inside or outside the country. The manufacturing was done using machinery unable to be quickly repaired or replaced and incapable of quick dispersal without significant production loss. Other factors of concern were the level of reserve stocks held by the adversary, the possibility of substitution, the susceptibility to air attack, and the potential of time-compression problems for the adversary military.[25]

Early in the war, the Royal Air Force did not have the technical capabilities to pursue a bottleneck campaign. The US Army Air Forces, however, entered later and with different capabilities, and adopted the Air Corps Tactical School's industrial web concept. In the Air War Plans Division's first plan (AWPD-1) developed prewar, the major targets selected were the electric power system, transport and particularly the railway network, and the petroleum industry. When the United States entered the war in 1942, the plan was modified into AWPD-42, which added aluminum and synthetic rubber, the latter based on the false assumption that the German army was as motorized as the US Army.[26]

In 1944, a bureaucratic battle erupted between proponents of interdiction versus industrial web attacks. With a need to support Allied amphibious landings in Normandy in mid-1944, some strategists argued interdiction attacks on connections—in this case railways and railway marshalling yards—would be more efficacious than bombing industrial web nodes, in particular oil refining plants. In the end, bridges, proving easier to destroy than anticipated, replaced marshalling yards in interdiction targeting, while attacks on oil plants had impacts on German military positions measured in days, not months, as planners had originally assumed.

The two target types—interdiction and industrial web—were to some extent related. The combination of attacks helped to isolate Normandy Beach. By forcing the Luftwaffe to defend the oil refineries and in so doing thus be destroyed, it also helped to

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24. "Air Warfare" section, *Air Force* [textbook], Air Corps Tactical School, February 1, 1938, USAFHRC, decimal file no. 248.101-01, as qtd. in Biddle, "British and American Approaches."

25. Scott E. Wuesthoff, *The Utility of Targeting the Petroleum-Based Sector of a Nation's Economic Infrastructure* (Maxwell AFB: AUP, 1994), 4–8.

26. R. J. Overy, *The Air War, 1939–1945* (London: Papermac, 1980), 107.

deliver a major strategic blow to German military capabilities.[27] The wartime commander of Germany's fighter forces, Adolf Galland, observed that "the raids of the Allied air fleets on the German petrol supply installations [were] the most important of the combined factors which bought about the collapse of Germany."[28]

Industrial web today. Modern conventional warfare requires not only adequate military forces, but also advanced economic infrastructures capable of supporting these forces. Such infrastructures provide large vulnerable targets susceptible to enemy air attack. For industrial web attacks, there are two alternative but potentially overlapping approaches available.

In a reductionist approach, the adversary economy is dissected into its component parts with specific parts then attacked in isolation. This steps through analyzing a national economy, determining a critical industry, and then finding the key bottlenecks within it, the destruction of which would damage the critical industry's functioning and outputs. The more systemic approach focuses on the interconnections between the elements of an economy, identifying these and then exploiting critical linkages. In the first approach, individual target sets are attacked, while in the second, key points across different target sets are attacked.[29] In both approaches, it is important not to view the adversary industries as a static set of targets; these industries are constantly changing in response to demand and supply factors.

One post-World War II scholar argued attacks on what were considered critical industries would not usually bring strategic success as the adversary could often substitute one product for another and fill the gaps created.[30] "It is not the type of good, but the type of use that distinguishes a necessity from a luxury."[31] Targeteers should accordingly choose an industry sufficiently large and unique that its replacement would be costly. They would then attack not only that industry but also the industries and activities that would substitute for it when it is destroyed.[32]

As one example from World War II suggests, the choice of industry is crucial to target system analysis. At the time, the ball bearing industry appeared to be a key node, as ball bearings seemed to be critical components of Germany machinery and equipment and production was concentrated within a few factories. Allied air attacks were undertaken at great cost in lost aircraft and crew and did cause significant damage. Yet the Germans substituted plain bearings and devised work-arounds, later

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27. W. W. Rostow, *Pre-Invasion Bombing Strategy: General Eisenhower's Decision of March 25, 1944* (Austin: University of Texas Press, 1981).

28. Adolf Galland, *The First and the Last* (New York: Bantam Edition, 1978), 266.

29. Steven M. Rinaldi, *Beyond the Industrial Web: Economic Synergies and Targeting Methodologies* (Maxwell AFB, AL: AUP, 1995), 1–2.

30. Mark Harrison, "Economic Warfare and Mançur Olson: Insights for Great Power Conflict," CEPR: Centre for Economic Policy Research, March 25, 2022, https://cepr.org/.

31. Mançur Olson Jr., *The Economics of the Wartime Shortage: A History of British Food Supplies in the Napoleonic War and in World Wars I and II* (Durham, NC: Duke University Press, 1963), 9.

32. Mançur Olson Jr., "The Economics of Target Selection for the Combined Bomber Offensive," *RUSI Journal* 107, no. 628 (1962): 314, https://doi.org/.

claiming that no military "equipment was ever delayed [in delivery] because bearings were lacking."[33] Choosing a target thus involves properly identifying a critical industry and deeply considering how an adversary may respond.

Economic Warfare

In 1939, with major war looming, the United Kingdom created the Ministry for Economic Warfare, later to be matched in the United States by the Board of Economic Warfare.[34] Combining the long history of British naval trade blockade operations and the new technology of airpower, the first official definition of economic warfare declared:

> The aim of economic warfare is so to disorganize the enemy's economy as to prevent him from carrying on the war. Its effectiveness in any war in which this country may be engaged will vary inversely with the degree of self-sufficiency which the enemy has attained, and/or the facilities he has, and can maintain, for securing supplies from neighbouring countries, and directly with the extent to which (i) his imports must be transported across seas which can be controlled by His Majesty's ships, (ii) his industry and centres of storage, production, manufacture and distribution are vulnerable to attack from the air, and (iii) opportunities arise from interfering with exports originating from his territories.[35]

Conceptually, economic warfare differed from attacking a state's military capabilities and, while it could overlap with such attacks, it could also be waged independently.

Economies are complex systems composed of a number of infrastructure elements interconnected in a myriad of ways and including electrical grids, petroleum and oil distribution networks, and telecommunications systems. As a result of this connectivity, an attack on one infrastructure element would influence the others to varying degrees. When targeting an economy, this connectivity and its intrinsic downstream effects could be leveraged.[36]

In this, to consider a national economy as static is misleading; instead, active adjustment to change is normal. Strategists were long familiar with creating tactical supply problems for the adversary, but airpower in World War II could now create a strategic supply problem that was new.[37] Strategic supply involved the capacity of a nation's entire economy to supply its military forces and continue the war. In a tactical supply situation, no quantity of extra supplies of the wrong kind could be substituted for the missing items.

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33. Olson, "Target Selection," 309.

34. Lois H. Gruendl, *The Impact Of Offensive Economic Warfare on the Operational Commander* (Newport, RI: Naval War College, 1995), 8.

35. William Norton Medlicott, *The Economic Blockade, Vol. 1* (London: His Majesty's Stationery House and Longmans, Green and Co., 1952), 1.

36. Rinaldi, *Beyond the Industrial Web*, v.

37. Olson, "Target Selection."

In contrast, in a strategic supply situation most of what was missing could be replaced provided a nation was willing and able to substitute enough production of other things to secure it. To avoid this, economic warfare proposed that a major bottleneck in the overall economic system should be destroyed with further attacks undertaken to close off the possibilities of substitution.[38]

Economic warfare today. At its core, economic warfare is a cumulative strategy where small gains each day add up.[39] It greatly relies on accurate and continuing intelligence to identify strategic raw materials, sources of procurement, available stockpiles, rates of usage, potential substitutes, and key industrial sites. But poor intelligence, an inadequate application of force, and the failure to maintain ongoing pressure can lead to poor results.[40] Even so, a national economy is large and difficult to fully understand. As one analyst notes, "the art of waging economic warfare is imprecise and unpredictable."[41] There is inevitably some degree of trial and error in waging such warfare.

On the other hand, the global proliferation of digital technology has revolutionized the means of economic warfare. Cyberattacks on an adversary's economy can be conducted worldwide with no constraints concerning geographic sanctuaries. Such attacks can be preplanned with malware installed prewar awaiting activation, can be low cost, and can capture financial assets and not draw off kinetic assets from being used elsewhere.

Contemporary Supply Chains

Process

The modern supply chain process involves four basic elements: plan, source, make, and deliver. The process may be usefully defined as "all the activities involved in delivering a product from raw material through to the customer," including sourcing the materials and parts, manufacturing and assembly, warehousing and inventory tracking, order management, distribution, delivery, and monitoring the activities by information systems. Management of the supply chain process "coordinates and integrates all of these activities into a seamless process."[42]

Structure

There is a vertical dimension to this as supply chains usually have different tiers. Tier-1 suppliers conduct business directly with the company that undertakes the final assembly. In the aerospace market, this company is often termed the original equipment

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38. Olson, "Target Selection," 310–14.

39. J.C. Wylie, *Military Strategy: A General Theory of Power Control* (Sydney: Australian Naval Institute Press, 1967), 26.

40. Gruendl, *Offensive Economic Warfare*, 10–11.

41. Gruendl, 3.

42. Rhonda R. Lummus and Robert J. Vokurka, "Defining Supply Chain Management: A Historical Perspective and Practical Guidelines," *Industrial Management & Data Systems* 99, no. 1 (1999), 11.

manufacturer (OEM). Beneath this, tier-*n* suppliers serve as the sources of primary materials and component parts for the higher tiers—for instance, tier-2 suppliers are the suppliers or subcontractors for tier-1 suppliers, tier-3 for tier-2 suppliers, and so on.

The supply chain concept drives companies to become highly specialized; as a result, many supply chains contain a multitude of tiers. Subordinate tiers are connected vertically; generally only the tier-1 suppliers are linked horizontally to the OEM. Consequently, supply chains represent not only a linear chain of one-on-one business relationships but also a downward web of multiple business networks and relationships. Moreover, the overall supply chain is entangled with its environment and continuously evolving with it. In a broad conceptual sense, the supply chain is a decentralized network of several layers all the way down the various interacting tiers.[43]

Command and Control

Supply networks are social-technical systems with human and nonhuman elements. Suppliers, manufacturers, retailers, and customers work together through partnerships or alliances; each has their specific function in the system. An environment of intense interaction is created driven by exchanges of material, financial, and informational resources including knowledge.[44] Along the supply chain, there is a forward flow of goods and a backward flow of information.[45]

The functioning of supply chains involves dispersed authority. Although the details of the overall supply chain may be unknown to any single company, individual companies engage in localized decision-making: they select their suppliers and ensure product delivery to buyers. Control is generated through simple behavioral rules that operate based on local information.[46] Given this, supply chains inherently favor stability and try to maintain their configuration in response to external disturbances. But at some point, a cascade of changes may be triggered that leads to system-wide reconfigurations.

Type of System

Generic supply chains can be perceived as restricted complexity systems in having semi-openness, multiple causality, and dispersed authority.[47] Semi-openness is being able to draw on resources outside the system to compensate for internal disruption, but only those resources that have a dual civil-military function. Most modern military

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43. Paul Baran, *On Distributed Communications: I. Introduction to Distributed Communications Networks, Memorandum RM-3420-PR* (Santa Monica, CA: RAND Corporation, 1964), 1–2.

44. Jamur Johnas Marchi, "Understanding Supply Networks from Complex Adaptive Systems," *BAR: Brazilian Administration Review* 11, no. 4 (October–December 2014): 446, https://doi.org/.

45. Amit Surana et al., "Supply-Chain Networks: A Complex Adaptive Systems Perspective," *International Journal of Production Research* 43, no. 20 (2005): 4239, https://doi.org/.

46. Surana et al.

47. Malte Brosig, "Restricted Complexity: A Middle Path between Postmodern Complexity Theory and Positivist Mainstream IR," *International Studies Review* 22, no. 4 (December 2020): 1015–19, https://doi.org/.

equipment requires specific components to operate and be repaired, and these can only come from particular supply sources. Supply chains have multiple causality in that supply solutions may come from multiple sources and through multiple pathways. Dispersed authority means there is no single directing authority; instead nodes communicate and coordinate among themselves to ensure inputs are received when the nodes need them and outputs are pushed into the supply chain when requested by other nodes.

Problems

Contemporary supply chains have some inherent problems. The first is that they can be brittle. This fragility arises from their opaqueness to most participants, the presence of single points of failure, and driven by the quest for economic efficacy, their high degree of complexity and interconnectedness. The more complex the supply chain, the greater the possibility it might fail in one or more of its functions. Still, this is only a possibility, as product substitutions and work-arounds may be viable, as mentioned earlier.

The second problem is their geographic spread, which is often worldwide. The final assembly of many products often requires materials from an assortment of manufacturers across the globe. Supply chains can then be subjected to distant unexpected events and geopolitical tensions that can quickly create outsized impacts. The third problem can be a lack of vendor diversity. Products that require materials from a certain region or a single source are at greater risk for disruption. A fourth issue is limited transparency. The companies involved rarely understand the full scope of their supply chain and so have trouble taking early corrective actions to effectively remedy looming disruptions. Contingency planning can be particularly difficult.[48]

A fifth issue is that information feedback in the system is often slow relative to the rate of changes occurring in the system. The system has a specific process to achieve the desired output; if disruptions happen too quickly for the control mechanism to keep up, outputs will markedly fluctuate as the system fractures and becomes internally disorganized.

The last problem is the so-called bullwhip effect, where one company's actions impact other companies along the supply chain given their interdependency. A small change in the downstream supply chain can then cause amplified effects in the upstream supply chain phases. The bullwhip effect may be caused by both sudden changes in demand forecast or unexpected scarcity, which is when the supply chain offers less than what is required at some stage in the chain, leading downstream companies to abruptly start rationing their products.[49]

All these issues mean that supply chains need to be managed. Ideally, supply chain management integrates all process activities seamlessly, with the entire process viewed

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48. Megan Lamberth et al., *The Tangled Web We Wove: Rebalancing America's Supply Chains* (Washington, DC: Center for a New American Security, 2022), 9.

49. Marchi, "Understanding Supply Networks," 448.

as a single large system.[50] The reality is often less expansive, with supply chain management generally limited in its scope. The most likely place for such management is between the firm undertaking final assembly and its tier-1 suppliers.[51] Supply-chain management now increasingly relies on information technology.

Supply Chain Warfare Campaign Planning

Attacking a contemporary supply chain involves four considerations: system analysis, the objective, leverage points, and the new equilibrium the attack will establish.

Analysis

The first step is to analyze the supply chain system by identifying the key nodes, flows and relationships, and the feedback mechanisms that hold the system together. One study on targeting processes determined there was a compelling need to understand the selected target system's complexity, its adaptation processes, and the role of feedback loops in making the system robust.[52]

To gain the required understanding of a system, one systems theorist outlines several useful steps: "get the beat of the system"; create a structural diagram and use it to verify system operation; assess not just the quantifiable aspects but the qualitative as well; understand the feedback loops that keep the system within certain parameters; examine the forces and structures that help the system run itself; determine where the responsibilities lie within the system; and lastly, understand a system's full complexity rather than try to oversimplify it.[53]

Objective

The campaign objective may vary depending on the impact that is sought. At the operational level of war, supply chain warfare might focus on supporting the activities of other friendly military forces. This might draw on interdiction thinking and be phrased as actions to divert, disrupt, delay, or destroy an adversary's military capabilities as they seek to gain their objectives. In the modern era the focus is not on supporting land forces as in some World War II campaigns but rather supporting and acting across all domains. Yet, as with traditional interdiction, supporting friendly forces in this way relies on the adversary actively using up supplies they need to quickly replenish.

50. Barrie Michael Cole, *Supply Chain Optimization under Uncertainty: Supply Chain Design for Optimum Performance* (Wilmington, NC: Vernon Press 2014), 4.

51. Ronald H. Ballou, "The Evolution and Future of Logistics and Supply Chain Management," *Produção* 16, no. 3 (December 2006): 341, https://doi.org/.

52. Andrew Hoffmann, Systems-Based Targeting (master's thesis, UNSW Canberra, August 2019), 111, https://doi.org/.

53. Donella H. Meadows, *Thinking in Systems: A Primer*, ed. Diana Wright (London: Earthscan, 2008), 170, 194.

At the strategic level, industrial web approaches might aim to shorten the duration of the conflict by attacking key supply chain nodes critical to particular industries supporting an adversary's armed forces. There is again a reliance on the adversary having suitable vulnerabilities that could be exploited; for example, the adversary might not be industrialized or might instead rely extensively on foreign support.

At the grand strategic level, economic warfare concepts could be drawn upon to guide disrupting the supply chains of industries necessary to sustaining an adversary's national power. This is much broader than degrading just an enemy's military power, would take longer to achieve, and would have a longer-lasting impact. This objective shades into war termination, in that an adversary's power might be purposefully reduced well into the post-war period.

Leverage Points

Ways suggested to improve a system's performance can be reversed to suggest ways to diminish its performance. This becomes a hunt for the critical variable, the so-called leverage point where a purposeful disruption in the way the system works will produce large changes in the system's output. In this, the term "leverage point" is a little confusing as while it relates to a particular part of a system, it actually seeks a change in system dynamics. The intent is to turn the way a system works against itself so that the effect of a disruption is magnified. This becomes apparent when considering two broad leverage types:

- **Physical leverages**. Using physical leverages includes attacking so as to drive the system outside its designed operating parameters; sharply reducing the stabilizing buffers—the system's internal material stockholdings kept at each step—that keep the system correctly flowing; attacking the system's structural arrangement to exploit physical limitations and bottlenecks; and causing delays in the feedback loops that are critical determinants of system behavior and that can cause system oscillations.[54]

- **Information and control leverages**. Using information and control leverages includes attacking the balancing feedback loops, in particular the accuracy and rapidity of monitoring, the quickness and power of response, and the directness and size of corrective flows; creating a runaway reinforcing feedback loop that leads to system destruction; damaging information flows so system managers cannot accurately control the system; attacking the internal self-reorganization devised to try to keep the system functioning while under attack; decapitating key control nodes; and if feasible, exploiting the different and dissimilar norms and identities of the diverse human staff across the system.[55]

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54. Meadows.
55. Meadows.

The leverage points noted are system generic and now need to be considered in terms of the restricted complexity type of systems associated with supply chains. In the plan, source, make, and deliver supply chain system process there are numerous entry points at which kinetic or virtual pressure can be applied. These include sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory management, distribution and delivery, and monitoring activities through overarching information systems. In this, the more complicated the supply chain, the greater its possible fragility and vulnerability to disturbance. Depending on its geographic spread, however, only some elements of the supply chain might be accessible and susceptible to physical attack. On the other hand, cyberattacks can usually be undertaken anywhere that information systems are used.

A factor in analyzing a supply chain is vendor diversity. If components are available from many sources, then this is not a critical step in the manufacturing process. On the other hand, if some components originate from only one supplier, then that node may present a systemic vulnerability. In this examination, the shape of the network in being decentralized may reveal exposed connections; there will be a choice between attacking the assembly node, the tier-1 suppliers, the tier-n suppliers, or combinations of these.

Such analysis makes an assumption that final assembly nodes are likely to be obvious to locate but in some way harder to be operationally impaired, whether by robustness, redundancy, or being defended. On the other hand, the various tier-1 and then tier-n suppliers will be progressively more difficult to pinpoint but be less resilient than an assembly node and, in generally being geographically dispersed, be less defended (if at all). Where pressure should be applied across the plan, source, make, and deliver process might vary with the objective of the supply chain warfare campaign.

Operational level. At the operational level, with its interdiction background, the deliver part of the process is stressed. This involves attacking warehousing, inventory management, distribution, delivery, and information systems. The campaign is then particularly shaped by the characteristics of the enemy's LOCs, including their length and type, the presence of choke points, and the concentration of supplies along the LOCs.

Accordingly, in terms of system leverages, the stabilizing buffers and the system's structure and node interaction represent key points for attack. On the other hand, the balancing feedback loop lever can be exploited to ensure adversary commanders keep pushing more and more supplies forward, driven by battlefield imperatives but increasingly providing multiple high-value targets and target sets for attack.

The World War II case of air and naval attacks on Japanese transport ships heading to the Solomon Islands across long, exposed, effectively indefensible LOCs was noted earlier. In a more recent example in Russia's war in Ukraine, the reliance by Russian artillery units on large ammunition storage dumps some 30 kilometers behind the

front line proved a significant vulnerability.[56] In being connected to railway lines, the storage dumps saw a rapid distribution by truck from them to the artillery units, which offered maximized efficiency, but this LOC relied on the Ukrainian military's inability to strike them, and that changed.

Strategic level. At the strategic level with industrial web approaches, there are distinct alternatives. The reductionist approach where key bottlenecks in a critical supply chain are attacked to create relatively swift results suggests a focus on the make part of the supply chain process. Accordingly, the stress might be on attacking the final assembly nodes of the chosen critical supply chain, even if these may in time be able to be replaced.

Another option is to damage one or more tier-1 suppliers in the chosen critical supply chain, accepting that the impact from this may be delayed but might be more enduring. The tier-1 suppliers actually make components; whereas, often the final assembly node is just that. Cutting the manufacture of an important component will not only affect final equipment assembly processes but may also affect sustainment of the in-service equipment if the component is needed in maintenance activities.

The alternative, more systemic approach focuses on key points across different target sets and suggests attacking selected tier-2 nodes across several industries. Such tier-2 attacks will impact several tier-1 nodes and then roll on to disrupt the final assembly nodes. The impacts will be relatively slow to be felt but will occur across the complete defense industry supply chain, depending on which nodes are targeted.

Considering system leverages, the main area for attacks is thus the interaction between the various levels in the chosen critical item chain, which is principally between the final assembly point and the tier-1 suppliers, and possibly down further into some selected tier-2 suppliers. To reinforce this disruption to supply, selected stabilizing buffers holding important components awaiting the final assembly phase might also be usefully attacked. Attacking these points will interrupt and delay the overall critical item system production process and cadence. In this, efforts could be made to reinforce and deepen the system oscillations caused by the attacks.

Additionally, it may be particularly advantageous to attack the information flows so decisionmakers have trouble understanding the scope of the problems arising and devising appropriate restructure work-arounds. In this, there will be balancing feedback loops brought into play that will try to introduce substitutes for those components made unavailable because of the attacks on the critical tier-1 and -2 suppliers. Attention should be paid to monitoring such systemic innovation and actions taken to negate it.

Grand strategic level. At the grand strategic level, the intent is diminishing the adversary's national power through choosing an industry sufficiently large and unique enough that its replacement will be costly, and then attacking not only that industry but also the industries and activities that serve as its substitute for when it is destroyed. This

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56. Mykhaylo Zabrodskyi et al., *Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February–July 2022* (London: RUSI, 2022), 42–43.

suggests attacking the several tier-1 suppliers in the chosen industrial supply chain and then multiple tier-2 suppliers in the possible substitute product supply chains.

In this scenario, there is the issue noted earlier of triggering larger changes in overall supply chain system behavior. Economies are complex systems composed of a number of infrastructure elements interconnected in a myriad of ways, including electrical grids, petroleum and oil distribution networks, and telecommunications systems. As a result of this connectivity, a comprehensive attack on one infrastructure element will influence the others to varying degrees. When targeting an economy, this connectivity and its intrinsic downstream effects can be leveraged. Removing major infrastructure nodes or tier-1 suppliers within the national infrastructure supply chain network, such as within the petroleum distribution supply chain, will trigger systemic change. Supply chains are entangled with their environment and rely on interconnections to function; being unable to connect will create the need to change.

There are options beyond the physical given that supply chains are social-technical systems with human elements. Supply chains need to be managed, and because of this there is increasing reliance on information technology. This is an area where cyberattacks might be used to confuse, perplex, or deceive the supply chain managers.

Such attacks might be able to be focused in that the most likely place for such management is between the firm undertaking final assembly and its tier-1 suppliers. The tier-n suppliers are instead most likely coordinating themselves under local control. Such dispersed authority gives some useful system resilience, but as these suppliers operate alone in a series of islands, an attack of this nature can create a fragmented system if the tier-1 supplier is affected.

Given a supply chain involves a backward flow of information to ensure a forward flow of goods, a cyberattack can adversely seriously impact system performance. A well-known cause of instability in a supply chain is that the information feedback in the system is slow relative to the rate of changes occurring across the system. On the other hand, a bullwhip effect may be caused if the cyberattack causes confusion by seemingly creating a sudden change in forecast demand or an unexpected scarcity.

Considering system leverages, the main area for attacks might be the structure, that is the critical tier-1 and tier-2 suppliers, with more emphasis on the latter. The intent is to cause disruption at the national economic system level, not in a specific critical industry's system, as in the industrial web. In a way it is systems all the way down, with systems thinking applied at different levels of granularity from the national to the individual firm level. Disruption might be reinforced by attacking selected stabilizing buffers holding critical components, although this may now be mainly at the tier-2 level. Attacking these points will again interrupt and delay the overall system production process and cadence, creating systemic oscillations.

At the national level, maintaining useful information flows will be problematic; there will be significant amounts of data but filtering out critical factors for decision-makers to take action on will take time. These information flows will be particularly important pressure points to attack with potentially high payoffs.

A New Equilibrium

As a system, a supply chain responds to disturbances, whether caused by internal or external influences. Supply chains may internally respond by using any economic slack, substitution, reallocation, reengineering, reconstitution, and increased productivity. There are also external actions that may be taken, including stockpiling, rationing, importing, smuggling, disposing, hardening assets, and active defense.[57] As noted, a small change downstream can cause amplified effects upstream through the bullwhip effect.

An attack will push the system into a new equilibrium that may be positive or negative depending on the objective sought. This is a key point that taking a systemic view makes apparent. Before waging supply chain warfare, target system analysis will need to determine what this new equilibrium may be; if it may be positive the planned campaign will need to be rethought.

Conclusion

The reductionist approaches of the interwar period's airpower thinkers are anachronistic in a time where system approaches are favored. Yet with system approaches, no one type of system is appropriate for all varieties of targeting problems. The restricted complexity system type, characterized by semi-openness, multiple causality, and dispersed authority can be used when considering supply chain warfare.

Supply chain networks are social-technical systems with human and nonhuman elements. Suppliers, manufacturers, retailers, and customers work together through partnerships or alliances, each with a specific systemic function. An environment of intense interaction is created, driven by exchanges of material, financial, and informational resources including knowledge.

Where pressure might be applied varies with the objective. At the operational level of war, with its interdiction background, the delivery part of the supply chain process is stressed. At the strategic level with industrial web ideas, the stress might be on attacking the final assembly node of the chosen critical supply chain, even if it may in time be able to be repaired or replaced. Another option is to damage one or more tier-1 suppliers in the selected critical supply chain, accepting that the impact from this may be delayed but might be more enduring. At the grand strategic level involving damaging the overall national economic system, consideration might be given to attacking several tier-1 suppliers in the chosen industrial supply chain and then multiple tier-2 suppliers in possible substitute product supply chains.

Across all three supply chain options the generic system leverages are similar but the specifics vary. The leverages are the system's structure and interaction, selected stabilizing buffers holding critical components, and information flows. In addition, in the interdiction case the balancing feedback can be exploited to ensure adversary commanders keep pushing more and more supplies forward, and so provide multiple

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57. Pat A. Pentland, *Center of Gravity Analysis and Chaos Theory* (Maxwell AFB, AL: AUP, 1993), 35.

high-value targets and target sets for attack. In contrast, in the industrial web and the national economic system cases, an adversary might bring balancing feedback loops into play to try to introduce substitutes for components made unavailable because of attacks; attention should be paid to monitoring for such systemic innovation and actions taken to negate it.

Supply chain systems have long been seen as suitable for air attack. Using a systemic perspective allows an understanding of enemy supply chains and of where to attack to maximize the damage done in terms of cutting system performance and output. Such analysis is gaining increasing relevance given the return of major, protracted war, the impact of economic warfare, recent successful interdiction of Russia's combat supply lines by Ukraine, the rise of heterogenous airpower, and the potential of affordable mass. Airpower thinkers should reconsider supply chain warfare. *Æ*

A CASE FOR AN INDEPENDENT CYBER FORCE

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Although cyberspace is considered the newest warfighting domain, military analysts and scholars have opined the United States remains woefully behind its peers in cyberspace and have called for the creation of a separate cyber service component. Yet a cohesive and robust discussion on this topic has yet to emerge. This article proposes a general framework that builds on the Joint doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) analysis to address questions of sufficiency and necessity. Such analysis reveals DoD cyber operations do not maximize the United States' ability to fight a cyber war, especially when compared against near-peer and peer threats such as China and Russia. A separate cyber force would position the United States to meet these challenges head on.

Since the 1990s, cyberspace has been part of the United States' combat mission, dating back to the creation of Joint Task Force (JTF)-Computer Network Defense in 1998.[1] Within the Department of Defense, this mission set has evolved throughout the years, culminating in US Cyber Command (USCYBERCOM). The purpose of the mission has remained relatively unchanged: defend and maintain US networks and crafting and launch offensive cyber operations against US adversaries. Throughout the years, US military and government analysts and scholars have discussed creating a military branch solely dedicated to cyber warfare.[2] Despite their

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1. US Cyber Command, "Our History," US Cyber Command (website), n. d., accessed October 31, 2022, https://www.cybercom.mil/.
2. David Barno and Nora Bensahel, "Why the United States Needs an Independent Cyber Force," War on the Rocks, May 4, 2021, https://warontherocks.com/; Anthony S. Caristi, "Ignoring a Revolution in Military Affairs: The Need to Create a Separate Branch of the Armed Forces for Cyber Warfare" (master's thesis, US Army Command and General Staff College, Leavenworth, KS, 2017); and James Stavridis and David Weinstein, "Time for a U.S. Cyber Force," *Proceedings* 140, no. 1 (January 2014), https://www.usni.org/.

many opinions, ranging from forming a separate military branch to a small civilian cyber force, a clear framework from which to determine when and why such a new military unit may be justified has yet to emerge.[3]

Several articles have attempted to discuss the issue by applying Joint doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) analysis to determine what a distinct cyber service component should entail based on the assumption that a cyber service component *should* exist.[4] This article attempts to tackle this assumption directly with a similar, but distinct approach to provide senior leaders with a framework that may inform their decision-making. The specific composition of a distinct cyber force, however, is beyond the scope of this article.

The US Space Force is the newest branch of the Department of Defense. It took 58 years from the first manned space flight for the United States to create the US Space Force. Past leaders determined the warfighting capabilities of the space domain must be separated from the other services to achieve maximum effectiveness of US combat forces.

Will cyber be the next branch of US military power? And what factors drive the decision to establish a new military branch? This article proposes a framework to determine the arguments for and against a distinct cyber service component and to examine the gaps within this framework to demonstrate the need for the United States to create a separate service dedicated to cyber operations.

Distinct Service Component Analysis Framework

The proposed framework focuses on questions of necessity and sufficiency—specifically, whether a change to the current system is necessary, and whether a new service component would sufficiently address the identified problems.

Table 1 introduces the framework and outlines a set of questions and concerns relative to necessity/sufficiency (columns) across the DOTMLPF-P elements (rows). This framework extends DOTMLPF-P with additional rows to address internal signaling, or how the US public will receive and perceive the change in force structure, and external strategic signaling, or how foreign entities will receive and perceive this change.

The DOTMLPF-P analysis framework is a well-accepted concept from the Joint military community. DoD staff typically use DOTMLPF-P analysis, defined in the Joint Capabilities Integrations Development System Process, to assist in designing administrative changes, acquisition efforts to fill a capability need, or course of action

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3. Zachary M. Smith, "Airpower History and the Cyber Force of the Future: How Organization for the Cyber Domain Outpaced Strategic Thinking and Forgot the Lessons of the Past" (master's thesis, Air Command and Staff College, Maxwell AFB, AL, June 2016).

4. Caristi, "Ignoring a Revolution"; and Lynn Scott et al., *Human Capital Management for the USAF Cyber Force* (Santa Monica, CA: RAND Corporation, 2010).

development.[5] Though it is hardly new, any discussion about the creation of a new service to fill a domain need would be remiss without including it. A full treatment of DOTMLPF-P can be found at the Defense Acquisition University.[6]

Internal signaling focuses on the response of the American public to a change in force structure. Will they look at it from a cost-saving or cost-generating perspective? Will they trust in the new organization to protect them and represent their best interests, or will they just see it as more governmental bureaucracy? In contrast, external signaling focuses on the potential responses of foreign governments. Will this change be perceived as a threat? Does the United States feel it necessary to demonstrate its resolve in each domain? Before the creation of a service or other governmental organization dedicated to a particular mission set can occur, the pros and cons of such an action must be weighed.

Not all sections of the proposed framework are equal and some may not apply at all. Decisionmakers themselves must decide which elements are priorities, and to what extent. A specific threshold is intentionally omitted because the topics are complex and nuanced and data that informs these questions may not be accessible. The framework is rather intended to prompt the reader to question the current state of military operations within a domain to encourage productive community discussion. No "correct" conclusion should come from DOTMLPF-P or strategic signaling analysis alone. Moreover, the framework omits the potentially contentious issue of funding because it focuses on long-term strategy. Ultimately, this analysis is intended to spark conversation that may help determine if a better method for implementing national power in an emerging military domain exists.

Table 1. Distinct Service Component Analysis Framework

	Distinct Service Component Analysis Framework	
	Necessary	Sufficient
Doctrine	Does current doctrine fail to answer capabilities gaps and can it be tweaked slightly, or does it need significant changes to be effective?	Does the proposed system use resources to enable its forces to maneuver and incorporate a diverse mission set?
Organization	Does the current organizational structure fail to address the inability of the military to fill the capabilities gap?	Will the new force be organized in a coherent manner to fight in the domain?
Training	Is the given training coherent, with a logical progression, and does it cover the material necessary to ensure US forces are trained to fight in the domain?	Will US forces be properly trained to fight in the domain in question?

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5. Chairman of the Joint Chiefs of Staff (CJCS), *Charter of the Joint Requirements Oversight Council and Implementation of the Joint Capabilities Integration and Development System*, CJCS Instruction (CJCSI) 5123.01I (Washington, DC: CJCS, October 30, 2021), https://www.jcs.mil/.

6. Defense Acquisition University (DAU), "DOTMLPF-P Analysis," DAU (website), n. d., accessed May 1, 2023, https://www.dau.edu/.

Distinct Service Component Analysis Framework		
Materiel	Is US equipment aging or inadequate? Is there enough quantity of US systems to fight?	Will US fighters in the domain be properly equipped to match peer and nonpeer adversaries?
Leadership and Education	Is leadership inadequately prepared to tackle the problems facing US forces in the domain? Are domain leaders focused on and adequately prepared to tackle problems facing US cyber forces? Are domain leaders caught up in noncyber, service-related issues to the detriment of the defense of the domain?	Will the leadership understand the problems they are facing? Will they have the necessary resources to correct the problems? Will leadership be placed properly to affect change?
Personnel	Is there a lack of qualified individuals in key areas? Are the wrong people placed in the wrong areas?	Is there proper staffing to deal with any issues that may arise and are the right people in the right places?
Facilities	Are facilities causing issues for operators? Does equipment maintenance keep up with mission demand?	Will maintenance operations and facilities allow operators to carry out the mission?
Policy	Does US policy limit any of the previously discussed areas? Can one of them not be solved solely due to existing DoD or service-level policy?	Will the new policy allow the previously discussed seven areas to be addressed properly?
Internal Signaling	Is it important for the Department to demonstrate how dedicated it is to the defense of the domain to the American people? Does the Department of Defense care more about defending the domain than it does about potential civilian backlash at the creation of a separate service component?	Will the creation of a separate service send the wrong message to the American people? Will this cause protests or uproar? Are tools necessary to accomplish the mission already in place?
External Signaling	Is it important enough to show that the United States deems the domain critical to defending its interests to the point that the creation of a service component is warranted? Does the United States want the world to know that it intends to be the best in the domain?	Will the creation of the service escalate conflict? Will US adversaries and Allies condemn the act?

The necessity column in the table elicits a discussion on why the Department of Defense might be motivated to make changes to the status quo, while the sufficiency column elicits a discussion on why the new military service will better address the needs of the nation.

Application of Framework: US Space Force

The framework can be validated by examining the establishment of the US Space Force in December 2019. In this case, the United States determined it had reached a point at which the current paradigm from which space operations were conducted

was inadequate. It based this decisions on criteria that identified a warfighting domain and the associated organizational restructuring.

Space Force

The creation of the US Space Force focuses on certain framework criteria: doctrine, materiel, facilities, and strategic signaling were the only major framework factors that seemingly played a large part in the decision to form the US Space Force. By 2015 US peer-and near-peer- threat adversaries, namely Russia and China, had branches in their militaries dedicated to full-spectrum space operations.[7] But before 2019, doctrinally, the US military used space capabilities as a force enabling tool or for defensive threat detection. The United States and NATO did not view space as a warfighting domain.[8]

Prior to the establishment of US Space Force, the services did not recognize space as a full-spectrum warfighting domain. The US Navy used space for ballistic missile defense, and the US Army and US Air Force used space for early warning missile defense, positioning for troop movements, GPS-guided missile strikes, and intelligence collection. A new service was necessary for the United States to pool space operators in one service and focus on building up space as a warfighting domain, not simply as an enabler or a defensive tool against long-range threats.[9]

Additionally, with the Chinese and Russian governments combining military branches with their civilian space agencies to create the People's Liberation Army Strategic Force Support and the Russian Aerospace Forces respectively, the United States needed to signal to its Allies and adversaries that it would take any action in space to protect its interests. Materiel and facilities were lacking as well. Despite the fact the United States employed top-tier technologies, many of those technologies were created by the commercial sector and many had to be carried into space on the backs of Russian-made Soyuz rockets, limiting the US ability to use space in a warfighting capacity should the need arise.[10] The Space Force has since shifted to using SpaceX vehicles to launch capabilities into space, removing the reliance on Russia.[11]

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7. John Costello and Joe McReynolds, *China's Strategic Support Force: A Force for a New Era*, vol. 13 (Washington, DC: National Defense University Press, 2018); and Matthew Bodner, "Russian Military Merges Air Force and Space Command." *Moscow Times*, April 3, 2015, https://www.themoscowtimes.com/.

8. Kevin Pollpeter and Elizabeth Barrett, *NATO Ally Contributions to the Space Domain* (Arlington, VA: Center for Naval Analyses, 2021).

9. Barbara Barrett, *Department of the Air Force [DAF] Report to Congressional Committees: Comprehensive Plan for the Organizational Structure of the U.S. Space Force* (Washington DC: DAF, February 2020), https://velosteam.com/; and US Space Force, *United States Space Force* (Washington, DC: Department of Defense (DoD), 2019), https://media.defense.gov/.

10. Jonathan O'Callaghan, "The Last Soyuz - NASA Ends Reliance on Russia with Final Launch before Crew Dragon," *Forbes*, April 9, 2020, https://www.forbes.com/; and Michelle Cordero and Dean Cheng, "Does the United States Need A Space Force?," July 27, 2018, in *Heritage Explains*, produced by Michelle Cordero and Tim Doescher, podcast, 12:59, https://www.heritage.org/.

11. Theresa Hitchens, "A Space Force Dozen: SpaceX, ULA Awarded Contracts to Launch 12 New Satellites," Breaking Defense, June 8, 2023, https://breakingdefense.com/.

As for internal signaling, the creation of the US Space Force told Americans that the United States was going to deter and defeat its adversaries in the space domain. This was an important message as many in the United States feared space threats from China and Russia.[12] The United States and the Department of Defense took space-based military operations seriously enough to work together in a single service to out-perform enemies and support Allies and partners around the world.

Application of Framework for a Separate US Cyber Force

Now that the framework has been demonstrated, it is necessary to validate the need for a US cyber force. A well-designed cyber force can remedy the inadequacies of current US cyber operations.

Doctrine

Necessary: Does current doctrine fail to answer capabilities gaps and can it be tweaked slightly, or does it need significant changes to be effective? One researcher argues the creation of US Cyber Command preceded the full development of military cyberspace doctrine.[13] With each service creating its own cyber forces, a lack of over-arching cyber theory and doctrine led to the Air Force applying airpower theory to cyber operations. Yet airpower and cyber power are not the same; in fact, this employment strategy of the Air Force and the other services has led to strategic mistakes.[14]

Joint Publication 3-12, *Cyberspace Operations*, is intended to provide Joint doctrine to plan, execute, and assess cyberspace operations.[15] This publication, however, does not remove the service-based lens and employment strategies. In order to remove these, there must be a service component that solely focuses on cyber operations. Research shows that three factors are necessary for cyber to be successful: autonomy, mastery, and purpose.[16] But the way the services treat cyber is not conducive to autonomy.

Sufficient: Does the proposed system use resources to enable its forces to maneuver and incorporate a diverse mission set? Cyber operations could greatly benefit from giving operators autonomy to train in laboratory environments and lowering the decision-making level. Higher-level leaders would need only request an end product or a required level of competency to be demonstrated. To more effectively employ cyber capabilities there must be new doctrine. A new service component with the ability to

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12. Loren Thompson, "Secret Pentagon Space Program Driven by Fear of China," *Forbes*, September 12, 2019, https://www.forbes.com/; and Robert A. Wood, "The Threats Posed by Russia and China to Security of the Outer Space Environment," U.S. Mission to International Organizations in Geneva, August 18, 2021, https://geneva.usmission.gov/.

13. Smith, "Airpower History."

14. Colin Gray, *Airpower for Strategic Effect* (Maxwell AFB, AL: Air University Press, 2012), 35–36.

15. CJCS, *Cyberspace Operations*, Joint Publication (JP) 3-12 (Washington, DC: CJCS, 2018).

16. John Chezem, "Air Force Cyber Mission Success Depends on Cultural Change," AFCEA International, October 1, 2015, https://www.afcea.org/

draft doctrine, focusing on enabling autonomy rather than one bogged down by existing force employment strategies, may be key to building a cyber force that is more prepared to deter and defeat our peer-level adversaries. Further issues within the military cyber community exist in the culture of box-checking and leadership appeasement.[17] This prevents individuals from being able to effect change, update broken processes, and deeply evaluate which policies and procedures are serving as barriers to mission needs. A separate service employing cyber-minded personnel may also be able to create new policies and procedures that can remove some of these bureaucratic barriers.

Organization

Necessary: Does the current organizational structure fail to address the inability of the military to fill the capabilities gap? The US military presents its cyber forces in the form of 133 cyber mission force teams. Each of these teams has one of four distinct assignments: Cyber National Mission Teams (CNMTs), Cyber Combat Mission Teams (CCMTs), Cyber Protection Teams (CPTs), and Cyber Support Teams (CSTs). These mission teams consist of members of all services. Currently, the services present their forces to USCYBERCOM, which in turn presents the teams to the geographic and other functional combatant commanders.[18] This structure means different services are developing capabilities separately.

In many cases, this may be beneficial, but because cyber operations weapons systems are expensive and time-consuming to develop, a lack of unity of effort can lead to duplicate capabilities, costing taxpayer money and stifling the ability to create diverse, top-of-the-line cyber weapons. As the Air Force's chief software engineer, Nicholas Chaillan, remarked in 2021, DoD cyber had "silos within silos" and "people reinventing the wheel," which reduced the effectiveness of US cyber forces. He stated, "we're very behind in cyber, to the point that it was very scary when it comes to critical infrastructure and the lack of security."[19]

Sufficient: Will the new force be organized in a coherent manner to fight in the domain? With the creation of a US Cyber Force, the format of the teams would not change; however, the key difference would be that the majority of presented forces would be sourced from the same service. Creating a new service to combine cyber professionals under one roof should lead to greater communication and help ensure that newly developed technology is shared within the entire cyber community and should result in greater cyber strength within the Defense Department.

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17. Greg Hadley, "Air Force Leadership Needs to 'Walk the Walk' in Baking Security into Cyber, Software Boss Says," *Air & Space Forces Magazine*, August 12, 2021, https://www.airandspaceforces.com/.

18. CJCS, Cyberspace Operations.

19. *CITI Hearing: The Future of War: Is the Pentagon Prepared to Deter and Defeat America's Adversaries?* House Armed Services Committee (2023) (statement of Rear Admiral [Ret.] Mark Montgomery, senior director, Center on Cyber Technology and Innovation Foundation for Defense of Democracies), https://armedservices.house.gov/.

Training

Necessary: Is the given training coherent, with a logical progression, and does it cover the material necessary to ensure US forces are trained to fight in the domain? Currently there is no Joint technical skills school to ensure consistent training for all DoD cyber personnel. Retired Rear Admiral Mark Montgomery states that this has resulted in a cyber force that is inconsistent in training, readiness, and organization.[20]

Sufficient: Will US forces be properly trained to fight in the domain in question? A new service would be able to bring in the best aspects of each technical school and provide consistent and advanced training for all cyber individuals. Further, with current cyber training conducted by noncyber service components, even highly trained and specialized cyber operators will inevitably approach cyber problems from the perspective of their own service. A new training pipeline within a single service for all DoD cyber would help remove the service-specific view that hinders cyber operators and help enable greater standardization across the US cyber force.

Leadership and Education

Necessary: Is leadership inadequately prepared to tackle the problems facing US forces in the domain? Are there domain-minded DoD leaders in high enough positions to effectively advocate on behalf of the domain? USCYBERCOM leadership currently comprises general officers with experience in their service component's cyber units. While this is a reasonable Joint approach, it may not be enough to resolve differences in how cyber is employed as a full-spectrum capability. More importantly, the shifting of leadership from the various service components—that is, with each service taking a turn—may induce significant and frequent policy changes that degrade organizational performance.

Furthermore, it requires a significant commitment from service components to grow leaders with appropriate backgrounds in order to maintain a pool of viable candidates. The Army, Navy, Air Force, Space Force, and Marine Corps operate differently, as they have different doctrine and perspectives on how to win wars. This is seen in Joint task forces, as they are led by the commander from the component that provides the most forces to the operation. As a result, Army doctrine is most prevalent in JTFs.[21] This results in the Air Force, Navy, and Marine Corps following unfamiliar Army structure and processes to conduct operations. This issue extends to most Joint forces as there will always be a need for a Joint force commander from one of the existing services. Joint forces will likely never be rid of this unfortunate byproduct of having the commander coming from a single service.

Sufficient: Will the leadership understand the problems they are facing? Will they have the necessary resources to correct the problems? Will leadership be placed prop-

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20. Daniel R. Walker, "The Organization and Training of Joint Task Forces" (master's thesis, Air University, 1996).

21. Walker.

erly to affect change? USCYBERCOM can benefit from a US Cyber Force as its leadership will be brought up within the cyber community—which means they will likely approach cyber as a force-projection capability instead of simply as a force multiplier—and will be brought up in cyber doctrine, exercising leadership through a purely cyber lens.

Personnel

Necessary: Is there a lack of qualified individuals in key areas? Are the wrong people placed in the wrong areas? Two major issues face US military cyber right now. The loss of qualified personnel to private industry and a lack of high-ranking cyber leadership to advocate for cyberspace.[22] Regarding the loss of talent, many cyber professionals rightly believe they can make more money working in information technology (IT) for a private company. Additionally, the size of the cyber mission forces each service contributes has not increased appreciably since 2012 despite the *National Security Strategy* directly calling for the United States to secure cyberspace.[23]

Sufficient: Is there proper staffing to deal with any issues that may arise and are the right people in the right places? To incentivize and retain cyber professionals, a US Cyber Force could distinguish itself from private industry, demonstrating that cyber defense and offense are different careers than IT. This distinction may help bring in talented individuals with a desire to operate in a warfighting capacity. Further, a separate branch would bring with it new general officer positions at the highest levels that could better advocate for the domain. This should lead to better educated cyber leaders that understand the domain and how to organize the force to remove barriers that frustrate personnel and lead them to separate from the US government.

Appearance standards are one area that provide an example of needed changes in the personnel arena related to recruitment and retention of cyber professionals.

Several individuals have called for changes to appearance standards for US military cyber operators. They have referred to requirements concerning hair color, tattoos, weight, and fitness level that would normally disqualify someone from becoming a cyber warrior.[24] Yet a relaxing of standards within existing military branches has led to morale issues in the British Army.[25] These morale issues are likely due to changing standards within existing branches. A distinct cyber component may permit a culture that emphasizes cyber skills over physical strength and endurance, preventing such a morale issue. The relaxed standards could simply be part of service branch rivalry. More research regarding relaxed standards within the US military could be useful in determining how beneficial a change like this could be.

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22. Stavridis and Weinstein, "U.S. Cyber Force."

23. Montgomery, *Future of War*; and Joseph R. Biden, *United States National Security Strategy* (Washington, DC: The White House, 2022).

24. Caristi, "Ignoring a Revolution"; and Stavridis and Weinstein, "U.S. Cyber Force."

25. Caristi.

Internal and External Signaling

Necessary: Internally, does the public understand the need for the creation of the domain? Is it important for the United States to state the importance of the domain and to show its citizens it takes the threat and the domain seriously? Externally, is it important to show that the domain is critical, and the US is resolute in this area? Does the United States want the world to know that it intends to be the best in the domain? Care must be taken to ensure that US adversaries do not see a cyber force as escalatory; however, the United States must also weigh the need to demonstrate how seriously it takes cyberspace both to adversaries and to the American people. The 2018 DoD *Cyber Strategy* outlined a new term called "defending forward," which is a shift from active defense defined in its *Strategy for Operating in Cyberspace* in 2011.[26]

Sufficient: Internally, will the creation of a separate service send the wrong message to the American people? Will this cause protests or uproar? Are tools necessary to accomplish the mission already in place? Externally, will the creation of the service escalate conflict? Will US adversaries and Allies condemn the act? The United States is often critical of China and Russia and their cyber tactics, calling out Russia for meddling in the 2016 presidential election and China for hacking into the Office of Personnel Management and stealing the personal files of millions of Americans with security clearances.[27] Yet China and Russia have both reacted to the defending forward strategy with criticism. Both nations state their cyber operations are limited to defense and retaliatory strikes.[28]

Releasing more aggressive strategy or establishing a new service will likely always elicit responses from near-peer and peer adversaries. After the creation of the US Space Force, for example, China and Russia issued statements condemning the US action.[29] The Chinese government accused the United States of turning space into a battlefield and the Russians echoed the sentiment. Yet actual actions in retaliation have been few and far between with continued cooperation between the Russian and US space agencies.[30]

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26. DoD, *Summary: Department of Defense Cyber Strategy* 2018 (Washington, DC: DoD, 2018), 4, https://media.defense.gov/; DoD, *DoD Strategy for Operating in Cyberspace* (Washington, DC: DoD, 2011), 6, https://csrc.nist.gov/; and Lyu Jinghua, "A Chinese Perspective on the Pentagon's Cyber Strategy: From 'Active Cyber Defense' to 'Defending Forward,' " *Lawfare* (blog), October 31, 2019, https://www.lawfare-blog.com/.

27. Josh Fruhlinger, "The OPM Hack Explained: Bad Security Practices Meet China's Captain America," CSO United States, February 12, 2020, https://www.csoonline.com/.

28. Michael Connell and Sarah Vogler, *Russia's Approach to Cyber Warfare* (Washington, DC: Center for Naval Analyses, March 2017); and Jinghua, "Chinese Perspective."

29. Reality Check team, "Russian President Warns over Expansion of US Space Force," BBC News, December 4, 2019, https://www.bbc.com/; and "China Attacks US Space Force as Threat to Outer Space Peace," Associated Press, December 23, 2019, https://apnews.com/.

30. Kenneth Chang and Anton Troianovski, "In Space, U.S.-Russian Cooperation Finds a Way Forward," *New York Times*, July 15, 2022, https://www.nytimes.com/.

Similarly, cyber often ends up serving a de-escalatory rather than escalatory function.[31] Cyber can alter the battlefield to force an adversary into disadvantageous situations, thus decreasing the desire to fight in that moment. On the other hand, by not creating a separate force in a new domain or surrounding a new capability, the United States may signal to Americans and adversaries that it views the domain with little or no significance.

The creation of the National Artificial Intelligence Initiative (NAII), while not a separate service, signaled to the American public, partners, and adversaries that the United States was taking the advent of artificial intelligence (AI) seriously by prioritizing AI research for purposes of national security and economic prosperity.[32]

If the United States decides that it wants to become the world leader in a new technology or domain, then due consideration must be made regarding the creation of an organization dedicated to developing this technology. As with NAII, the United States decided that AI is of key importance to national security. While some capabilities may be more effectively governed in a national organization such as the NAII, other capabilities should have a dedicated warfighting service. Cyberspace is one of those. By establishing a separate cyber force, the United States is signaling cyber is on par with the other warfighting domains.

Counterarguments to a Separate US Cyber Force

The arguments made thus far highlight key aspects of the proposed framework. This section identifies not only counterarguments but also potential gaps in the framework, namely the historical coupling of the intelligence and cyber communities, as well as the argument that USCYBERCOM should model itself after US Special Operations Command (USSOCOM) instead of forming a separate service component.

Relationship between Intelligence and Cyber

Intelligence operations have been closely linked to cyber and cyberspace operations since their inception. Cyber was spawned through intelligence with ciphers and cryptographic machines such as Enigma in World War II. Following the war, cyber became a tool for organizations to gain intelligence on adversaries' computing devices.[33] Computing devices transitioned from the means to conduct intelligence to intelligence targets.

The creation of an independent US Cyber Force would likely see the split of USCYBERCOM and the National Security Agency (NSA), two organizations that currently are highly intertwined, with one leader dual-hatted as the commander of

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31. Christopher Whyte and Brian M. Mazanec, *Understanding Cyber Warfare: Politics, Policy and Strategy* (Abingdon, UK: Routledge, 2023).

32. National Artificial Intelligence Initiative (NAII) Act of 2020, Pub. L. No. 116-283 (2021); and NAII Office (NAIIO), "About," NAIIO, accessed June 21, 2023, https://www.ai.gov/.

33. Whyte and Mazanec, *Understanding Cyber Warfare*.

USCYBERCOM and NSA director. This close connection between the two organizations has been controversial for years, with some calling for the separation of the two.[34] Still, the coordination ability between the cyber domain and the Intelligence Community is of paramount importance when considering the capabilities of US adversaries and the speed in which decisions can be made when unity of command exists. The cooperation between the NSA and USCYBERCOM is beneficial in coordinating offensive and defensive cyber operations. One command structure enables greater sharing of ideas and capabilities, and the creation of innovative solutions for mutual operations.[35] This innovation is critical when dealing with adversaries such as Russia and China that have developed and are developing their own internet standards. China already has developed the Great Firewall that censors traffic deemed inappropriate by its government, and Russia is developing its own domain name system, capable of redirecting users and internet traffic as the government sees fit.[36] These efforts by near-peer and peer adversaries underpin the need for a close relationship between intelligence and cyber. Yet despite the current arrangement, this need for closeness does not require the NSA and USCYBERCOM be led by a single individual.

In fact, US Congress decided this connection could be terminated in the future, but only once Cyber Command was able to stand on its own. Congress recognized the mission sets of the NSA and Cyber Command are large enough in their own right to justify each needing its own commander. In 2016, the National Defense Authorization Act established a set of criteria that USCYBERCOM and the NSA would have to meet in order to separate. These criteria mainly revolve around creating a command-and-control structure, operational infrastructure, and capabilities to enable intelligence collection and cyber operations as well as training for cyber operators.[37] Cyber Command has not yet developed a robust enough system of command and control or operational infrastructure to break free from the NSA, but creating a US Cyber Force will help to realize these conditions for separation.

The link between cyber and intelligence will likely remain; however, one of the criteria for separating NSA and USCYBERCOM is that capabilities must be established to enable intelligence collection and operational preparation of the environment— that is, the highly technical requirements—for cyber operations. Placing intelligence liaisons, perhaps even intelligence personnel staffed from a newly created US Cyber Force, in cyber teams or within the cyber operations center is a simple way of furthering the integration of cyber operations and intelligence. This can even be extended to

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34. Chris Demchek, "Five Reasons Not to Split Cyber Command from the NSA Any Time Soon – If Ever," War on the Rocks, March 5, 2021. https://warontherocks.com/.

35. Paul Nakasone, "CYBERCOM and NSA Chief: Cybersecurity Is a Team Sport," *Defense News*, August 19, 2022. https://www.defensenews.com/.

36. "Russia: Growing Internet Isolation, Control, Censorship," Human Rights Watch (website), October 28, 2020. https://www.hrw.org/; and Yaqiu Wang, "In China, the 'Great Firewall' Is Changing a Generation," *Politico*, September 1, 2020, https://www.politico.com/.

37. National Defense Authorization Act for Fiscal Year 2017, Pub. L. No. 114-328 (2016).

liaisons from other mission sets, such as other forms of nonkinetic or kinetic operations personnel, further strengthening the ties of US cyber operations to noncyber missions.

Following the USSOCOM Model and a Duplicative Service

Many have stated, as far back as 2007, that a US Cyber Force should be modeled after the example set by US Special Forces.[38] Similarities between cyber operations and special operations include the need for an agile acquisition process for capabilities as well as the ability to leverage different authorities and work across service lines as USCYBERCOM, like USSOCOM, is a functional combatant command instead of a geographic combatant command.[39] Further, if the services are providing highly specialized forces to USSOCOM to enable special operations, and the services are providing highly technically proficient forces to USCYBERCOM for cyberspace operations, then why is the USSOCOM model not sufficient for US military cyberspace operations? Many also argue that each of the services are growing their cyber components in ways to support their services, with the US Army prioritizing the integration of cyberspace operations with their land forces and the US Navy prioritizing cyberspace for fleet defense operations.[40] This parallels the idea of each service providing special operations forces with expertise in their respective domains.

Drawing such parallels between the two commands, however, is problematic. USSOCOM must function in multiple domains, where USCYBERCOM only functions in one domain: cyberspace. Echoing a similar sentiment, Vice Admiral Craig Clapperton, commander of Fleet Cyber Command, said that a distinct cyber force would be a duplicative force, as the Navy's Fleet Cyber Command would still work to carry out cyberspace operations necessary for fleet defense, and similar cyberspace operations would be needed within the Army.[41] While this paper does not deign to guess whether a cyber branch would or would not assume those functions for the services, the argument against a duplicative service falls flat when considering the current state of US military aviation assets.

Nearly all services have aviation capabilities despite the existence of the US Air Force. The US Air Force could not serve the unique aviation functions of the other services as well as the individual services themselves. This may be true as well for a future cyberspace service component. Perhaps there will still be need of cyberspace operators in key roles in each of the existing services. The argument that a cyber service might be duplicative does not negate the value of a service component dedicated

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38. John Sakellariadis, "For Future of Cyber Command, Look to SOCOM," *Politico*, January 9, 2023, www.politico.com/; Mark Pomerleau, "Many Believe It's Time for an Independent Uniformed Cyber Service. Here's What It Could Look Like." DefenseScoop, May 15, 2023, https://defensescoop.com/; and Joe Gould, "Former NSA Chief: Follow SOCOM Model for Cyber," *Defense News*, August 19, 2022, https://www.defensenews.com/.

39. Pomerleau, "Uniformed Cyber Service."

40. Stavridis and Weinstein, "U.S. Cyber Force."

41. Pomerleau, "Uniformed Cyber Service."

to organizing, training, and equipping multicapable cyberspace operators, capable of working throughout the domain in support of multidomain operations.

Conclusion

Whether cyber becomes a separate branch of the military is yet to be determined; however, the case can be made that the current system is inadequate if the United States is to continue to compete at the highest levels with its peer and near-peer adversaries. The United States must find a way to develop a cohesive cyber organization that can be organized to thwart these ever-present and potentially existential threats. This force must be appealing to a new generation of fighters in a way that the current services are not, allowing for potentially different standards to allow for the best talent. There must be a change in doctrine and leadership styles if the US military is to cultivate a lethal and effective cyber force.

The current way of thinking about cyber limits the nation's ability to scale cyber operations. The United States will need to increase the number of cyber competent leaders in the higher echelons of government. This line of thinking follows for any future service or capability. Warfare solely focused on air and naval superiority and land occupation is a concept of the past. Today's militaries must be able to think in new and creative ways and leverage technologies such as cyber and artificial intelligence in innovative manners. Æ

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