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FROM THE EDITOR

Dear Reader,

This issue marks the beginning of our second year as *Æther: A Journal of Strategic Airpower & Spacepower*. Over the course of 2022, Team Æther published the work of 55 authors across 37 long-form articles. Our annual print distribution totaled over 14,000, and the journal tallied approximately 150,000 views and downloads of *Æther* articles worldwide over 10 months. In addition to book reviews and a podcast, we added a new line of digital-only informed commentaries called "Perspectives." It's been a busy but rewarding year, and I am extremely grateful for our small but mighty team and the remarkable researchers and practitioners who chose to publish with us in 2022.

Our first offering of 2023 journeys from leaders in the history of airpower to events in Ukraine, Russia, and the Middle East, and along the way considers military strategy and the effects of combat on military service. The Spring 2023 issue leads with a review essay of *Airpower Pioneers: From Billy Mitchell to Dave Deptula* (2023), edited by John Andreas Olsen. General Ron Fogleman, USAF, Retired, who served as the 15th chief of staff of the Air Force (1994 to 1997), met, worked for, or worked with 9 of the 12 Airmen featured in the book. He provides an insightful overview of these leader-innovators and their contributions to US airpower.

A military service is as much about individuals as it is about the institutions that provide a context in which individuals can excel. The lived accounts, even in the guise of a fictional narrative, of people in key Air Force institutions provide important context for today's reckoning with past grievances and in fact highlight progress the service has made. In our second review essay, Bill Eliason brings the memories of his time at the US Air Force Academy in the late 1970s to bear in his review of Mark Clodfelter's *Between Two Shades of Blue*, the first work of fiction by this leading airpower thinker.

In our *Ways of War* forum, Alison Russell examines the so-called digital blockade of Russia that began in the early months of Russia's war in Ukraine, arguing it should more accurately be referred to as a digital corporate boycott. In the second article in the forum, Roy Boone, David Rehbein, John Swegle, and Christopher Yeaw make the case that the capability asymmetry between the United States/NATO and Russia could

trigger a decision by Moscow to employ nonstrategic nuclear weapons in the early stages of a future conflict.

The *On Strategy* forum begins with a look at strategic narratives. Nick Blas explores the role of strategic narratives in society and military strategy and reminds military planners to be cognizant of the importance of these narratives. The forum then turns to the Arctic. Elizabeth Anne Hoettels argues for revisions to the Health Support Services annex to the *DoD Arctic Strategy* to better enable critical Joint health services in the event of an Arctic conflict.

Our third forum, *The Costs of War*, take us to Afghanistan. Kelly Atkinson proposes a theory of mission injury and advises institutional changes to the structure of US military service to mitigate this form of trauma in future conflicts. In *Airpower in the Middle East*, we venture to the eastern Mediterranean region as Joshua Dryden outlines the development of Israeli and Iranian airpower in recent decades, revealing lessons from this protracted conflict that can be applied to other advanced air forces facing adversaries employing similar asymmetric capabilities.

The issue closes with *Par Avion* in which we are pleased to share an article from *Vortex: Studies on Air and Space Power*, published by the French Air and Space Forces. Anne Maurin examines Russia's cosmostrategy and argues Moscow's recent tendency to undertake guerilla actions in space is an attempt to counterbalance its otherwise lagging space industry.

Thank you for taking the time to read through our latest issue. **Æ**

~ The Editor

SOME REFLECTIONS ON A PANTHEON OF ICONIC AMERICAN AIRPOWER PIONEERS

Ronald R. Fogleman

Review of *Airpower Pioneers: From Billy Mitchell to Dave Deptula*
John Andreas Olsen, Editor, Naval Institute Press, 2023, 446 pp

A new compendium titled *Airpower Pioneers: From Billy Mitchell to Dave Deptula* and edited by Colonel John Andreas Olsen of the Royal Norwegian Air Force is the third in a trilogy released in recent years by the Naval Institute Press that is devoted to exploring the unique capabilities and combat uses of airpower. The first volume, *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd*, reviews the seminal contributions made by two of the better-known twentieth-century American air-warfare strategists. The second, *Airpower Applied: US, NATO, and Israeli Combat Experience*, employs a case-study approach in examining how political, strategic, and employment considerations have affected the varied uses of airpower by the leading airpower players around the world.

This latest volume spotlights the contributions made by a select group of American Airmen who were especially pivotal in the development and application of airpower throughout its brief history, not so much because they were the first to address growing need but more so because they were uncommonly influential in understanding, developing, and then applying unique approaches to the organization, roles and missions, and combat uses of the evolving air weapon.

Olsen, a widely-published writer on the subject of airpower, enlisted an impressive quorum of well-known and accomplished fellow airpower historians to profile the lives and achievements of 12 American air leaders who became particularly influential in the development and application of military aviation throughout the years, both in the US Air Force and in its various predecessor organizations. The individuals and their respective biographers represented in this volume include Brigadier General William "Billy" Mitchell (Richard P. Hallion), General Henry Harley "Hap" Arnold (Dik Alan Daso), Major General Haywood S. "Possum" Hansell Jr. (Richard R. Muller), General Hoyt S. "Van" Vandenberg (Phillip S. Meilinger), General Curtis E. "Curt" LeMay (Paul J. Springer), General Bernard A. "Bennie" Schriever (Karl P. Mueller),

General Ronald R. Fogleman, USAF, Retired, served as the Air Force chief of staff from 1994 to 1997.

Lieutenant General Glenn A. Kent (David A. Ochmanek), General David C. "Dave" Jones (Brian D. Laslie), General Wilbur L. "Bill" Creech (Benjamin S. Lambeth), Colonel John A. Warden (John Andreas Olsen), General Merrill A. "Tony" McPeak (Heather P. Venable), and Lieutenant General David A. "Dave" Deptula (Christopher J. Bowie).

Although extensive biographies already exist for a number of these accomplished Airmen, no previous effort has focused expressly on their unique contributions, their rise to positions of leadership, and their accomplishments and contributions to the organizational and intellectual evolution of the US Air Force and its place within the broader American national defense establishment. The book is aptly titled, well-researched, well-written, and most pertinent at a time when discussion about the leadership within the ranks of our armed services has become part and parcel of a larger public dialogue, with recent national surveys having shown a marked decline in the American public's confidence in our nation's military.

As a long-time student of military history, I have always been especially interested in the broad topic of leadership, its development, and its practical application. When one looks at this particular group of exceptional Airmen, one quickly sees how their respective careers and contributions were all shaped by the common factors of competency, courage, and character. Olsen's most recent volume in this trilogy offers a concise primer on how these three distinctive attributes of leadership have been defined and nurtured by a combination of professional knowledge, practical experience, distinctive personality, and happenstance opportunity.

During my career I had the opportunity to meet and work with, or for, 9 of the 12 individuals. While I thought I generally understood the roles they played and the contributions they made, as a result of reading this volume, I became aware of things about them and their contributions that I did not know or appreciate. To begin with, a remarkable richness of professional knowledge and acquired experience is clearly evident in the career paths of all of these exceptional past Air Force leaders. Most of them attended professional military educational institutions. Hansell, Vandenburg, and surprisingly, Jones attended one of the earliest of these institutions, the Air Corps Tactical School. With the exception of Jones, all were graduates of an established war college. Those who earned advanced degrees from civilian institutions included Schriever, Kent, Creech, and McPeak. Warden and Deptula earned advanced degrees from the National War College. Jones was an exception to all the others in that he never attended an undergraduate or graduate school. Among the others, the one exception to having pursued an advanced degree at a professional military education or academic institution was LeMay.

All but Arnold and Kent either participated in or actually led units in combat operations, and LeMay was the most experienced in that regard. It might be noted two of them—Kent and Hansell—are not all that well-known by today's students of airpower history.

Before the start of World War II, the US Army Air Corps needed a blueprint for determining its impending requirements by way of manpower, equipment, and munitions for defeating Nazi Germany. Hansell—then a major with less than 13 years of

service time and an instructor at the Air Corps Tactical School—was, along with a small cadre of fellow planners, tasked with developing an air war plan of extraordinary scope and magnitude. At the heart of this plan was a clear recognition that the most vital foundation of a nation's war-making capacity was its industrial base. Lacking any experience at actual combat yet well-steeped in the professional content and operational concepts that had been taught at the Air Corps Tactical School during the 1930s, Hansell and his cohorts contributed materially toward building the eventual air warfare strategy that would be applied in World War II.

For his part, Kent, the second of the two lesser-known air principals explored in the book, was truly a pioneer in that his career exemplified the first use of a new dimension of airpower thought in which understanding weapons effects became just as important as the actual employment of the weapon. In many respects, the later contributions of Warden in the conventional-force arena were closely akin to those of Kent, whose principal expertise had been in the realm of nuclear weapons employment.

For both Kent and Warden, knowing the combat power of a given weapon was undeniably important, but knowing the likely effect of that weapon on an adversary's will and warfighting capacity was perhaps even more crucial, because it allowed for more confident decisions about what types of weapons and delivery systems might be most effective at a campaign level. Kent's work as both a member of and an advocate for a joint strategic planning staff for nuclear weapons employment ultimately led to the creation of the Single Integrated Operational Plan (SIOP), and it introduced the use of computer simulation models in the areas of weapons targeting and campaign planning.

Three pioneers explored in this book made their contributions in different but also important mission areas: LeMay in the creation and growth of the Strategic Air Command; Schriever in the establishment of an intercontinental ballistic missile (ICBM) force, the pursuit of Air Force space operations, and the founding of Air Force Systems Command; and Creech in the revitalization of the Tactical Air Command and the creation of the Air Force's cutting-edge conventional air-warfare capability that arose in the decade following the Vietnam War.

With the Strategic Air Command, LeMay relied heavily on his past combat experience and on his appreciation of the new demands of modern warfare brought about by the nuclear age. Schriever, after having gained combat experience in the South Pacific during World War II, joined the Army Air Forces headquarters as chief of the scientific liaison branch. From there he went on to head a special agency charged with developing an ICBM force. His expertise in the missile arena led to the eventual development of the Air Force's capabilities in space.

Creech was also a combat veteran who had career experiences in both the tactical air forces and in modern weapons development. All three airpower pioneers appreciated the need for high standards, abiding discipline, and due care of the Airmen they led. Moreover, they had the needed background and courage of their conviction to pursue key innovations in their respective mission areas.

The force that LeMay built was indispensable to the successful outcome of the Cold War, and the motto at the time of Strategic Air Command's Eighth Air Force, "Peace

through Strength," epitomized the contribution which that command's assets made to deterrence and stability in a nuclear bipolar world. And the missile and space capabilities seen to fruition by Schriever yielded an ICBM force that was crucial to the maintenance of peace and stability throughout the Cold War, as well as a national space capability that went unchallenged into the twenty-first century.

Similarly, the innovations and associated emphasis on technology advances that were the hallmarks of Creech's leadership, along with his exacting professional and personal standards of conduct and his hallmark mentoring of his senior subordinates, yielded the force that was pivotal in securing a swift and decisive victory in Operation Desert Storm against Iraq's Saddam Hussein in 1991. For all these airpower pioneers, their uncommon competency was a natural outgrowth of their professional knowledge, operational expertise, and acquired practical experience.

When considered in that context, a related leadership quality—courage—is not so much about bravery and valor as it is about having the requisite commitment to do what is both right and essential for successfully pursuing a desired outcome. In this respect, Mitchell was clearly among the most courageous of all the airpower giants discussed in Olsen's compendium. In the end, he sacrificed his career advancement as a necessary price to pay to help educate the American public and his fellow service members regarding the still-unrealized potential offered by a determined use of airpower across the entire conflict spectrum. Another pioneer who evinced a similar trait was Vandenberg, who worked quietly but effectively during the formative years of the newly independent US Air Force to demonstrate to the public, to Congress, and to the president how airpower both could and should be a key element of the nation's defense posture.

For his part, Jones was not so much an outspoken proponent of airpower as he was a leader who fully appreciated the unique capability and potential of airpower, even as he also showed due obeisance to and respect for the important roles and missions of the other uniformed services. First as Air Force chief of staff and then as chairman of the Joint Chiefs of Staff, he recognized how each of the separate services contributed to the national defense, but even more importantly, how they should best be organized and led in joint warfare. Jones was tireless in his efforts to make the needed organizational changes to render the Joint Staff more effective in providing military advice to the secretary of defense and to the president.

In contrast, Warden was something of a throwback to Mitchell. Warden found himself faced with an Air Force that had origins in the combat experience of Vietnam and the subsequent demands imposed by the Cold War throughout the 1970s and 1980s. This resulted in the guiding doctrine embraced by the Air Force's tactical air forces as a newly spawned concept called AirLand Battle. This Army-espoused doctrine portrayed airpower's primary role as the on-call support of ground-force employment in conventional warfare.

As Warden pondered this subject, he quickly came to realize that airpower instead could be the decisive force in such warfare if effectively applied. Toward that end, he developed his so-called Five Rings Model in which simultaneous air attacks against

carefully selected target sets might bring an enemy to its knees by producing systemic paralysis throughout its armed forces. At a time when most of the Air Force's senior leaders had bought into the Army's AirLand Battle doctrine, Warden's ideas were deemed radical and accordingly were either met with resistance or dismissed outright by key service leaders. But much like Mitchell, he, too, was willing to risk his future career prospects in order to be fully heard. With limited but important support from a few superiors who mattered most to him at the time, his Five Rings model was endorsed by the theater commander for the Persian Gulf region and eventually proven in combat during the First Gulf War.

After the successful outcome of that war, the Air Force moved eventually toward institutionalizing his ideas; however, Warden himself was never given his personal due. In Olsen's book, his courage and persistent contributions in the face of continued opposition from within the Air Force are documented and duly recognized. In all, the courage displayed by the 12 airpower pioneers was a major contribution to their success and to their ensuing leadership legacies.

Character, the third of the primary attributes of a successful leader, stems from a lifetime of cumulative experiences, observations, interactions with others, and the exploitation of often fleeting opportunities in pursuit of closely held beliefs and goals. All the airpower pioneers explored in this book were men of distinctive professional character. For some, happenstance opportunity played a key role in their respective legacies, including those of Arnold, McPeak, and Deptula.

Arnold did not experience combat during World War I because he had voluntarily removed himself from flying status before the war began. Prior to the war's outbreak, he had sought to return to flying status, but the Army decided his experience and knowledge of aviation would be more valuable on the Army staff, where his expertise would be used to help with the nation's nascent aircraft manufacturing industry and with issues involving industrial mobilization and logistics. As a result, during World War I, Arnold met and dealt with all the civilian aviation industrialists who two decades later would be critical to the mobilization of the American aviation industry for World War II. His happenstance opportunity came when Chief of the US Army Air Corps Major General Oscar M. Westover lost his life in an aircraft accident in 1938, as a result of which Arnold became the new chief.

After becoming chief, Arnold recognized the need for a requirements blueprint to guide the further growth of the Air Corps. He accordingly called on Hansell and others from the Air Corps Tactical School to build a war plan defining the air assets needed to defeat Nazi Germany. Arnold secured his blueprint, and Hansell went on to lead combat operations in Europe and the Pacific before being relieved by Arnold for not having achieved desired results from the B-29 force. Given his distinctive personality attributes and his previous stateside duty experience gained during World War I, Arnold proved to be just the person to lead what became the US Army Air Forces during their inception and initial growth.

In the case of McPeak, he moved back and forth between flying and staff assignments throughout the course of his career, and he eventually worked directly for two

four-stars who would play important roles in determining his future, namely, General Charles A. Gabriel, the commander of US Air Forces in Europe and later Air Force chief of staff, and Creech, the commander of Tactical Air Command. While working for Gabriel and Creech, McPeak was anything but a sycophant. On the contrary, he was regarded as an exceptional aviator and a no-nonsense leader at every level of command and staff.

In 1988, he was finally promoted to four-star rank and given command of Pacific Air Forces. Although the Air Force chief of staff position was due to change out in 1990, by that time, McPeak had already been commissioned for 33 years. In the summer of 1990 when General Michael J. Dugan was named chief of staff, it appeared as though McPeak would finish his Air Force career in Pacific Air Forces (PACAF). But after Dugan was relieved not long after by Secretary of Defense Richard B. Cheney in fall 1990, McPeak was chosen to replace him as chief of staff.

With McPeak, the key elements of leadership—professional knowledge, expertise, practical experience, motivation, personality, character, and opportunity—came together in a rare harmonic convergence. During his incumbency as chief, he made many changes in routine operating procedures, but his main contribution was a more fundamental Air Force reorganization into what he saw as a more flexible and effective structure. Along with his competence, courage, and character, he proved, after a happenstance turn of events, to be a strong and effective advocate for airpower. Furthermore, he implemented needed organizational changes in his role as chief even when faced with doubters and critics.

The last airpower pioneer considered in the book is Deptula, called a twenty-first-century reincarnation of Mitchell by the chapter's author. On one level, I would agree with that assessment, but on another, I would point out that Deptula is less flamboyant than Mitchell. In the end, he may have an even greater impact on airpower advancement than Mitchell.

I have had the opportunity to watch Deptula both throughout much of his career and into retirement. During his earlier career experiences, he flew and led in combat, commanded in both peacetime and in war, and served in key staff positions in between. As a major and a member of the secretary of the Air Force's staff group, he was the principal author of an important document titled "Global Reach, Global Power." That document offered a well-founded blueprint for what the Air Force could provide for the nation in the emerging post-Cold War era. The Air Force was the only service to produce such a document at the time, and the secretary of the Air Force used it to helpful effect in communicating with his contemporaries as well as throughout the Air Force and with Congress.

Prior to being assigned to the Secretary's staff group, Deptula had worked in another organization within the Air Staff headed by Warden. In this position, Deptula helped Warden in developing his Five Rings concept. As the first Gulf War approached, Warden was asked to brief his Five Rings strategy to the incumbent combatant commander, General Norman Schwarzkopf, at his headquarters in Tampa, Florida. Schwarzkopf liked the plan and directed Warden to proceed to the forward

theater and to brief his air component commander, Lieutenant General Charles A. Horner. Horner was a senior Air Force leader who had grown up under the influence of the AirLand Battle doctrine.

Warden took Deptula with him on his trip to brief Horner. The presentation did not go well. Horner sent Warden back to Washington but retained Deptula as a member of his battle staff. Horner already knew Deptula well from an earlier career assignment during which Deptula had impressed him while serving as his instructor pilot. Thus embedded in Horner's staff, Deptula was able to apply Warden's ideas in prioritizing and sequencing the effects-based targeting scheme that proved to be decisive in the first Gulf War.

During the later 1990s, Deptula served in both operational and staff assignments and ultimately was chosen to be the Air Force's representative on both the Commission on Roles and Missions and the Pentagon's quadrennial defense reviews. His participation in these study groups clearly identified him as the Air Force's preeminent advocate for the most effective use of airpower in modern warfare. Yet in the process, other service leaders felt distinctly threatened by Deptula's persuasiveness and success as an airpower advocate, and in a bureaucratic concession to the spirit of "jointness," he was accordingly denied a fourth star by the Air Force's senior leadership at the time.

Since his ensuing retirement from active service, Deptula has built the Mitchell Institute for Aerospace Studies into the country's most respected institution for the advocacy of air and spacepower and an organization highly regarded for its rightful key role in future conflicts. His pioneering vision for air and space operations since the end of the Cold War has truly made him an oracle for air forces around the world.

Like all the American airpower pioneers profiled in this book, Deptula's leadership emerged from a high level of professional competency developed over time, the needed courage to act when appropriate, and the character traits essential for making good on such action. In the end, that is the main lesson to be drawn from the careers of these leaders and, accordingly, the key takeaway from this book. These 12 Airmen were not just pioneers but also leaders through their thoughts, deeds, and actions. They were, moreover, people who saw things that others could not see—not just ideas for their own sake but also their practical application in the pursuit of air and spacepower. There is an old dictum that says one manages things and leads people. One of the main unifying characteristics of these airpower pioneers is that they showed an uncommon capacity to do both. **Æ**

A COMING OF AGE

William T. Eliason

Review of *Between Two Shades of Blue*
By Mark Clodfelter, Air University Press, 2022, 268 pp

Whether you are a graduate of a military academy, especially the US Air Force Academy (USAFA), or a fan of the University of North Carolina (UNC), or just someone who enjoys imagining someone else's life for a time, you will find Mark Clodfelter's freshman novel an enlightening experience. A history and strategy professor and retired Air Force officer with top-tier Air Force history and Joint professional military education credentials, Clodfelter has taken aim at capturing a very specific period of time in the late 1970s at both institutions and hit the mark in a most engaging, entertaining, and true-to-life way. *Between Two Shades of Blue* is a most impressive novel and an especially adventurous effort for both author and publisher, Air University Press, which is not noted for publishing fiction. Here I believe they have teamed up to outstanding effect.

I likely first met Clodfelter at the Air Force Academy sometime in his senior year. At that time, he was a part of an all-male upper class of cadets, and I was a doolie (Academy slang for freshman cadets). I say likely as I don't remember him from that period, but we were both there, and his writing in this book captures that time so well. My class, USAFA 1980, was working through the double challenge of being the first class with women included and the constant pressure of any military academy's first year. Without the privileges I had in high school and not particularly a fan of college basketball at the time, I approached Mark's novel with my personal perceptions of that time and place, which I thought must have been far different from his. While the angle was different, the scene he depicts is spot on. The arrival of women to the military academies was not without controversy both inside and outside the military. The very public opinions in our nation at the time of our Bicentennial that favored excluding

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women from combat and by extension the service academies had not been silenced by executive and congressional actions in those pre-social media days.

The class of 1980 collectively bore the brunt of the upper-class training and the constantly changing organization of the way women were to be housed. Initially, women were segregated in an isolated section of one of the dormitories and trained by Air Training Officers who were junior female officers, while their male classmates were trained by the cadets. An active effort to turn the men of my class against the women was alive and only partially suppressed through the course of that year. The effects would linger for years and, for some, would manifest into what we today recognize as PTSD. But not every member of these four classes was against the admission of women. Eventually the military itself would slowly adapt to accept the value of anyone who had the capability and persistence to perform the mission, even in combat. But that year, from the summer of 1976 to June Week of 1977, was unlike any other before or since at our military academies.

As a fictional member of the class of 1977, Cadet Paul Glattan, Clodfelter's protagonist, worked his way through four years of strict military life in the immediate post--combat-in-Vietnam period, a time when it was not uncommon for cadets visiting off--campus in uniform to be treated unkindly by passing motorists. Only senior cadets had their own cars, and freshmen had to wear uniforms while on a pass to visit Colorado Springs. Life on campus for cadets was not much easier for all the reasons one can expect at a service academy. Glattan hails from North Carolina and has a passion for Tarheel basketball and all things military history. His basic training experience is as harsh as any I remember and in fact more so as he becomes hospitalized due to injuries that went untreated. His near-death experience is due in part to upperclassmen enforcing the "tough it out" Spartan ethic of these environments—some would say all the more so because of the youthful cadets enforcing the standards of behavior. Glatten works through the "fourth class system," leveraging his significant knowledge of aviation greats and his passion for classical music—which he experiences in the cadet library, one of the two sanctuaries for doolies on campus, the other being the Chapel. It is important to note that Clodfelter himself was a history major at USAFA and to this day has an unbridled passion for UNC sports.

The progress of the story includes a number of very real experiences with love and loss in Glattan's life that will be familiar to both military academy graduates and civilians alike, but each is heightened by the constant requirement to return to the confines of the campus at the foot of the Front Range of the Rockies. Glattan wonders if his personality has been altered by his military experience as his relationships with young women he meets are at times less than successful due to his cold attitude. Many a cadet has loved and lost due to that life, sometimes just from the sight of a skinhead version of that high school Big Man on Campus returning home on Thanksgiving leave that doolie year. Sometimes the uniform isn't enough, especially in the late 1970s lingering antimilitary period, a time far removed from today's "Thank you for your service" responses to learning about one's time in the military.

An even darker subplot appears and involves Glattan's history professor, a passed over US Air Force lieutenant colonel who, as an intelligence officer, was exposed to Agent Orange in Vietnam. Lieutenant Colonel Chadwick is a man whom the cadet greatly admires; moreover, Glattan has fallen in love with his daughter. How Chadwick deals with his worsening health and performance of his duties as one of the toughest instructors at the Academy—wielding a green-inked pen vice a red one on cadet papers in order to prevent any psychological trauma—is central to a good portion of the book.

Clodfelter skillfully uses his history chops and highly developed storytelling abilities to bring the reader into the very real and often raw day-to-day experience of a young man navigating this highly stressed life. His treatment of Glattan and his engineering roommate is particularly on target and no doubt timeless for anyone who lived in a dorm for their entire college experience as military academy students do. Using language as cadets would and scenes dealing with issues that continue to plague military life today, such as suicide, caused the publisher to place a disclaimer in the front matter as a warning to the reader.

What really helps the reader keep from being overwhelmed by this difficult coming-of-age story is the other "shade of blue" that the North Carolina subplot offers. Glattan gets the opportunity of a lifetime when he is able to return to his hometown there during his senior year spring break. He visits with friends and family—both have their own colorful parts to play in the cadet's backstory—and lucks into being on the UNC campus as the Tarheels are playing in the NCAA tournament, which has today become March Madness.

According to the supporting quotes on the back cover and my Google research of the game that year between UNC and the University of Nevada, Las Vegas, the author successfully recreates that game, the experience on the UNC campus in celebration, and probably the most exciting day of Glattan's life up to that point. We all should have been so fortunate at that age. But he eventually has to return to the difficult trials of the final weeks of his cadet life leading to graduation. Readers will find this part of the novel especially page-turning, as Clodfelter turns up the drama all around this well-described and interlocked cast of characters, one that includes the Academy itself, as it is ever present in each cadet's mind while there and long afterwards.

Life is said to be made of circles where we are often caused to confront our past. History may not repeat, but I agree that it rhymes. It does so because of the things we experience with others, both friends and family as well as all the other characters who appear in our stories. Lieutenant Colonel Clodfelter capped his two careers, military and civilian, teaching first at the School of Advanced Air and Space Studies at Maxwell Air Force Base, where I was one of his students, and later at the National War College on the campus of the National Defense University (NDU), where we served together and have since collaborated in publishing some of his finest works. Students of the Vietnam War and leadership in combat should read his work, including *The Limits of Airpower,* and his more recent NDU Press monographs on the Lavelle Affair and how B-52 crews adapted to the losses of Operations Linebacker I and II. But *Between Two*

Shades of Blue is a remarkable first work of fiction, and Air University Press is to be applauded for taking the risk of publishing it. Maybe another similar work will come my way.

Mark Clodfelter has provided as close a brush with the life of a young man of those times of change in the late 1970s at our military academies as one who experienced it can do. Trying to display the trials and complications of different worlds such as the Air Force Academy and the University of North Carolina does, in fact, offer a glimpse into two very different shades of blue. Each has its value in understanding where military academy graduates come from and what they are changed into in order to serve the nation. Some parts of us are lost to youth, but as this book wonderfully portrays, the best of our character rises from within each of us and, if we seek it, places us on the road to success in life. ***Æ***

DIGITAL BLOCKADE OR CORPORATE BOYCOTT?

A NEW TACTIC OF WAR

Alison Lawlor Russell

The Ukraine-Russia war is both an information war and a conventional military war. The effects of the bombs, tanks, and missiles are brutal and undeniable as are the effects of competing social media and digital public relations campaigns. Existing literature on blockades in the cyber domain is closely tied to the empirical evidence of a few cases. The events in Ukraine provide additional evidence and improve the understanding of blockade operations in cyberspace, corporate boycotts, and what could be termed digital exclusion zones.

When Russia invaded Ukraine on February 24, 2022, Ukraine's Vice Prime Minister and Minister of Digital Transformation Mykhailo Fedorov launched a technology campaign against Russia. Before the war, he led an effort to digitize Ukrainian social services. Fedorov, a former technology entrepreneur and campaign director for digital outreach for candidate Volodymyr Zelenskyy, implemented this multipronged effort to protect and defend Ukraine and retaliate against Russia in cyberspace. Using Twitter and other social media, Federov urged multinational technology companies (MNCs) such as Apple, Google, Netflix, Intel, PayPal, and others to cease conducting business in Russia, aiming to sever it from the world economy and the global internet.

Fedorov helped organize a team of volunteer hackers to create chaos on Russian websites and online services and then built an "IT Army" to neutralize and counterpunch Russian cyberattacks on Ukraine. His office also created a cryptocurrency fund to raise money for the Ukrainian military. For these efforts, Fedorov was credited with creating a new playbook for technology in war, particularly in a war against a formidable aggressor.[1]

The Ukraine-Russia war is both an information and conventional military war. The effects of the bombs, tanks, and missiles are brutal and undeniable. But the social media campaigns and digital public relations campaigns have kept the conflict at the center of the world's focus, sharing images and videos of what is happening on the

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1. Adam Satariano, "Shaming Apple and Texting Musk, a Ukraine Minister Uses Novel War Tactics," *New York Times*, March 12, 2022, https://www.nytimes.com/.

ground, and mobilizing public support for Ukraine and against Russia.[2] Ukraine cannot win the conventional military war without international public support, including political, economic, and military aid. Similarly, it is unlikely to be victorious without a savvy information campaign designed to keep the world's focus on Russia's aggression and Ukraine's suffering and heroism. In galvanizing the world community, the campaigns have portrayed Russia's aggression as an attack on the international system, not just the territorial sovereignty of Ukraine.

Fedorov has created a digital blockade to make life so inconvenient for Russian citizens that they will not support the war.[3] But what does a digital blockade mean? Are the actions of the technology companies involved significant, and if so, why? How can this be understood in the context of cybersecurity theory? Misnaming or conflating actions with something they are not may lead to a lack of clarity about a problem, inadequate resources, and an inappropriate response. The existing literature on blockades in the cyber domain is closely tied to the empirical evidence of a few cases. The events in Ukraine provide additional supporting evidence; examining these events may improve the understanding of blockade operations in cyberspace.

Multinational technology corporations are engaging in a novel way in international conflict by leveraging their influence over society and government. This phenomenon needs to be analyzed for its similarities to other actions such as blockades, and its implications must be considered more broadly for the role of MNCs in international conflict. This article will analyze events in Ukraine's digital blockade to update and refine the digital blockade theory, making it more applicable and relevant to innovations in international relations. This analysis will also help clarify the digital events related to Ukraine. If these events do not meet the criteria of a blockade, a more accurate term should be used to describe them and explore their implications.

Background

Russia's cyberattacks on Ukraine started on January 14, 2022, with the first attacks affecting about 70 Ukrainian government websites. Many sites were defaced and included the message to Ukrainian citizens to "be afraid and expect the worst."[4] While the websites were restored within a few hours, the attack hinted at what would come. About a month later, another cyberattack targeted Ukraine's defense ministry and two state-owned banks, Privatbank and Oschadbank. This distributed denial-of-service attack lasted less than 24 hours but impacted service during that time.[5] These attacks proved to be the prelude to Russia's military invasion of Ukraine.

2. Satariano, "Shaming Apple."

3. Satariano, "Shaming Apple."

4. "Ukraine Cyber-Attack: Russia to Blame for Hack, Says Kyiv," BBC News, January 14, 2022, https://www.bbc.com/.

5. "Ukraine Banking and Defense Platforms Knocked Out amid Heightened Tensions with Russia," Netblocks, February 15, 2022, https://netblocks.org/; and The Cube, "Ukraine's Defence Ministry and Two Banks Targeted in Cyberattack," Euronews, February 16, 2022, https://www.euronews.com/.

On February 24, 2022, Russian forces invaded Ukraine. Two days after the war began, Fedorov asked Meta to ban access to Facebook and Instagram in Russia. Meta declined, citing the need for protestors to use the site to organize against the war and provide independent information, but it did agree to label and fact-check posts by Russian-controlled state media. Fedorov also asked YouTube to block Russian propaganda media, and YouTube responded by blocking more than 900 Russian channels and taking down more than 70,000 videos for violating its content guidelines, such as referring to the invasion as a "liberating mission."[6] Federov continued asking technology companies to withdraw from Russia to create a "digital blockade."[7] As of early April 2022, more than 600 companies had withdrawn their services from Russia.[8]

While foreign technology companies were withdrawing services to Russia, the Russian government was blocking access to those sites. Meta restricted access within the European Union to state-controlled media outlets Russia Today and Sputnik and labeled postings from the Kremlin or other official government outlets. In retaliation, Russia banned Facebook and Instagram from the country.[9]

The Russian government also blocked independent media outlets in Russia—such as Echo of Moscow, an influential radio station; Dozhd; TV Rain, Russia's only independent television station; and Meduza, an English- and Russian-language news website—because of their war reporting. The government also blocked foreign sites such as the BBC Russian Service and other international Russian-language programs because of their coverage of the war in Ukraine. These restrictions caused the loss of independent programming for millions of people inside and outside Russia.[10]

The United States began imposing sanctions on Russia on February 22, 2022.[11] Within six months, more than 1,000 companies had voluntarily curtailed operations in Russia beyond the minimum legal requirements of international sanctions. Some companies continue to operate in Russia undeterred, but an unprecedented number of companies chose to leave or suspend operations when they were not compelled to by law.[12] These firms collectively represent about 40 percent of Russia's gross domestic

6. Laurens Cerulus, "Ukraine's Digital Minister Pleads with Big Tech to Pressure Moscow," *Politico*, February 26, 2022, https://www.politico.eu/article/; and Dan Milmo, "YouTube Removes More Than 9,000 Channels Relating to Ukraine War," *Guardian*, May 22, 2022, https://www.theguardian.com/.

7. Satariano, "Shaming Apple."

8. Jeffery Sonnenfeld et al., "Over 1,000 Companies Have Curtailed Operations in Russia—But Some Remain," Chief Executive Leadership Institute, Yale School of Management, updated February 5, 2023, https://som.yale.edu/.

9. Ryan Mac, Mike Isaac, and Sheera Frenkel, "How War in Ukraine Roiled Facebook and Instagram," *New York Times*, March 31, 2022, https://www.nytimes.com/.

10. "Russia: With Tech Firms Pulling Out, Internet Spiraling into Isolation," Human Rights Watch (website), March 14, 2022, https://www.hrw.org/; and "BBC, CNN, and Other Global News Outlets Suspend Reporting in Russia," *Guardian*, March 4, 2022, https://www.theguardian.com/.

11. "Sanctions Framework," Russia-Country Commercial Guide, International Trade Administration, US Department of Commerce (website), updated July 21, 2022, https://www.trade.gov/.

12. Sonnenfeld et al., "Over 1,000 Companies."

product.[13] The list of technology companies that have now withdrawn from Russia include major corporations such as Qualcomm, Intel, Sony, Google, IBM, Microsoft, Cisco, PayPal, Apple, Meta, Oracle, Twitter, TikTok, and SnapChat.[14]

Four days after the Russian assault on Ukraine began, the Ukrainian government asked the Internet Corporation for Assigned Names and Numbers (ICANN) to cut Russia off from the global internet. Specifically, it asked for the country code .ru and its Cyrillic equivalents to be revoked. The corporation rejected the request as "neither technically feasible nor within its mission."[15] Gören Marby, ICANN chief executive officer, went on to explain, "ICANN has been built to ensure that the Internet works, not for its coordination role to be used to stop it from working."[16]

Ukraine has also advocated for Russia's removal from the International Telecommunication Union (ITU). Ukraine views Russian access to the ITU as "an international security priority."[17] The Ukrainian government has called for cutting off Russia's access to any hardware or software that could allow Russia to upload and disseminate malware and viruses. Ukraine lobbied the United States and other allies to include telecommunications products such as software and microelectronics in sanctions so that Russian systems could not be updated or repaired during the conflict.[18]

Russia's removal from the International Telecommunication Union would send a clear message and cut off Russia's access to technical information and innovation. The ITU's international standardization process encourages innovation in both large and small businesses, market leaders, and followers. To participate in the standardization

13. Jeffrey Sonnenfeld and Steven Tian, "Zelensky Unplugged: Ukraine's President Gives American CEOs Advice and Sobering Warnings about 'Our Common War,' " *Fortune*, June 14, 2022, https://fortune.com/.

14. Natalie Huet and Pascale Davies, "Which Tech Companies Are Cutting Ties with Russia over Its War in Ukraine?," Euronews, March 17, 2022, https://www.euronews.com/.

15. Brian Fung, "Ukraine's Request to Cut Off Russia from the Global Internet Has Been Rejected," CNN, March 3, 2022, https://www.cnn.com/.

16. Fung, "Ukraine's Request."

17. Kenneth R. Rosen, "The Man at the Center of the New Cyber World War," *Politico*, July 14, 2022, https://www.politico.com/.

18. Raphael Satter, "Ukraine Lobbies US Officials for Bans on Russia Software, Aviation-Diplomat," Reuters, February 24, 2022, https://www.reuters.com/; Bureau of Industry and Security (BIS) Office of Congressional and Public Affairs, "Six Months into Russian Invasion, Commerce Actions Making a Difference in Support of Ukrainian People," press release, US Department of Commerce BIS (website), August 25, 2022, https://www.bis.doc.gov/; and Iryna Bogdanova, "The Role of Technology Sanctions in Crippling Russia's War Machine," International Institute for Sustainable Development (website), September 26, 2022, https://www.iisd.org/.

process, members must have the technical expertise to know how things are made or done, and it is an opportunity for businesses and subject matter experts to learn from each other and potentially shape new standards in their favor.[19]

Ukraine seeks to restrict Russian access to software that will be installed on servers as a way of restricting its access to those services globally. The innovation sharing and research that come with membership and attendance at conferences are valuable and sometimes critical to maintaining technical standards and compliance; if Russia were removed from the ITU, it would lose access to this information. Without modern information technology developments, Russia could not install its software on modern hardware. It is a slow process, but Ukraine wants Russia to stagnate technically while Ukraine continues to advance.[20]

Theoretical Foundations for Digital Blockades

Blockades have a specific definition in international law, and Federov has called the actions of technology companies regarding Russia a "digital blockade." But is it a blockade, and if not, what is it? International law roots its understanding of blockades in naval operations. Naval blockades are the offensive regulation of trade during wartime. Their purpose is "to isolate the enemy in such a fashion as to destroy its import and export trade."[21]

Blockades can also occur on land, in air, in cyberspace, and possibly in space. A cyberspace blockade is defined as "an attack on cyber infrastructure or systems that prevents a state from accessing cyberspace, thus preventing the transmission (ingress and egress) of data beyond a geographical boundary."[22] As coercive operations of war, blockades are designed to achieve military advantages and diplomatic advantages. Diplomatic advantages include creating financial constraints, isolating the adversary politically, rendering society uncomfortable and inconvenienced in order to influence policy, or demonstrating relative power and capabilities to influence negotiations.

Blockades in cyberspace share a critical feature with actions that are recognized as blockades in other domains, namely, preventing the ingress and egress of normal traffic—ships, aircraft, land vehicles, or data packets—in that domain beyond a specific geographic area. The actors involved are usually but not exclusively states. Blockades require certain technological capabilities, knowledge of the domain, and knowledge of the opponent's vulnerabilities and capabilities.

Furthermore, blockades almost always occur during war or extant conflict. In blockade operations, neutral parties should not be targeted and have rights that

19. Johan Bjerkem and Malcolm Harbour, "Europe as a Global Standard-Setter: The Strategic Importance of European Standardisation," discussion paper, Europe's Political Economy Program (Brussels: European Policy Centre, October 15, 2020), 6-7, https://www.epc.eu/.

20. Rosen, "Man at the Center."

21. Maurice Parmelee, *Blockade and Sea Power: The Blockade, 1914–1919, and Its Significance for a World State* (New York: Thomas Y. Crowell Company, 1924), 7.

22. Alison Russell, *Cyber Blockades* (Washington, DC: Georgetown University Press, 2014), 5.

should be protected, although unintended consequences can occur.[23] Naval blockades, aerial blockades, and land blockades are all considered acts of war according to international law. Moreover, there is support in the international community to consider blockades in cyberspace acts of war as well.[24]

International law maintains an important distinction between blockades and exclusion zones, which is relevant for the digital blockade campaign against Russia. Blockades prevent data from traversing a boundary, whereas exclusion zones focus on the activities that take place within a specific geographic area. Exclusion zones, or areas of denial, are areas in which a state that is actively engaged in war, also known as a belligerent, possesses "the ability to degrade, deny, or destroy the adversary's freedom of action within the contested area."[25]

Blockades deny access to an area while exclusion zones deny operations within that area. They are often used in tandem as they can be mutually reinforcing and effective at achieving the goal, which is dominance of the domain, but they are separate operations. Thus, an aerial blockade prevents aircraft from crossing a border, while an aerial exclusion zone—a no-fly zone—prevents the movement of aircraft within that border. If Ukraine could block aircraft from leaving Russia, it would not need a no-fly zone over Ukraine. Despite the technical and legal distinction between these two concepts, scholars, practitioners, and policymakers alike frequently use them interchangeably. For a time, the US military itself combined these two concepts into the term "anti-access/area-denial" or "A2/AD" operations.

A cyber (or digital) exclusion zone could also be implemented. Prior work has examined how a cyber exclusion zone could be conducted at the physical (e.g., hardware) layer or the logic (e.g., networks) layer of cyberspace (fig. 1). The choice of cyber instead of digital is deliberate in this instance. Cyberspace encompasses satellites and other technology that is broader than the internet. Digital typically refers to internet-based activities and therefore may not be broad enough to encompass the full spectrum of cyber capabilities. Earlier scholarship details how submarine and terrestrial cables, satellites, and the electromagnetic spectrum could all be leveraged to create either a blockade or an exclusion zone at the physical layer. At the logic layer, root servers, border gateway controls, and internet service providers could be manipulated to deny service or access to a region.[26]

These types of exclusion zones, imposed at the physical or logic layer, could prevent someone inside the region from conducting activities in cyberspace, either digitally online or via satellites. The exclusion zones at the physical or logic layers could be created through digital attacks, such as blunt distributed denial-of-service attacks, more

23. Russell, *Cyber Blockades*, 63.

24. Michael N. Schmitt, ed., *The Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations*, 2nd ed. (Cambridge: Cambridge University Press, 2017), 195–98.

25. Alison Russell, *Strategic A2/AD in Cyberspace* (Cambridge: Cambridge University Press, 2017), 3.

26. Russell, *Strategic A2/AD*, 26–52.

sophisticated command-and-control attacks, or in extreme cases, through the physical manipulation or destruction of the necessary hardware.

Depending on the way an exclusion zone is implemented, it may or may not be easy to cease or reverse the operation, and it may have significant effects on the post-conflict environment. If physical infrastructure is destroyed, economic, political, and social recovery takes time, whereas these activities might resume immediately following the conclusion of a targeted offensive cyber operation.

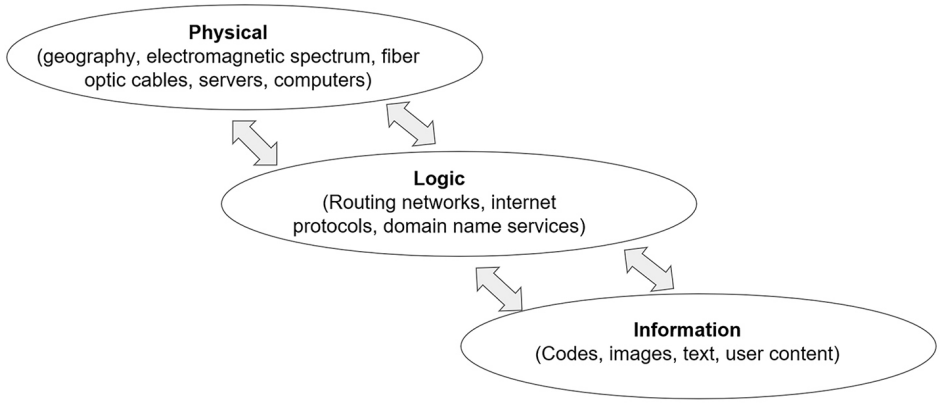

Figure 1. Layers of cyberspace

The extant literature on digital or cyber blockades does not address blockades or exclusion zones that take place at the information layer of cyberspace (fig. 1). The majority of internet users are only vaguely aware of the physical or logic layers of cyberspace. For most users, the information layer of the internet is what they see on their screens: applications and websites that help them interface with emails, texts, photos, navigational systems, social media, banks, government services, and many other facets of modern life. [27] Cyberattacks at this level can range from unsophisticated and minor defacement attacks to sophisticated and potentially extremely damaging network intrusions. They can be very difficult to deter and prevent, and they can be conducted by a wide range of actors, from lone individuals to large government entities.

This gap in the literature addressing the information layer may be a result of the few cases of cyber blockades that have occurred thus far. Cases of blockades in cyberspace are limited to Estonia in 2007 and Georgia in 2008. But the events in Ukraine in 2022 appear to present an additional case that may provide further insights into the concept of digital and cyber blockades. Specifically, the Ukraine case offers two avenues of inquiry and examination. First, it suggests blockade-like operations can occur at the information level, which has not yet been systematically examined. Second,

27. Nazli Choucri and David D. Clark, "Integrating Cyberspace and International Relations: The Co-Evolution Dilemma" (Explorations in Cyber International Relations Working Paper 2012–3, Massachusetts Institute of Technology Political Science Department, Boston, MA, 2012), https://hdl.handle.net/.

it suggests the level of analysis must go beyond state actors and state-sponsored actors to include the role of multinational corporations.

Digital Blockade of Russia

In the so-called digital blockade of Russia, the Ukraine government called on global technology companies to sever ties and services to Russia. Clearly, as private companies, corporations can choose where they do business notwithstanding government embargoes or other legal restrictions. At Ukraine's request, some multinational corporations reduced or suspended their business operations in Russia. The request and subsequent responses were conducted in the context of an armed conflict in which Russia violated international law and invaded Ukraine. Ukraine and Russia are the sole belligerents, but the technology companies called upon to boycott Russia are in other countries, many of which have provided political, economic, and military support for Ukraine.

Blockades in different domains are historically defined by certain common elements that provide the legal basis for recognizing a blockade.[28] Under the first criterion, a defining action must occur: blockades involve preventing all vessels and traffic—enemy and neutral—from entering specified ports or areas that are controlled by the enemy belligerent state.[29] The actions taken against Russia by multinational technology companies prevent the entry or exit of data. But although they cease the flow of their data and services, they do not prevent anyone else from transmitting data. If the Internet Corporation for Assigned Names and Numbers had cut off access for all domains that ended in .ru, it would have forcibly prevented access to any actor; however, it has not done so. Accordingly, the first criterion is not met.

The second criterion concerns the actors involved. According to international law, belligerent states, specifically armed forces, participate in blockades.[30] Because a blockade is an act of war under international law, only states can conduct one.[31] In a few cases, actors that are not or were not internationally recognized states have been parties to blockades, but these instances have been rare and have usually involved self-governing territories that wished to be recognized internationally as states, such as contemporary Palestine and the nineteenth-century Confederate States of America. The *Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations* clarifies that "non-state actors are not entitled to establish a naval, aerial, or, a fortiori, cyber blockade."[32] Because multinational corporations are the ones attempting to conduct the blockade action in this case, this criterion is not met.

28. Schmitt, *Tallinn Manual*, 196; and Russell, *Cyber Blockades*, 62–64.
29. Schmitt, 195; and Russell.
30. Schmitt, 196; and Russell.
31. Schmitt, 198; and Russell.
32. Schmitt.

The third criterion is the capability to enforce an effective blockade. Blockades must be enforceable and reasonably effective in their domain.[33] In the case of the actions against Russia, the actions were not designed to prevent the flow of all or even a majority of data. Consequently, these actions have not been effective as blockades, and thus, this criterion is not met.

The fourth criterion is the presence of conflict. As an interaction between belligerents often involves armed forces, the presence of conflict or a declaration of war usually either precedes or immediately follows a blockade. International law also specifies that the blockades must be declared, which is almost the same as declaring war, since blockades are acts of war.[34] Armed conflict exists at the level of interstate war between Russia and Ukraine, and it was this war that led to the actions against Russia, so this criterion is met.

In the fifth and final criterion, the blockade must be impartial and respect the rights of neutral parties—states.[35] In this case, the rights of neutral states were not violated because data from neutral states were not blocked. Also, the technology companies acted as private companies and not on behalf of their home countries, and they did not provide direct material support to either belligerent. Their actions may have aided Ukraine, but they did not violate the neutrality of their home countries or other states. This criterion is therefore met.

Under this analysis, the digital blockade of Russia does not satisfy the criteria for a blockade under international law because it does not forcibly prevent the ingress and egress of traffic, it is not conducted by belligerents, and it is not effective and enforceable. As such, the actions against Russia are a different type of action and cannot be sufficiently addressed by adjusting the definition or theories of blockades. Furthermore, the actions against Russia represent a difference in kind, not degree. Still, if it is not a blockade, what should it be called? The terminology should address what the actions accomplish and the implications for the international system.

Corporate Boycotts

One possibility is to identify the actions undertaken by multinational technology corporations as a corporate boycott. Boycotts are usually led by consumers who refuse to conduct business with an individual, group, or company to protest the target's behavior, inflict economic losses, indicate moral outrage, and/or induce the target to change its behavior. Boycotts can also be led by companies that refuse to do dealings with customers, such as governments or countries, for the same reasons and goals. Technology companies are particularly well-suited to conduct boycotts because they can reach a large audience, and their products tend to be well integrated into the social, political, and economic lives of the consumers.

33. Schmitt, 196; and Russell.
34. Schmitt; and Russell.
35. Schmitt; and Russell.

The collective activities undertaken by multinational corporations against Russia at the request of the Ukraine government represent a corporate boycott, defined here as a situation where corporations refuse to conduct business operations in a country in response to that country's policies or actions. In this case, corporations are refusing to conduct business in Russia because of the Russia's invasion of Ukraine.

This is a new phenomenon, and the terminology is not settled. Some scholars refer to it as a "business retreat" or a "business withdrawal," but due to the large scale and political motivation of the actions, this article favors corporate boycott as the best term to describe the phenomenon.[36] This corporate boycott complements national boycotts and sanctions and terminates the sale of their goods or services in Russia. It is voluntary for companies to participate in the boycott, and the boycott is widespread, with many industries and hundreds of companies participating.

Still, some companies have chosen to remain on the sidelines for specific reasons. For example, Cloudflare continues to operate in Russia because, according to Chief Executive Officer Matthew Prince, shutting down in Russia would have adverse effects on society, particularly dissidents, and ultimately be beneficial to the Russian government.[37] Other companies argue boycotts create an opportunity for the Russian government to exert more control over Russian people, which is counterproductive, or that boycotts are ineffectual because they will economically hurt only innocent people instead of the government or military.[38]

A corporate boycott on the scale of the one in Russia and under these circumstances is a rare and perhaps unprecedented event. In the 1980s, government boycotts, corporate boycotts, and divestment campaigns were waged against South Africa in protest of apartheid. But there has not been an event like the Russian invasion of Ukraine in recent decades, nor has there been a corresponding corporate boycott. Additionally, boycotts decades ago predated the information and communications technology systems that underpin contemporary financial, business, social, government, and military functions. Therefore, this boycott is the first of its kind—a voluntary corporate boycott of digital services directed against a strong country in retaliation for its aggression and violation of international law.

The corporate boycott is designed to draw attention to Russian government aggression, satisfy the moral outrage of global consumers and stakeholders, and impose costs on the lives of the Russian people so they pressure their government to change its policy. It is not a short-term solution but a long-term pressure campaign. Akin to norm development, the corporate boycott seeks to counter Russian President Vladi-

36. Sonnenfeld et al., "1,000 Companies"; and Jeffrey Sonnenfeld et al., "Business Retreats and Sanctions Are Crippling the Russian Economy," Social Science Research Network (SSRN), July 19, 2022, http://dx.doi.org/.

37. Aimee Chanthadavong, "Cloudflare and Akamai Refuse to Pull Services out of Russia," ZDNet, March 8, 2022, https://www.zdnet.com/.

38. William MacAskill, "Does Divestment Work?," *New Yorker*, October 20, 2015, https://www.newyorker.com/.

mir Putin's propaganda and increase pressure to return to the post-1945 international rules of nonaggression.

Importantly, the war in Ukraine is being interpreted as more than simply a war between countries. Nations and international organizations are perceiving it as Russia's challenge to the international system.[39] The international system includes multinational corporations that operate within the current system, following its laws and norms. Thus, while not belligerents and not parties to the conflict, MNCs can impose costs—sanctions—on countries that threaten international law and global stability. This appears to be what these businesses are attempting to do with this corporate boycott.

Ultimately, this boycott is a new phenomenon in the panoply of international relations: MNCs, acting en masse and independent of state or government instruction, can deny access to information, goods, and finances for an entire country without endangering the neutrality of their home country.

This research, then, raises new questions about the role of multinational corporations in war. Large corporations, particularly technology companies, are integral to the global economy, the domestic function of states, and the ability of military forces to operate effectively. The role of MNCs matters because those companies may seek protection from the government from hackers or belligerent states, and they may need to respond if they are targeted by adversaries in retaliation for their corporate actions. Lastly, attacks on major actors in the international cyberspace ecosystem, such as technology companies, may require a coordinated, comprehensive response that involves multiple corporations as well as the government.[40]

Implications of Corporate Boycotts for Conflict

Blockades in cyberspace have previously been conducted at the logic layer because it is easier for state actors to control access to information at that level, which is upstream from the information layer (fig 1).[41] The logic layer tells computers which routes to follow to create a pathway for a request for information to be fulfilled. The information layer is downstream in that it relies on the physical and logic layers to provide the structure for sharing information in cyberspace. The information layer is much more diffuse and disparate, and is the focus of defacement, phishing, or ransomware campaigns. If a state wanted to conduct a blockade in cyberspace, the infor-

39. Robert Pszczel, "The Consequences of Russia's Invasion of Ukraine for International Security—NATO and Beyond," *NATO Review*, July 7, 2022, https://www.nato.int/; Stefan Meister, "A Paradigm Shift: EU-Russia Relations after the War in Ukraine," Europe's East Project, Carnegie Europe (website), November 29, 2022, https://carnegieeurope.eu/; UN General Assembly Resolution, Aggression against Ukraine, A/ES-11/L.1 (March 1, 2022), https://www.documentcloud.org/; and Lise Morjé Howard, "A Look at the Laws of War — and How Russia Is Violating Them," Analysis and Commentary, United States Institute of Peace (website), September 29, 2022, https://www.usip.org/.

40. Brad Smith, "Foreword," in *Defending Ukraine: Early Lessons from the Cyber War*, Microsoft, June 22, 2022, 1–4, https://blogs.microsoft.com/.

41. Russell, *Cyber Blockades*, 69–127.

mation layer presents challenges because the outlets are so numerous that it would be resource-intensive to deny access to information as it is provided.[42] As a result, a true blockade in cyberspace led by one state against another state is unlikely to occur at the information level.

A corporate boycott in the technology sector is another way to achieve effects similar to a cyber blockade but at the information layer and without state involvement. Corporate boycotts, when conducted en masse against a country, can deny the country access to information and services in cyberspace. As a corporate boycott, the action is the result of the decision of private companies, and it cannot constitute an act of war. Yet it achieves the result of disrupting and perhaps even preventing access to information and services in cyberspace. Multinational corporations have the freedom to decide where to conduct business, and they are free to sever or downgrade business relationships for any reason, including profits, stability, or politics.

Private companies acting together can create what is effectively a digital exclusion zone. Unlike other types of digital exclusion zones such as domestic censorship or internet "kill switches" that are frequently discussed in connection with authoritarian regimes, providers of content and services can create digital exclusion zones by refusing to provide services to a country. Usually, technology companies seek to expand their services and market reach; it is notable, therefore, that in the case of Russia, dozens of MNCs have chosen to reduce their services and market reach because of a conflict to which they are not directly parties.

According to international law, only states can be considered belligerents in warfare. Thus, by definition, MNCs cannot impose a blockade. Moreover, while MNCs engaging in a type of digital exclusion zone may have the ability to unilaterally cut off the flow of data or digital services that impact the political, financial, and social life of a country's population, for the reasons stated previously, this does not constitute a blockade. If a state ordered companies to undertake these actions, and the state were belligerent to the conflict, the result may constitute a blockade.

Yet, while multinational corporations cannot impose a blockade, they can withhold action through a boycott. If an MNC holds a monopoly position in a vital sector, a boycott might result in a strangulation. A strangulation is the extreme edge of the same discomfort-to-force-policy-change that is the purpose of boycotting. The extreme edge may be unlikely, but it is based on the same principles. Moreover, in the case of Ukraine, Russia is the clear aggressor in the war. Yet it may not always be obvious who the aggressor is, and the ability of an MNC to potentially conduct strangulation of a country without the involvement or support of a state is new and has further implications of its own.

A corporate boycott, digital or otherwise, represents innovative statecraft that involves different actors—MNCs—than blockades to help states achieve their goals. The resulting economic pressure occurs below the threshold of warfare in the gray zone but can have important consequences for the outcome of a conflict. The actions do not nec-

42. Russell, *Strategic A2/AD*, 40–52.

essarily broaden a conflict but instead tap into sympathy and moral support that allow noncombatants to help support combatants in meaningful ways. This is a nonviolent way for nonstate actors who are members of the international community to apply pressure to a state that has blatantly violated international norms and created instability. In this way, MNCs are supporting an international system that benefits them.

Conclusion

The concept of a digital blockade raises interesting questions about the conflict in Ukraine, what this so-called blockade accomplishes, and the implications for the international system. But the actions by MNCs in Russia do not satisfy the criteria for a blockade under international law. The (mis)labeling of the MNCs' actions as such reveals the shortcomings of current terminology; much of the language of war in international law—blockades, zones, sanctions, and quarantines—concerns actions all rendered by states against states. Commercial entities have not taken actions such as these independently in modern history until now, and the terminology has not evolved to explain and define these actions.

The MNCs' actions against Russia examined in this article are more appropriately called a digital corporate boycott instead of a digital blockade. This type of action, undertaken below the threshold of armed conflict, allows powerful actors not beholden to states to act independently in an active conflict to try to influence the outcome. The idea of corporations supporting one side in a conflict is not new, but the scale of the MNCs' actions—the size of the corporations and their potential to impact the countries—is unlike anything the world has seen in modern history. The East India Companies or privateering companies would be the closest historical examples, but they differed in important ways, such as having the letters of marque or explicit approvals to conduct business on behalf of the state, including signing treaties.

Ukraine's Ministry of Technology is engaging in innovative statecraft by involving MNCs and the international community more broadly to punish Russia for its invasion. This digital corporate boycott could be very effective at making life uncomfortable for people in Russia, but it relies on the continued voluntary cooperation and action of technology companies. Because the corporate boycott targets information and society, not critical infrastructure or government operations, its specific effects will likely be difficult to pinpoint. Similar to economic sanctions, a digital boycott is not designed to apply significant pressure in the short term. Instead, its effects will manifest over a longer period of time.

More research is needed to understand the motivations and incentives for multinational corporations to become involved in geopolitical conflicts such as Russia's war in Ukraine, particularly when doing so seems to be contrary to typical market-driven behavior. The technology companies did not decide to reduce or eliminate services to Russia because they were forced into it or were provided with clear financial incen-

tives to do so. In fact, many companies lost money when they withdrew from Russia.[43] Plausible reasons for their actions include support for Ukraine, a desire to support the global consensus against Russia, and a fear of retaliation from their customers or other stakeholders if they continue to operate in Russia.

Incidentally, an ongoing debate exists over the impact of this boycott. Those tracking the withdrawal of companies from Russia assert the corporate boycott and sanctions are crippling the Russian economy. Russia has lost business with companies that are worth about 40 percent of its gross domestic product and reversed several decades of foreign investment growth. Also, a flight of capital and people has negatively impacted Russia's economic base. The sanctions, not discussed in this article, are debilitating to Russian industry. These state-supported actions have weakened Russia's position as a commodity exporter, prompted the collapse of imports, and hollowed out domestic innovation and production. As a result, Russia's financial markets performed worse than all others in the world in 2022.[44]

According to other experts, Russia is bearing up due to financial decisions to raise interest rates early in the conflict, which gave it a protective cushion.[45] Russia's relative detachment from the international economy—the West in particular—has also meant sanctions and a corporate boycott have not been as devastating as they may have been in another country. Finally, the sale of hydrocarbons has served as a financial lifeline for the Russian economy. By this accounting, the Russian economy is faring better than expected. Over time though, there is little doubt the corporate boycott and sanctions will take a toll, but it is difficult to determine exactly what the impact has been so far.[46]

Corporations have always engaged in domestic and international politics to secure their interests. The corporate digital boycott of Russia raises questions of scale and scope because multinational technology corporations have considerably more power and influence than twentieth-century corporations. For supporters of Ukraine, the involvement of technology companies to act in a coordinated fashion to pressure Russia may represent a welcome moral stand against aggression in the international community.

Before it is celebrated though, scholars must consider the implications of multinational corporations enacting a corporate boycott on the scale of a blockade. What are the risks of nonstate actors creating blockade-like effects against major states in the international system? This may lead to politically difficult and diplomatically dangerous situations for states with multinational corporations usurping or supplementing state power. Further research should be done on the motivations and rationale of the many technology corporations that acted so swiftly to sever services to Russia, so states and policymakers can better understand the circumstances under which these actions are likely to take place.

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43. Ukrainian President Zelenskyy Addresses CEOs at Yale Summit, Yale CEO Summit, filmed by CNBC Television, streamed live on June 8, 2022, YouTube video, 1:07:46, https://www.youtube.com/.

44. Sonnenfeld et al., "Business Retreats."

45. "Bearing It," *Economist*, August 27, 2022, 59–60.

46. "Bearing It."

This corporate boycott opened a new avenue of influence or source of leverage in an armed conflict. It carves out a new role for private-sector initiatives in war and influences how the role of nonstate actors like multinational corporations should be analyzed in international security. International law does not consider this type of action because it is not conducted by a state. This perhaps points to a weakness in international law—the assumption that corporations do not or will not wield significant power independent of states. It may also affect the norms and rules for internet governance and lead to a reconsideration of the notion that private sector corporations are neutral actors.

The corporate boycott of Russia suggests technology companies believe private and public sector collaboration is necessary to counter some geopolitical threats. This shift in focus and corresponding way to fight in armed conflicts could have serious implications for governance and society as multinational corporations exercise more power in interstate conflict. **Æ**

RUSSIA'S NONSTRATEGIC NUCLEAR WEAPONS AND WESTERN AIR SUPREMACY

Roy Boone
David Rehbein
John A. Swegle
Christopher Yeaw

Western advantages in fifth-generation aircraft and precision-guided munitions threaten Russia, which does not have a true fifth-generation fighter. Expecting that the early stages of conflict will be decisive, Russia is likely to employ theater-strike systems to degrade or defeat NATO attack systems and the associated airfields, command-and-control nodes, radars, and supporting infrastructure. If conventional weapons are insufficient, Russia could employ nonstrategic nuclear weapons. Russia's use of very-low- and ultra-low-yield nuclear weapons appears to be predicated on a belief that their use will not trigger a strategic nuclear exchange. This asymmetry, in which each side's favored defensive option is also the greatest threat to the other side, creates a dilemma for those who wish to control nonstrategic nuclear weapons.

Airpower has assumed an increasingly important role in projected conflict for the United States and NATO. Alliance nations, particularly those on the eastern periphery, perceive a need for this defensive air combat capability to ensure their security. On the other hand, for historical and geographic reasons, Russia is apprehensive about threats along its European border. In this regard, Russia views the growing effectiveness of US and NATO airpower from Operation Desert Storm in 1991 through the Kosovo conflict in 1999 to Operation Iraqi Freedom in 2003 as validation these capabilities can be used offensively against it.

Against large numbers of stealthy fifth-generation F-22s and F-35s, backed by fourth-plus-generation F-15EXs and Block III F-18E/Fs, Russia's air defenders are likely to experience high attrition, or possibly even be overwhelmed in the decisive early stages of a military conflict. The US military is expected to retain this advantage well into the future, as it is already flight testing its latest sixth-generation fighter aircraft, while Russia's newly deployed Su-57, even given its virtues, has failed to truly

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reach fifth-generation status. Based on clear technological and numerical inferiority, Russian political and military leadership see the need for a range of nonstrategic nuclear capabilities to even the odds.[1]

Russian research and development into ultra-low-yield (ULY) and very-low-yield (VLY) nuclear warheads in the range of tens to hundreds of tons of high-explosive-equivalent for nonstrategic nuclear weapons (NSNW) reduces the barrier to use. Underwriting this dependence on these weapons is a gap Russian military analysts perceive between nonstrategic nuclear weapons use at some very limited level of violence and the necessary conditions for even a limited strategic nuclear response.[2] This article argues Russian military planners and political leaders have identified a need for theater-range ULY and VLY nuclear systems in order to blunt NATO airpower that they expect as the inevitable opening gambit of any conflict with the West. Further, this employment of nonstrategic nuclear weapons could provide Moscow's most probable pathway across the nuclear threshold.

The asymmetry in these two approaches has implications for elements of Alliance stability, deterrence, defense planning, and nuclear arms control between the two sides. Using the last as one example, the limited nonstrategic nuclear options on the US side largely eliminate its leverage for nonstrategic nuclear-nuclear trades in a negotiation. Unfortunately, the problem is only exacerbated by the fact that what the United States and NATO perceive to be their most effective defensive option is regarded by Russia as the greatest offensive threat against it and a major motivator for the possession of nonstrategic nuclear weapons.

US and NATO Fifth-Generation Weapons Advantage

The F-22 and the F-35, currently the world's only true fifth-generation combat aircraft, underpin NATO air superiority. The differences in NATO and Russian airpower are stark. The Alliance has a 3.4:1 advantage in combat aircraft and an even greater 4:1 advantage in such aircraft with a primary air-to-air mission. To date, over 1,000 fifth-generation aircraft have been built in the United States, largely for NATO nations including the United States—142 F-22 and 890 F-35s.[3] The F-35 is the only fifth-generation fighter currently in production. While output will be somewhat affected by COVID-19, projections indicate that about 2,000 fifth-generation aircraft will be built by 2030.[4]

1. Michael Kofman et al., *Russian Military Strategy: Core Tenets and Operational Concepts* (Arlington, VA: Center for Naval Analysis, August 6, 2021), 32, https://www.cna.org/.

2. Kofman et al., *Russian Military Strategy*, 32; and authors' extensive personal experience.

3. John Venable, "Congress Should Stop the Air Force from Retiring F-22s," Breaking Defense, September 20, 2022, https://breakingdefense.com/; and Chris Galford, "Agreement between Pentagon, Lockheed Martin to Net up to 398 F-35 Jets for U.S. Military," Homeland Preparedness News, January 4, 2023, https://homelandprepnews.com/.

4. Stephen Losey, "F-35 Costs Have Been Declining. That's About to Change," *Defense News*, November 18, 2022, https://www.defensenews.com/.

In addition to NATO's planned fifth-generation acquisitions, the United States is already developing sixth-generation fighters. In 2019, the US Air Force announced it had built and flown a prototype sixth-generation fighter.[5] The US Navy also has a program to develop a sixth-generation fighter, and both services have reported they hope to begin production by the end of this decade.[6]

These fifth-generation aircraft are distinguished by several features. First, stealth incorporates specific design elements, including limiting engine exhaust and electronic signals, that reduce the range at which hostile radars and other sensors can detect, track, and engage the aircraft.[7] Second, enhanced situational awareness includes the integrated avionics that fuse data from advanced multispectral sensors and offboard data to provide a real-time operating picture of the battlespace. The F-35 has active and passive sensors that can see in all directions and at night.[8]

Third, electronic warfare capabilities offer a suite of offensive and defensive capabilities that can detect hostile emitters, geolocate them and identify specific threats, and jam, degrade, or avoid them.[9] Fourth, advanced engine performance from the Pratt & Whitney F135 engine offers the most powerful fighter engine ever built and includes features such as low-observable exhaust and thermal management.[10]

Fifth, networking capabilities in the F-35 can gather, exploit, and move information from aircraft to aircraft even in widely-spaced aircraft formations. This enables a complete, real-time view of the battlespace. This ability to collect, synthesize, and share information is at the heart of a radical change in combat tactics. The F-35 will play quarterback in modern aerial combat—directing individual aircraft to specific targets in real time.[11]

Stealth confers enormous relative advantage, offering first-look, first-shot, and first-kill capabilities. Look involves the F-35's APG-81 active electronically scanned array (AESA) low-probability-of-intercept radar for air-to-air and advanced air-to-ground application, as well as high-resolution mapping, multiple ground moving target identification and track, electronic warfare, and ultra-high-bandwidth communications.[12] Shoot and kill involves the AIM-120 advanced medium-range air-to-air missile, an active-radar-guided, medium-range, supersonic air-to-air missile. The latest

5. Valerie Insinna, "The US Air Force Has Built and Flown a Mysterious Full-Scale Prototype of Its Future Fighter Jet," *Defense News*, September 15, 2020, https://www.defensenews.com/.

6. Michael Tyrrell, "US Navy Reveals More on Plans for Sixth Generation Fighter Jet," *Aerospace Manufacturing*, April 20, 2021, https://www.aero-mag.com/.

7. Deborah Lee James and Daniel Gouré, *The Implications of Fifth-Generation Aircraft for Transatlantic Airpower, A Primer* (Washington, DC: Atlantic Council, October 7, 2019).

8. James and Gouré, *Fifth-Generation Aircraft*.

9. Todd Caruso, "AN/ASQ-239 F-35 EW Countermeasure System," BAE Systems (website), n.d., accessed January 24, 2023, https://www.baesystems.com/.

10. "F135, The World's Most Advanced Fighter Engine," Pratt & Whitney, n.d., accessed January 24, 2023, https://prattwhitney.com/.

11. James and Gouré, *Fifth-Generation Aircraft*.

12. Caruso, "AN/ASQ-239"; and Kate Mauss, "AN/APG-81 and the F-35 Lightning II," Northrop Grumman (website), n.d., accessed January 24, 2023, https://www.northropgrumman.com/.

version, AIM-120D, with a range of about 90 miles, offers improved range, GPS-assisted guidance, updated data links, and jam resistance, in addition to greater lethality.[13]

In 2019, the Air Force announced it was developing the AIM-260 joint air tactical missile with the Navy to replace advanced medium-range air-to-air missiles with a longer range (possibly up to 180 miles) and more capable weapon to counter high-end threats.[14] Initial operating capability was expected in 2022 but so far has not been observed. The Air Force refers to the joint air tactical missile as the next air-to-air dominance weapon.[15]

Russia currently has no fifth-generation aircraft and may not have any by the end of this decade.[16] Despite Russia's claims to the contrary, its newest fighter aircraft, the Su-57, falls short of true fifth-generation performance in a number of respects, including the radar cross section, the radar, and the engine.

Radar Cross Section

Radar cross section is the effective area of a body such as an aircraft as seen by a radar. The smaller the radar cross section, the shorter the range at which an object can first be detected. Unclassified sources indicate the F-22 has a radar cross section of about 0.0001–0.0002 square meters (comparable in size to a steel marble), and the F-35 has a radar cross section of about 0.0015 square meters (comparable in size to a metallic golf ball).[17] In comparison, the fourth-generation MiG-29 has a radar cross section of 5 square meters. Analysis of the Sukhoi company's patents for the T-50 prototype of the Su-57 called for a radar cross section of 0.1–1 square meter.[18] To compare, if an F-22 with a radar cross section of 0.0001 square meters is detectable at 100 kilometers, an Su-57 with a radar cross section of 0.1 square meters is detectable at 567 kilometers.[19]

Radar

Advanced aircraft use multifunction AESA radars that can also perform electronic warfare roles. The United States has much more experience in the production of these

13. Aaron M. U. Church, *USAF & USSF Almanac 2020: Weapons & Platforms*, *Air Force Magazine*, June 2020, https://www.airforcemag.com/; and Garrett Reim, "US Air Force Claims Longest Air-to-Air Missile Shot with AIM-120 AMRAAM," *Flight Global*, April 14, 2021, https://www.flightglobal.com/.

14. John A. Tirpak, "As Air Force Ramps Up JASSM, Work Begins on Its Replacement," *Air & Space Forces Magazine*, August 5, 2021, https://www.airforcemag.com/.

15. Rachel S. Cohen, "Air Force Developing AMRAAM Replacement to Counter China," *Air & Space Forces Magazine*, June 20, 2019, https://www.airandspaceforces.com/.

16. Tirpak, "JASSM."

17. "F-35 Joint Strike Fighter (JSF) Lightning II," GlobalSecurity.org, n.d., accessed November 26, 2022, https://www.globalsecurity.org/.

18. Piotr Butowski, "PAK FA Stealth Features Patent Published," *IHS Jane's 360*, January 10, 2014, https://archive.ph/ZHbOH.

19. Abhirup Sengupta, "Was the 'Stealth Feature' of the Su-57 Just a Ruse?," Quora, May 14, 2018, https://www.quora.com/.

devices and is now building third-generation devices. The AESA radar on the Su-57 is basically Russia's first such radar and is expected to be far less capable in both the radar and electronic warfare roles.[20]

Engine

The Su-57 entered production with an engine other than its originally intended model, since that engine (known as Article 30, or *izdeliye* 30) will likely not be available until the late 2020s at the earliest. As a consequence, the current engine is less powerful and less stealthy than intended.[21]

Precision-Guided Munitions

The US military relies on precision-guided munitions (PGMs)—air- and sea-launched missiles, multiple-launch rockets, and guided bombs—to execute military operations. These guided munitions are intended to destroy a point target and minimize collateral damage. Using advanced guidance systems, these weapons are launched at long ranges to attack an enemy without risking American forces. Accordingly, Russia's large and sophisticated anti-access/area-denial systems are likely to increase the value of PGMs. As a result, the Department of Defense has argued it requires and is procuring longer-range munitions to meet these and other new threats.[22] A few are worth highlighting.

The joint air-to-surface standoff missile (JASSM) is a stealthy, precision-guided cruise missile designed to defeat defended high-value targets, including enemy air defenses. There are several configurations of this missile: AGM-158A (JASSM), AGM-158B (JASSM-ER), and the AGM-158D (JASSM-XR), with ranges of 230 miles, 620 miles, and 1,120 miles, respectively.[23] There is also the AGM-158C, a long-range anti-ship missile.[24]

The AGM-88G, designed to suppress enemy air defenses, is an extended-range version of the current high-speed anti-radiation missile, which is already in production and service. Improvements to the AGM-88G include warhead lethality, advanced

20. Abhirup Sengupta, reply to "Why Is the Radar on the Sukhoi Su-57 Not as Advanced as the Radar on the Lockheed Martin F-22 Raptor?," Quora, October 21, 2022, https://www.quora.com/.

21. Abhirup Sengupta, reply to "What Is the Difference between Su-57 and F-22 Engines?," Quora, September 29, 2022, https://www.quora.com/.

22. John R. Hoehn, *Precision-Guided Munitions: Background and Issues for Congress*, R45996 (Washington, DC: Congressional Research Service [CRS], June 11, 2021), https://crsreports.congress.gov/.

23. Missile Defense Project, "JASSM/JASSM ER," Missile Threat, Center for Strategic and International Studies (CSIS) (website), last modified July 30, 2021, https://missilethreat.csis.org/; Brian W. Everstine, "USAF to Start Buying 'Extreme Range' JASSMs in 2021," *Air Force Magazine*, February 14, 2020, https://www.airforcemag.com/; Frank Wolfe, "USAF Requests $711 Million for 525 'Max Production' of JASSM-ER," Defense Daily, June 7, 2021, https://www.defensedaily.com/; and Church, *Almanac 2020*.

24. Church, *Almanac 2020*.

seekers, a classified range extension, and networking capability.[25] The Air Force is also using the AGM-88G as the basis for its next-generation stand-in attack weapon to equip the F-35A with comprehensive suppression/destruction of enemy air defense capability.[26]

As final examples, the GBU-39 small-diameter bomb I and the GBU-53 STORMBREAKER are precision-guided munitions with explosive armaments of approximately 100 pounds or less, capable of striking targets in all weather from up to 46 miles away. The GBU-39 is designed to attack fixed targets, and the GBU-53 can attack moving targets. Their small size allows them to be carried in fighter aircraft internal weapon bays or to increase overall load-out to enable more independent strikes per sortie.[27] Eight of these weapons will fit internally on the F-35A.[28] Moreover, the bombs are retargetable after release.[29] The range of these glide bombs allows them to attack modern Russian surface-to-air missile systems comfortably outside the range in which the radar can track an F-35.

Russia's Expectations and Concerns

According to one expert, if fighting breaks out with NATO, the Russian military will "expect a US aerospace blitzkrieg which cannot be blocked at the outset."[30] The effectiveness of American and NATO airpower in Operation Desert Storm in Iraq (1990–91), Operation Deliberate Force in the Bosnian conflict (1995), Operation Allied Force in the Kosovo conflict (1995), and Operation Iraqi Freedom (2003) justify this expectation.[31] Assuming "that the initial period of war will be decisive," Russia will move rapidly to deflect, attrit, and disorganize the US response with the goal of undermining US political will and disrupting the Allied plan of operations or creating enough pain to cause the attackers to de-escalate. And if Russia fails to achieve those goals conventionally, "there is always theater employment of nonstrategic nuclear weapons, an area where Russia does not suffer credibility problems."[32]

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25. Stefano D'Urso, "US Navy Launched an AGM-88G Advanced Anti-Radiation Guided Missile–Extended Range for the First Time," Aviationist, August 5, 2021, https://theaviationist.com/; Church, *Almanac 2020*; and "US Navy's AGM-88G AARGM-ER Missile Enters Production Phase," Global Defense Corp, September 7, 2021, https://www.globaldefensecorp.com/.

26. Garrett Reim, "US Air Force Requests Information on New Anti-Radiation Missile for F-35A," Flight Global, January 10, 2020, https://www.flightglobal.com/.

27. Flight International in association with Ruag, *World Air Forces 2020*, Flight Global, 2020, https://www.flightglobal.com/.

28. John Keller, "F-35 Block 4 Jet Fighter Could Become Killer for the Navy with Small Diameter Bomb II, Aim 9X Block II," *Military & Aerospace Electronics*, February 18, 2019, https://www.militaryaerospace.com/.

29. Church, *Almanac 2020*.

30. Michael Kofman, "It's Time to Talk about A2/AD: Rethinking the Russian Military Challenge," War on the Rocks, September 5, 2019, https://warontherocks.com/.

31. David E. Johnson, *Learning Large Lessons: The Evolving Roles of Ground Power and Air Power in the Post–Cold War Era* (Santa Monica, CA: RAND Corporation, March 7, 2007), https://www.rand.org/.

32. Kofman, "A2/AD."

Russia has taken two notable actions to respond with urgency to the NATO air advantage. In 2015, Russia created the aerospace forces military branch, which is on par with their ground forces and navy and aggregates the Russian air force, the aerospace and missile defense forces, and the space forces. The Russian military also realizes that given the expectation of a rapidly developing situation, these units require fully staffed and equipped permanent readiness troops.[33]

Russia's expectation of holding a weak conventional military hand means Russia's military analysts predict the need for an asymmetric response.[34] This approach is similar to that anticipated over 50 years earlier by Herman Kahn, who recognized that for a technologically and economically inferior Soviet Union, the possession of tactical nuclear weapons in large numbers was the equalizer.[35]

Active Defense

Three elements are integral to Russia's active defense against aerospace attack. (1) Air defense systems protect strategically important targets. Additionally, forward army units are being integrated with new bistatic over-the-horizon radars and a network of radars covering the Barents Sea. (2) Missile defense systems cover the Moscow area and are integrated with ballistic missile early-warning radars ringing the country and launch-warning satellites in space. (3) Theater-strike systems are used to degrade or defeat NATO attack systems, including airfields, command-and-control nodes, radar systems, and supporting infrastructure.[36]

Russia is in the process of overhauling its ballistic missile and air attack early-warning radars by replacing older systems, some of which were placed on the territory of former Soviet republics. To reduce costs, Russia designed and built or is building 12 new modular ballistic-missile warning radars of the Voronezh type, with models operating in the meter and decameter wavelength ranges.[37] These radars ring the country from

33. Nikolai Makarov, "Speech before the Academy of Military Sciences," *Vestnik Akademii Voennykh Nauk* 2, no. 39 (2012); S. V. Surovikin, "Forms for Employing and Organizing Command and Control of a Joint Troop (Force) Grouping in the Theater of Military Activity," *Vestnik Akademii Voennykh Nauk*, 1, no. 46 (2014); Samuel Charap et al., *Russian Grand Strategy, Rhetoric and Reality*, RR4238 (Santa Monica, CA: RAND Corporation, 2021), https://www.rand.org/; and Andrew S. Bowen, "Russian Armed Forces: Capabilities," In Focus 11589 (Washington, DC: CRS, June 30, 2020), https://sgp.fas.org/.

34. Kofman et al., *Russian Military Strategy*, 32.

35. Herman Kahn, *On Escalation: Metaphors and Scenarios* (New York: Praeger, 1965).

36. Kofman, "A2/AD."

37. "General Designer Saprykin: Russia's Early Warning System Can Track Missile Launches from Anywhere in the World," TASS, February 15, 2021, https://tass.ru/.

sites at Lekhtusi, Olenegorsk, Vorkuta, Pechora, Yeniseysk, Mishelevka, Barnaul, Orsk, Armavir, and Pionersky.[38]

The hardware cost alone for those radars is roughly 55 billion rubles, comparable to the cost of two to three Borei-A fleet ballistic missile submarines. (A 2012 contract for five submarines totaled 100 billion rubles.) Two additional radars of the new Yakhroma type are to be built in Crimea and on the Chukchi Sea.[39]

New Konteiner bistatic, over-the-horizon radars are to be built for aircraft early-warning, cruise missile, and short- to intermediate-range ballistic missile attack. The first such radar was built and deployed in December 2019 with a transmitter near Gorodets and a receiver near Kovylkino.[40] Construction of a second radar began near Zeya in the far eastern Amur region, although completion is delayed.[41] A third is planned for Kaliningrad, and a fourth may be built at an undisclosed location in the Arctic.[42]

These radars cost about 10 billion rubles each. Another type of over-the-horizon radar, the Rezonans-N—claimed to have enhanced ability to detect stealthy and hypersonic targets—is deployed at five locations around the Barents Sea to protect Russia's ballistic missile submarine launch bastion as well as the Northern Fleet and other defense facilities.[43] According to a source in the military-industrial complex as reported in TASS, there are plans to build as many as five additional Rezonans-N radars in the Russian Far East, starting with an undisclosed location on Sakhalin Island.[44]

These radars are available for networking with Russia's mobile missile defense units. The main long-range systems are the S-300 series (S-300P type for air defense units, S-300V to protect ground units, and S-300F aboard ship); S-350 with smaller, more maneuverable missiles; S-400, a more capable successor to the S-300P and S-300F series; and the even more capable S-500 to be used for air and missile defense and

38. "Deep in the Sky," LiveJournal, February 15, 2012, https://archive.is/; "Construction of a Radar Station Began in Vorkuta," KomiInform, September 26, 2015, https://komiinform.ru/; Ilya Kramnik, "Arithmetic SPRN: Minus Two 'Dneprs,' Plus One 'Voronezh,'" *RIA Novosti*, May 26, 2021, https://ria.ru/; and "Three Advanced Early Warning Radars Enter Service in Russia," TASS, December 19, 2017, https://tass.com/.

39. "Russia to Deploy Latest Early Warning Radar in Crimea," TASS, February 15, 2021, https://tass.com/; and "Russia to Build Newest Missile Attack Warning Radar on Chukchi Peninsula by 2030," TASS, January 12, 2021, https://tass.com/.

40. Tony Roper, "Russian OTHR 29B6 Konteyner Analysis," February 25, 2020, *Planes and Stuff* (blog), https://planesandstuff.wordpress.com/.

41. "The Media Found Out Where the Second 'Container' Radar Station Is Deployed," MIL.Press, December 15, 2020, https://xn--b1aga5aadd.xn--p1ai/; and "On the Amur, a Radar Station Will Be Built to Control US Aviation, the Source Said," VPK, December 16, 2020, https://vpk.name/ (originally published in *RIA Novosti*).

42. "Russia's Advanced Radar in Kaliningrad to Monitor Entire Territory of Europe—Source," TASS, March 18, 2020, https://tass.com/; and Joseph Trevithick, "Russia Plans to Set Up Massive New Radar Array to Help 'Control' the Arctic Region," The Drive, December 2, 2019, https://www.thedrive.com/.

43. Svetlana Tsygankova, "Several Russian Radars to Be Deployed in the Arctic by the End of 2021," RGRU, April 14, 2021, https://rg.ru/.

44. "Source: The Russian Federation Will Deploy in the Sakhalin Region a 'Hunter for Invisible' Radar Station 'Rezonans-N,'" TASS, August 23, 2021, https://tass.ru/.

possibly in an antisatellite role.[45] Each of these systems consists of a missile launcher carrying canisterized missiles sealed at the factory, a vehicle with a loading crane to reload missiles, long-range detection and shorter-range targeting radars, and a control vehicle. As an example, S-400 launchers can carry 4 missiles and control vehicles can manage up to 12 launchers, with each 12-launcher unit networked with 5 others—spaced at distances of tens of kilometers.[46]

The new S-500 system is capable of networking with S-500s, S-400s, and S-300s.[47] Different types of missiles can be loaded with each system. The defense radar servicing these systems can see aerial targets over the horizon and has a maximum range of about 400 kilometers for large targets like the airborne warning and control system (AWACS) aircraft. Russia's air defense is multilayered as well, with shorter-range Buk missiles and the Pantsir system for protection at even shorter ranges.[48]

The problem for Russia is the detectability of low-flying stealthy cruise missiles and stealthy NATO aircraft that can attack targeting and long-range search radars before the aircraft are even detected.[49] Possible mitigating factors playing in Russia's favor are the strength of the network of warning radars and networked air-defense radars and Russia's electronic-warfare capabilities; however, both topics are beyond the scope of this analysis.

As mentioned, active defense for Russia also includes a strike element aimed at disrupting and reducing the ability of an adversary to mount air attacks. Russia can cover much of NATO with 2,500-kilometer-range Kalibr land-attack cruise missiles (the SS-N-30A) fired from submarines in the Black and Norwegian Seas, as well as the 9M729 ground-launched cruise missile (the SSC-8) launched from bases at Shuya and Voronezh.[50] Several other systems include the ship-launched hypersonic Tsirkon (SS-N-33) missile, which has a range of about 1,000 kilometers; the hypersonic air-launched Kinzhal (Kh-37M2), with a range of 2,000–3,000 kilometers for launch from

45. "S-300," Arms Russia, https://arms-russia.ru/; "S-350E Vityaz 50R6 Surface-to-Air Defense Missile System," Army Recognition, August 18, 2022, https://www.armyrecognition.com/; "Anti-aircraft Missile System S-400 'Triumph,' " Missile Technology, https://missilery.info/; "S-500 Prometheus 55R6M Triumfator-M Air Defense Missile System," Army Recognition, December 15, 2022, https://www.armyrecognition.com/; and Brian Wang, "Russia's S-500 Missile System Still in Development but the 77N6 Hypersonic Missiles Are Key to a Real Ballistic Missile Defense," *Nextbigfuture* (blog), July 20, 2016, https://www.nextbigfuture.com/.

46. "SAM S 400: Purpose, Features, Characteristics, Range," https://bo-priboy.ru/.

47. Zachary Keck, "Russia's S-500, the Ultimate Missile Defense System," *National Interest* (blog), January 18, 2020, https://nationalinterest.org/.

48. Michael Kofman, "Russian A2/AD: It Is Not Overrated, Just Poorly Understood," *Russia Military Analysis* (blog), January 25, 2020, https://russianmilitaryanalysis.wordpress.com/.

49. Reim, "Anti-Radiation Missile."

50. Defense Intelligence Ballistic Missile Analysis Committee, *2020 Ballistic and Cruise Missile Threat* (Washington, DC: Defense Intelligence Agency, January 11, 2021), https://media.defense.gov/; US Department of State (DOS), *Adherence and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments* (Washington, DC: DOS, August 2019), https://www.state.gov/; and Missile Defense Project, "9M729 (SSC-8)," Missile Threat, CSIS, March 31, 2022, https://missilethreat.csis.org/.

the MiG-31K or Backfire bomber, respectively; or the long-range Kh-101/-102 air-launched cruise missiles from strategic Bear-H or Blackjack bombers, which can cover Europe.[51] These weapons are all dual-capable, conventional, and nuclear.[52]

Similarly, certain missiles for the S-300P series and S-400, and the S-500, have nuclear warheads. Low-yield nuclear warheads for S-300 and S-400 were designed at the All-Russian Scientific Research Institute of Experimental Physics (VNIIEF).[53] A photograph of the claimed nuclear warhead for the S-300PT was featured in a 2019 blog post.[54] In addition, TASS has indicated in the past that at least some missiles carried by S-400s can be used in a surface-to-surface mode.[55] More recently, the use of S-300P missiles in a surface-to-surface mode in Ukraine has been reported.[56]

Russia's NSNW Response

Declassified Central Intelligence Agency analysis of Russian thinking on ultra-low-yield and very-low-yield nuclear weapons from August 2000 suggests "the need for subkiloton nuclear weapons with minimal long-term contamination had been argued in the media by senior Ministry of Atomic Energy (Minatom) officials, nuclear weapons scientists, and military academics since the mid-1990s." The same report also suggested unnamed Russian advocates were said to "cite clean, very-low-yield weapons as an 'asymmetric response' to US superiority in conventional weapons."[57]

This analysis followed an April 30, 1999, meeting of the Russian Federation Security Council that, according to then-Council Secretary Vladimir Putin, dealt with a concept for the use of nuclear weapons, including tactical nuclear weapons.[58] Investigative journalist Pavel Felgengauer, reporting in *Segodnya*, wrote that this included a plan to develop a new, low-yield nuclear warhead.[59] What is clear from available infor-

51. Thomas Nilsen, "Northern Fleet Makes Ready for Long-Range Test of Tsirkon Hypersonic Missile," *Barents Observer*, November 2, 2020, https://thebarentsobserver.com/; "Kh-32 Air-Launched Cruise Missile," Military-Today.com, n.d., accessed January 24, 2023, http://www.military-today.com/; "Russian Strategic Bomber to Extend Kinzhal Hypersonic Missile's Range—Source," TASS, July 18, 2018, https://tass.com/; and Missile Defense Project, "Kh-101/Kh-102," Missile Threat, CSIS, July 31, 2021, https://missilethreat.csis.org/.

52. Hans M. Kristensen and Matt Korda, "Russian Nuclear Weapons, 2021," *Bulletin of the Atomic Scientists* 77, no. 2 (2021), https://doi.org/.

53. A. V. Veselovsky, "65 Years of Glorious History Is a Guarantee of Stability and Development," *PRO-Atom*, February 3, 2011, http://www.proatom.ru/.

54. Diana Mikhailova, "Nuclear Warhead of an Anti-Aircraft Guided Missile 5V55S SAM S-300PT," LiveJournal, December 3, 2019, https://diana-mihailova.livejournal.com/.

55. "Russian Troops in Crimea Receive S-400 Antiaircraft Missile System," TASS, August 12, 2016, https://tass.com/.

56. Thomas Newdick, "Russia Now Firing S-300 Surface-to-Air Missiles at Land Targets in Ukraine: Official," The Drive, July 8, 2022, https://www.thedrive.com/.

57. Central Intelligence Agency, Office of Transnational Issues, "Evidence of Russian Development of New Subkiloton Nuclear Warheads," intelligence memorandum, August 30, 2000 (redacted for release).

58. "Documents Adopted at the Meeting of the Security Council on the Development of Nuclear Forces," *Interfax*, April 29, 1999.

59. Pavel Felgengauer, "Limited Nuclear War? Why Not!," *Segodnya*, May 6, 1999, 1, 2.

mation is that Russia's interest and work on these types of nuclear weapons dates back at least two decades.

According to the Defense Intelligence Agency, as of May 2019, "Russia's stockpile of nonstrategic nuclear weapons, already large and diverse, [was] being modernized with an eye towards greater accuracy, longer ranges, and lower yields to suit their potential war-fighting role."[60] In developing these capabilities, Russia understood the asymmetric advantage it would bring to a fight with NATO in Europe.

The limitation on collateral damage from ULY and VLY air-to-air missiles may not be fully appreciated. In "Ground Zero Population 5," a video made in 1957 at the Nevada Test Site, five officers and a cameraman stand under a 2-kiloton explosion from an air-to-air missile at 18,500 feet above them. No one was injured and none of the participants experienced any symptoms.[61] Of note: the picture of the men flinching shown in the article is not at the time of the explosion, but at the time the sound of the blast reached them, in the same way that thunder follows lightning.

In short, under the right conditions, low-yield nuclear weapons are not weapons of mass death and destruction. Russia is well aware of this and sees such nuclear weapons as usable on the battlefield. For nuclear weapons of tens or hundreds of tons yield, collateral damage and casualties are even lower and have the potential, in the apparent view of the Russian leadership, to serve as a tool for leveling the playing field against NATO airpower.

Russia's Escalation Philosophy and Strategy

The conflict between Russia and NATO is likely to reside at the boundary of what Russian military analysts characterize as regional and large-scale conflict, depending on the degree to which NATO strikes Russia and Russia strikes NATO.[62] These analysts believe there is an escalatory gap between the use of nonstrategic nuclear weapons and the circumstances that create a strategic nuclear exchange.[63]

This gap may widen even further as Russia develops ULY and VLY nonstrategic nuclear weapons. Such weapons, combined with highly accurate Russian precision-guided munitions, create a very potent and usable combination that increases the downtime of stricken airfields and dramatically increases the number of high-priority NATO targets, to include possible nonstrategic nuclear weapons launchers and launch sites. Further, it is possible that the more destructive effect of ULY and VLY warheads demands fewer PGMs as delivery devices, an issue of growing significance.

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60. Robert P. Ashley Jr., "Russian and Chinese Nuclear Modernization Trends" (remarks, Hudson Institute, Washington, DC, May 29, 2019), https://www.dia.mil/.

61. Robert Krulwich, "Five Men Agree to Stand Directly under an Exploding Nuclear Bomb," National Public Radio, July 17, 2012, https://www.npr.org/.

62. "Mission and Objectives of the Russian Armed Forces," Ministry of Defence of the Russian Federation (website), https://eng.mil.ru/.

63. David S. Yost, "Russia's Non-Strategic Nuclear Forces," *International Affairs* 77, no. 3 (July 2001).

Beyond the Russian assessment of a gap between regional NSNW use and a strategic exchange, the evidence also indicates the Russian military has less aversion to the use of nonstrategic nuclear weapons than NATO. Russia's wide variety of dual-capable systems are an indicator of this view. While it is highly unlikely there is a nuclear warhead for every dual-capable weapon, it is highly likely there are at least some nuclear warheads for almost every type of theater-range weapon system.

Building the warheads is not a challenge for Russia, provided a 2014 estimate of 1,000 plutonium pits per year in Russia is comparable to a similar number of warheads per year.[64] Assuming this also means 1,000 warheads are built yearly, the production complex has the capacity to support 10,000 to 20,000 total warheads.[65]

Russia has some advantages over the United States in managing escalation in the nuclear realm. These advantages include the fact that Russia has a host of escalatory targets to be attacked within the European theater without having to strike highly escalatory targets outside the region (American territory) and run the risk of escalating from a regional to a large-scale conflict. In comparison, NATO has a paucity of regional escalatory targets outside Russia, so that strikes against the Russian homeland are almost required, opening up European members and the United States to retaliation, potentially leaving NATO self-deterred.

Further, Russia's force of ULY and VLY nuclear weapons targets a gap in the NATO arsenal and is able to achieve military objectives while also achieving psychological effects. NATO and the United States have focused far more on conventional responses to Russia's use of nonstrategic nuclear weapons and have fewer nuclear response options.

Russia's use of NSNW would also act as a substantial jolt to the Alliance and strain unified decision-making among member states. Transconflict fractures may prove operationally determinative, while postconflict fractures may constitute an acceptable outcome for Russia, even under status quo ante conditions. Potential political challenges for NATO include limited support from southern European member states not directly affected by Russia's aggression, wavering support of the NATO nuclear mission from nuclear weapons host nations, and questions of whether the territorial integrity of NATO member states on Russia's border is worth nuclear conflict. Putin appears to believe he can severely stress or fracture NATO with the discrete use of NSNW, which he believes allows Moscow to "dial in" pressure on the Alliance.[66]

Implications of the Conventional-Nuclear Asymmetry

Consideration of the conventional-nuclear asymmetry between the two sides could proceed in several directions, including the strength of the NATO Alliance in the face

64. Houston T. Hawkins, "Rethinking the Unthinkable," *National Security Science* (June 2014), https://permalink.lanl.gov/.

65. Mark B. Schneider, "Will Russia Build 8,000 Nuclear Weapons by 2026?," RealClear Defense, January 26, 2018, https://www.realcleardefense.com/.

66. Pierre de Druzy and Andrea Gilli, "Russia's Nuclear Coercion in Ukraine," *NATO Review*, November 29, 2022, https://www.nato.int/.

of nuclear threats or use, further conventional and nonstrategic nuclear force development, the evolution of military doctrine, and approaches to nuclear arms control. The article will address this last direction—approaches to nuclear arms control. Although talks are currently stalled between the two sides on a successor to New START (New Strategic Arms Reduction Treaty) that is at least hoped to include NSNW, the clock is running on the existing treaty, which expires in February 2026 with no provision in the text for further renewal.

Since the early 1990s, the United States has tried to limit Russia's nonstrategic nuclear weapons. These attempts have basically been unsuccessful, as evidenced by the nonbinding, unilateral presidential nuclear initiatives (PNIs) of 1991 and 1992, and a hoped-for accompaniment to New START that never materialized. Indeed, the PNIs—unilateral, voluntary, unverified pledges with general correspondence between the two sides—arguably resulted in the loss of negotiating leverage on NSNW for the United States when Russia reneged on its pledges.

The PNIs began with US President George H. W. Bush in a televised September 1991 address and his January 1992 State of the Union address and were answered in televised addresses by USSR President Mikhail Gorbachev in October 1991 and by Russian Federation President Boris Yeltsin the day after Bush's State of the Union address.[67]

Although the PNIs contained both strategic and nonstrategic elements, this discussion will focus on the nonstrategic elements. In his first address, Bush pledged to eliminate all nuclear artillery shells and tactical ground-launched missiles capable of carrying nuclear warheads. In addition, the development of the tactical version of the air-launched short-range attack missile was halted, and shortly after, NATO announced a reduction in the remaining air-delivered tactical nuclear gravity bombs in Europe. Finally, all tactical naval nuclear weapons on ships and naval aircraft were to be removed to central storage, with many to be dismantled and destroyed.

In response, Gorbachev announced the planned elimination of all nuclear artillery, nuclear warheads for short-range missiles, and nuclear mines, and the withdrawal of all tactical nuclear weapons from naval ships and aircraft to central storage, with the elimination of some. Yeltsin reaffirmed Gorbachev's planned elimination of the ground forces' nuclear weapons, and his pledges were more quantitative with regard to air and naval tactical nuclear weapons: eliminate one-half of all air-defense nuclear warheads, one-third of all sea-launched nuclear warheads, and one-half of all air-launched tactical nuclear warheads.

While the reductions seemed broad in scope, from the US standpoint, the PNIs ultimately failed in their goal of reducing and eliminating Russia's NSNW. In 2006, Assistant Secretary of State Stephen Rademacher declared that while the United States

67. Susan J. Koch, "The Presidential Nuclear Initiatives of 1991–1992," Center for the Study of Weapons of Mass Destruction, Case Study 5 (Washington, DC: National Defense University Press, September 2012); and *The New START Treaty, Hearings before the Senate Committee on Foreign Relations,* 111th Cong. (2010) (statement of Rose Gottemoeller, Assistant Secretary of State for Verification, Compliance, and Implementation, chief US negotiator in Post-START negotiations), 239, and (question by Senator Richard Lugar), 243.

had honored its PNI pledges, the Russian side had not completely fulfilled its pledges.[68] In 2021, the US State Department report on other nations' compliance with their treaties and commitments stated Russia had not met all its PNI commitments, specifically noting it had not eliminated all the warheads for its ground-based tactical missiles.

Nonstrategic nuclear weapons have not been included in any of the Strategic Arms Reduction Treaties (START, the unratified START II, and the only outlined START III), and NSNW were not a part of the New START negotiations, by agreement between the presidents of the two countries.[69] At the New START signing ceremony, however, then-US President Barack Obama stated his belief that the strategic agreement would be followed with talks including nonstrategic and nondeployed nuclear weapons.[70]

The US Senate reinforced that sentiment in its resolution of ratification for the treaty, where one of the conditions levied on the president was that he seek to initiate negotiations to address the difference in the holdings of NSNW on each side and verifiably secure and reduce their numbers.[71] Further, the president was urged to pursue measures aimed at building confidence in the numbers and security of the two nations' NSNW. Nevertheless, despite Secretary of State John Kerry's announcement at the 2015 Nuclear Nonproliferation Treaty (NPT) Review Conference that the United States had a total of 4,717 warheads as of September 2014, Russia issued no corresponding statement about its nuclear-warhead count.[72]

With the five-year extension of New START by Presidents Joe Biden and Putin in 2021, the United States and Russia reengaged the Strategic Stability Dialogue "to lay the groundwork for future arms control and risk reduction measures."[73] Speaking at the September 2021 NATO Conference on Weapons of Mass Destruction, Arms Control, Disarmament, and Nonproliferation, Under Secretary of State for Arms Control and International Security Bonnie Jenkins said the United States "will seek to address all nuclear warheads, including . . . so-called nonstrategic nuclear weapons."[74] Not

68. DOS, *Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments* (Washington, DC: DOS, April 15, 2021), https://www.state.gov/.

69. The White House, Office of the Press Secretary, "Joint Statement by President Dmitriy Medvedev of the Russian Federation and President Barack Obama of the United States of America," April 1, 2009, The Obama White House Archives (website), https://obamawhitehouse.archives.gov/.

70. The White House, Office of the Press Secretary, "Remarks by President Obama and President Medvedev of Russia at New START Treaty Signing Ceremony and Press Conference," April 8, 2010, The Obama White House Archives (website), https://obamawhitehouse.archives.gov/.

71. Resolution of Ratification: Senate Consideration of Treaty Document 111-5, 111th Cong. (2010), https://www.congress.gov/.

72. John Kerry, "Remarks at the 2015 Nuclear Nonproliferation Treaty Review Conference," New York, NY, April 27, 2015, https://2009-2017.state.gov/.

73. The White House Briefing Room, "US-Russia Presidential Joint Statement on Strategic Stability" (Washington, DC: The White House, June 16, 2021), https://www.whitehouse.gov/.

74. Bonnie Jenkins, "Nuclear Arms Control: A New Era?," remarks to NATO Conference on WMD Arms Control, Disarmament, and Nonproliferation, Copenhagen, Denmark, September 6, 2021, https://www.state.gov/.

surprisingly, the Strategic Stability Dialogue has been frozen because of Ukraine.[75] Further, as of February 21, 2023, Putin announced that Russia was suspending participation in New START.[76] As it stands today, the dynamic of deterrence and defense causes each side to lean most heavily on what it does best. For NATO and the United States, especially in the early days of any high-intensity conflict, airpower—advanced aircraft and precision-guided munitions—has become a decisive element. For Russia, aerospace defense is important; however, if conventional defense alone is not enough, Russia maintains an extensive set of NSNW options. The irony is each side considers its options to be defensive; however, those same options appear to be the most threatening offensive options to the other side.

Ultimately the United States has a problem with finding the right leverage to induce Russia to cut NSNW numbers. As mentioned above, the United States lost much of its leverage for direct, symmetric reductions in nonstrategic nuclear weapons when so many of its own NSNW options were unilaterally eliminated as the Cold War wound down. The development of countering potentially tradable nonstrategic nuclear weapons by the United States seems to lack support at this time.

Asymmetric trades are difficult to construct. Western airpower and Russian NSNW have evolved as primary defense and deterrence options for each side, even as they constitute the greatest threat to the other side. Russia frequently points to its desire to reestablish limits on US and NATO missile defense (even as, somewhat ironically, defense contractor Almaz-Antey develops increasingly capable air defense systems with antimissile applicability). But the US Senate's aforementioned resolution to ratify New START eliminated NSNW/missile-defense trades as a matter of policy. And while beyond the scope of this paper, conflicting demands on missile defense played a rather complicated role in the failure to ratify START II. *Æ*

75. "Russia-US Strategic Stability Dialogue Formally 'Frozen,' Says Senior Diplomat," TASS, April 30, 2022, https://tass.com/.

76. Vladimir V. Putin, "Presidential Address to Federal Assembly," February 21, 2023, Official website of the President of Russia (English version), http://en.kremlin.ru/events/.

BEYOND STORYTELLING

STRATEGIC NARRATIVES IN MILITARY STRATEGY

Nick Blas

Military strategy, rooted in elite politics and in social dynamics, is difficult to separate from strategic narratives. As such, military strategy forms a meaningful discourse that unites political narration, public understanding, and the application of military force to influence an adversary. Together, strategic narratives and military strategy link intent, action, and understanding. Civilian and military practitioners must take seriously their responsibilities with respect to the development of strategic narratives.

More than just stories, strategic narratives establish and maintain convincing story lines that influence military strategies in dynamic conflicts. Today more than ever, military strategy is nested in a nation's strategic narratives. If military professionals have learned anything from recent conflicts, like that in Ukraine, it is that strategic narratives are becoming an imperative. Ukrainian President Volodymyr Zelenskyy has clearly out-narrated Russian President Vladimir Putin throughout the Ukrainian conflict.

But the need for strategic narratives is a growing concern even at the operational level of warfare. The information domain is a wide set of largely dissimilar components, each with unique operational qualities. The underlying connection among them is a respect for the cognitive element of war, particularly the perceptions and attitudes of the players. Within this context, military strategy is situated in broader political and public spheres that are linked by storytelling. As such, strategic narratives function at a crucial confluence of perceptions of security, interests, and legitimacy.

Military strategic thought has increasingly recognized the need to acknowledge the power of strategic narratives. Late last year, the Office of the Chairman of the Joint Chiefs of Staff J-7 published Joint Publication (JP) 3-04, *Information in Joint Operations*, which fills a long-standing gap in Joint doctrine. This new doctrine is an outgrowth of the requirement to be on the leading edge of the information domain, and more specifically, to understand the role of strategic narratives within conflict ecologies.

The new doctrine explains, "A defining feature of the security environment is how competitors, adversaries, and enemies are using information as they seek to gain relative

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advantage over the US and use that advantage to affect behavior and achieve their objectives."[1] These adversaries are seeking means to apply their strategic narratives in a way that disrupts the political and public spheres. This disruption through directed strategic narratives can become particularly salient during times of conflict. People make sense of war through stories, without which they are left wondering its meaning.[2] Thus, military strategy should form a meaningful discourse between political narration, public understanding, and the application of military force to influence an adversary.[3] Put simply, strategic narratives within a military strategy form direct links between intent, action, and comprehension. Therefore, it is incumbent on civilian and military practitioners to realize their responsibilities with respect to crafting and sustaining strategic narratives.

Strategic Narratives

A strategic narrative is a story line used to forge consensus and influence audiences to understand complex events in a way that supports a particular stance and its associated actions. Lawrence Freedman defines a strategic narrative as being "designed or nurtured with the intention of structuring the responses of others to developing events"; such narratives "are strategic because they do not arise spontaneously but are deliberately constructed or reinforced out of the ideas and thoughts that are already current."[4] Nations inherently compete to be the authoritative voice in recounting a course of events by strategically employing narratives in support of their position.[5] Strategic narratives can connect and influence audiences through three essential storytelling components: a plot that establishes the context of the event, a set of subjects that drive the story's action, and a conclusion that argues for a clear moral path forward.

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1. Chairman of the Joint Chiefs of Staff (CJCS), *Information in Joint Operations*, Joint Publication (JP) 3-04 (Washington, DC: CJCS, 2022), I-2.

2. Beatrice De Graaf, George Dimitriu, and Jens Ringsmose, "Shaping Societies for War: Strategic Narratives and Public Opinion," in *Strategic Narratives, Public Opinion and War: Winning Domestic Support for the Afghan War*, ed. Beatrice De Graaf, George Dimitriu, and Jens Ringsmose (Abingdon, Oxon, UK: Routledge, 2015), 7; and "How to Operate Strategic Narratives: Interweaving War, Politics, and the Public," in *Strategic Narratives*, 352.

3. David Barry and Michael Elmes, "Strategy Retold: Toward a Narrative View of Strategic Discourse," in *The Aesthetic Turn in Management*, ed. Stella Minihan (London: Routledge, November 2017), 432; Barry R. Posen, "Foreword: Military Doctrine and the Management of Uncertainty," *Journal of Strategic Studies* 39, no. 2 (2016): 167, https://www.tandfonline.com/; Rupert Smith, *The Utility of Force: The Art of War in the Modern World* (London: Penguin Books, 2005), 12–13; and Emile Simpson, *War from the Ground Up: Twenty-First Century Combat as Politics* (Oxford: Oxford University Press, 2018), 43.

4. Lawrence Freedman, *The Transformation of Strategic Affairs* (New York: Routledge, 2017), 30.

5. Jelena Subotic, "Narrative, Ontological Security, and Foreign Policy Change," *Foreign Policy Analysis* 12, no. 4 (2015): 611; Shaul R. Shenhav, "Political Narratives and Political Reality," *International Political Science Review* 27, no. 3 (2006): 250; James Pamment, "Strategic Narratives in US Public Diplomacy: A Critical Geopolitics," *Popular Communication* 12, no. 1 (2014): 50; and Thomas Colley, "What's in It for Us: Responses to the UK's Strategic Narrative on Intervention in Libya," *RUSI Journal* 160, no. 4 (2015): 61–62.

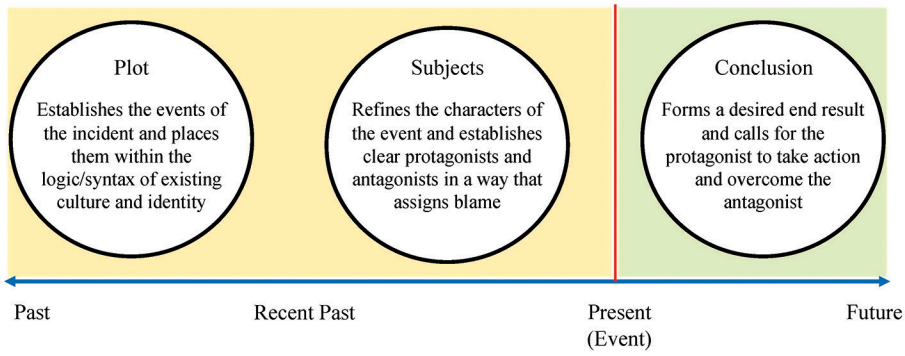

Figure 1. Narrative format

Strategic narrative plots create understanding by explaining contemporary events in a historical context that resonates with audiences (fig. 1). For example, 9/11 has often been explained through references to Pearl Harbor as a parallel instance of a deadly surprise attack on American soil that profoundly changed the social dynamics of the United States and the US military's approach to counterterrorism efforts. Narratives derive historical context from cultural memory, but the plots are constructed with significant interpretation.[6]

These narratives produce social meaning for people by making a temporal connection with their sometimes collective and traumatic history. Strong narratives draw on the existing frames of reference to establish threat and tension in the plot.[7] Narratives evoke deep emotional identification, and broad social understanding establishes a socially constructed context to comprehend a current event.

The characterization of a narrative's subjects as protagonist and antagonist is the second component of narrative formation that embeds story lines into societal understanding. Strategic narratives accomplish this by pulling from historical stories of good and evil. The development of protagonists and antagonists within a strategic narrative resonates with audiences when a dichotomous relationship is established within easily grasped story lines (fig. 1). Societies tend to gravitate toward narratives

6. Rick Busselle and Helena Bilandzic, "Fictionality and Perceived Realism in Experiencing Stories: A Model of Narrative Comprehension and Engagement," *Communication Theory* 18, no. 2 (2008): 257–60; Shaul R. Shenhav, *Analyzing Social Narratives* (New York: Routledge, 2015), 11–12; Melanie C. Green and Timothy C. Brock, "The Role of Transportation in the Persuasiveness of Public Narratives," *Journal of Personality and Social Psychology* 79, no. 5 (2000): 701–2; and Donald E. Polkinghorne, *Narrative Knowing and the Human Sciences* (Albany, NY: SUNY Press, 1988), 62–64.

7. Alexandra Homolar, "Rebels without a Conscience: The Evolution of the Rogue States Narrative in US Security Policy," *European Journal of International Relations* 17, no. 4 (2011): 707; Robert M. Entman, *Projections of Power: Framing News, Public Opinion, and US Foreign Policy* (Chicago: University of Chicago Press, 2004), 6–7; David Campbell, *Writing Security: United States Foreign Policy and the Politics of Identity* (Minneapolis: University of Minnesota Press, 1992), 348; and Todd H. Hall, "We Will Not Swallow This Bitter Fruit: Theorizing a Diplomacy of Anger," *Security Studies* 20, no. 4 (2011): 531.

with protagonists who are familiar national heroes and antagonists who are clearly identified as villains.[8]

In a primarily American context, an excellent example of this characterization is seen in old western movies where—as clichéd as it might be—"good guys" wear white hats and "bad guys" wear black hats. This reductive characterization of good and bad can blur the lines between story and reality. As an individual becomes immersed in the narrative story line, the story's plot and characters become more real than the factual details of the actual events and their players.[9] This often unnoticed subtle shift of perspective can cause greater identification with protagonists and more animosity toward the antagonists.

As the third component, a conclusion takes a story line into the future and establishes a desired moral goal not entirely based on rational calculations or material interests. Strong strategic narratives project desired ends to the story that draw its audience into moral considerations rather than cost-benefit calculations (fig. 1).

As the conclusion of a strategic narrative shapes desired ends, it will inevitably ignore some elements of truth and overemphasize moral claims as it develops an emotional hold on its audience and influences how they choose to act.[10] Such conclusions can emphasize social anger, call for retribution, or evoke ethical pacifism. Instead of being purely analytical, narratives thus influence rationality relative to the expected outcome promised by the story line. As E. H. Carr aptly explains, "The greater the emotional stress, the nearer and more concrete is the goal."[11] The linking of anger, morality, and outcome expectancy can lead to a distinctly nonmaterial and nonrational course of action.

Much of the influence found in narratives is a function of the storytelling format that develops emotional identification with large audiences, which creates a catalyst for moral action. People tend to identify more with narratives that evoke intense feelings of fear, desire, and hope.[12] Even when an individual was not present during an

8. Séverine Autesserre, "Dangerous Tales: Dominant Narratives on the Congo and Their Unintended Consequences," *African Affairs* 111, no. 443 (2012): 207; Busselle and Bilandzic, "Fictionality and Perceived Realism," 258; Merlijn van Hulst and Dvora Yanow, "From Policy Fictionality and Perceived Realism in Experiencing Stories: A Model of Narrative Comprehension and Engagement 'Frames' to 'Framing': Theorizing a More Dynamic, Political Approach," *American Review of Public Administration* 46, no. 1 (2016): 96; and Lene Hansen, "Theorizing the Image for Security Studies: Visual Securitization and the Muhammad Cartoon Crisis," *European Journal of International Relations* 17, no. 1 (2011): 58.

9. Busselle and Bilandzic, "Fictionality and Perceived Realism," 261–62; Green and Brock, "Role of Transportation," 701–2; and Janice Bially Mattern, "Why Soft Power Isn't So Soft: Representational Force and the Sociolinguistic Construction of Attraction in World Politics," *Millennium* 33, no. 3 (2005): 596.

10. Subotic, "Narrative," 612.

11. Edward Hallett Carr, *The Twenty Years' Crisis, 1919-1939: An Introduction to the Study of International Relations* (London: Macmillan & Co, 1946), 90.

12. Campbell, *Writing Security*, 70; Hansen, "Theorizing the Image," 53; Richard Ned Lebow, "Power, Persuasion and Justice," *Millennium* 33, no. 3 (2005): 575; and Robert Jervis, *Why Intelligence Fails: Lessons from the Iranian Revolution and the Iraq War* (Ithaca, NY: Cornell University Press, 2010), 3.

event, a narrative laced with strong emotional content can make them feel as though they were.

As the need for judgment and politics pushes at the bounds of facts, strategy becomes more social than rational.[13] The attacks on 9/11 are a prime example. For those who watched the events unfold from a distance, the horror, anger, and sorrow they felt were real. Scholars describe this connection as narrative identification, which enables individuals to engage with the story in such a way that they become immersed in the traumatic event.[14] In this immersive process, broad audiences connect to a salient story line that helps define social understanding. Subsequent action can be inspired by the emotional connections people experience through narrative story lines.

But the complexity of a conflict's environment makes forming and maintaining a military strategic narrative difficult without a firm knowledge of the relevant narrative groups. One scholar described this environment as a "politically kaleidoscopic battlespace," where audiences do not intrinsically recognize what is being communicated through the application of force.[15] Therefore, a military strategy that does not start with a focus on strategic narratives will rarely communicate to its audiences the desired outcomes of an action and its political intent. Instead, to overcome this obstacle, it is advisable to use an anthropological approach to developing such a narrative within a military strategy by focusing on societal groups, relationships, status dynamics, and nonstate-based frameworks.[16]

Operational planners can, and should, leverage a strategic narrative, but they must understand the conditional effectiveness of narratives within a contested environment. Groups, and more importantly, adversaries will develop strategic narratives that run counter to one's strategic goals. The conditional nature of strategic narratives brings up two important considerations for planners. First, there are always other and likely opposing strategic narratives at play. Second, strategic narratives are never static and will evolve as the conflict dynamics and environment change. The environment pulls and shapes strategic narratives in a way that demands planners be vigilant about monitoring adversary and internal strategic narratives at all operational planning and execution phases.

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13. Richard Ned Lebow, *The Tragic Vision of Politics: Ethics, Interests and Orders* (Cambridge: Cambridge University Press, 2003), 169, 96–97; Gordon A. Creig and Felix Gilbert, "Reflections on Strategy in the Present and Future," in *Makers of Modern Strategy: From Machiavelli to the Nuclear Age*, ed. Gordon Craig and Peter Paret (Princeton, NJ: Princeton University Press, 1986), 863–64; Liddell B. H. Hart, *Strategy*, 2nd rev. ed. (London: Meridian, 1991), 323; and Lawrence Freedman, "The Possibilities and Limits of Strategic Narratives," in *Strategic Narratives*, 23–24.

14. Jonathan Cohen, "Defining Identification: A Theoretical Look at the Identification of Audiences with Media Characters," *Mass Communication and Society* 4, no. 3 (2001): 245; Barry and Elmes, "Strategy Retold," 433–34; Melanie C. Green et al., "Narrative Effects," in *Media Effects: Advances in Theory and Research*, 3rd ed., ed. Jennings Bryant, Mary Beth Oliver, and Arthur A. Raney (New York: Routledge, 2009), 130–33; and Robin L. Nabi, "Media and Emotion," in *Media Effects*, 163–70.

15. Simpson, *Ground Up*, 23.

16. David Kilcullen, "New Paradigms for 21st Century Conflict," *Foreign Policy Agenda* 12, no. 5 (2007): 42.

Integrating Strategic Narratives with Military Strategy

Military strategy outlines the causal linkages that compose an underlying problem to be addressed and determines the means that best empower inherent capabilities to solve the challenge or defeat the adversary. The application of military force in politically complex situations warrants a common understanding of the negotiating objectives, because without firmly agreed-upon ends, new rationales can cause unexpected complications.[17] Thus, strategy is the schematic that connects means to ends in a logical and achievable fashion. Specifically, operational design within military strategy is the process of framing and managing the underlying political problems that necessitate the application of military means.[18] The intent of operational design within military strategy is to enable an orderly and analytical process that can be applied to complex situations.

Modern warfare necessitates military strategy be nested in a nation's strategic narratives to effectively translate the application of force into national objectives. Placing military strategy into a broader context of strategic narratives enables a greater understanding of a strategy's connection with the political and public spheres. Military planners inherently reach for strategic narratives as they operationally design military actions to affect the battlespace in a way that achieves a transition from the observed environment to the desired environment. This transition requires a degree of common understanding among multiple groups within the environment and an interpretive framework for the application of force.[19] Strategic narratives form the bridge that increases connections among the groups within an environment and which thus helps translate military force into strategic objectives.

Joint doctrine has begun to provide specific guidance on the application of strategic narratives within military strategy, but the connection between theory and practice needs further elucidation. Such narratives would ideally provide a straight vector from

17. Herbert R. McMaster, *Dereliction of Duty: Johnson, McNamara, the Joint Chiefs of Staff, and the Lies That Led to Vietnam* (Boston: HarperCollins, 1998), 29; Emily Goldman, *Power in Uncertain Times: Strategy in the Fog of Peace* (Redwood City, CA: Stanford University Press, 2010), 8; Emanuel Adler, "Complex Deterrence in the Asymmetric-Warfare Era," in *Complex Deterrence: Strategy in the Global Age*, ed. Thazha V. Paul, Patrick M. Morgan, and James J. Wirtz (Chicago: University of Chicago Press, 2009), 86–87; and Peter V. Jakobsen and Jens Ringsmose, "How the Danish Public Was Persuaded to Support an Unprecedented Costly Military Endeavor in Afghanistan," in *Strategic Narratives*, 144.

18. Robert Erdeniz, "Operations Planning Revisited: Theoretical and Practical Implications of Methodology," *Defence Studies* 16, no. 3 (2016): 248–49; and Jeffrey M. Reilly, *Operational Design: Distilling Clarity from Complexity for Decisive Action* (Maxwell AFB, AL: Air University Press, 2012), 1.

19. Cori E. Dauber, "The TRUTH Is out There: Responding to Insurgent Disinformation and Deception Operations," *Military Review* 89, no. 1 (2009): 14–15; David T. Culkin, "Discerning the Role of the Narrative in Strategy Development," *Military Review* 93, no. 1 (January–February 2013): 63, https://www.armyupress.army.mil/; Alister Miskimmon, Ben O'Loughlin, and Laura Roselle, *Forging the World: Strategic Narratives and International Relations* (Ann Arbor: University of Michigan Press, 2017), 23; and Lene Hansen, *Security as Practice: Discourse Analysis and the Bosnian War* (London: Routledge, 2006), 6.

the highest levels of strategy down to the tactics used on the battlefield.[20] Establishing this connection is difficult at best, but operational planners can begin by applying strategic narratives in three aspects.

The first use of a strategic narrative within military strategy is to understand the context of a conflict's environment. Studying the narratives operating within a conflict environment can help the planner discern the observed/current situation and the desired future outcome. This is an important element to strategic design within the planning process. Studying the presence of strategic narratives helps planners understand the conflict environment, and thus, planners can better leverage the influence of strategic narratives.

The second phase of strategic narrative employment is intended to maintain legitimacy for sustained domestic support and to link actions with national security objectives. American Joint military doctrine recognizes the importance of strategic narratives to synchronize the actions and messaging of efforts to achieve mission accomplishment.[21] Without a level of domestic support, it is extremely difficult to conduct extended military operations.[22]

Third, strategic narratives are a significant consideration when ensuring military force is applied with a purposeful design to elicit a desired response from an adversary and achieve national security ends. Momentary battlefield victories should be considered secondary to the effective application of military force to achieve deliberately chosen strategic objectives through messaging.[23] These three phases set a functional schematic for the use of strategic narratives within formulations of strategy.

The Operational Environment

Strategic narratives play an essential role in the initial stages of operational design as the planner makes sense of the current environment and defines the desired environment. Narratives are a human's primary means of forming explanations and predicting future outcomes.[24] Though they often go unnoticed, these threads shape human understanding of events and establish patterns of thought that develop into mechanisms to achieve strategic ends. Within the operational design process, nar-

20. David Betz, "Communication Breakdown: Strategic Communications and Defeat in Afghanistan," *Orbis* 55, no. 4 (2011): 615; Erik Noreen and Jan Angstruom, "A Catch-All Strategic Narrative: Target Audiences and Swedish Troop Contribution to ISAF in Afghanistan," in *Strategic Narratives*, 282–83; and Simpson, *Ground Up*, 46.

21. CJCS, *Joint Planning*, JP 5-0 (Washington, DC: CJCS, 2020), I-3, III-61.

22. CJCS, *Joint Operations*, JP 3-0 (Washington, DC: CJCS, 2022), III-14.

23. Antulio J. Echevarria, *Toward an American Way of War* (Carlisle, PA: US Army War College Press, 2004), 10; Smith, *Utility of Force*, 5; Robert J. Art and Kelly M. Greenhill, eds., *The Use of Force: Military Power and International Relations*, 8th ed. (New York: Rowman & Littlefield, 2015), 11; and Andrew Mack, "Why Big Nations Lose Small Wars: The Politics of Asymmetric Conflict," *World Politics* 27, no. 2 (1975): 177, https://www.jstor.org/.

24. Mark Turner, *The Literary Mind: The Origins of Thought and Language* (New York: Oxford University Press, 1996), 28–29.

ratives are a crucial sense-making tool that enables a better understanding of the operational environment and focuses strategies on effectively bringing conflicts to their desired conclusion.[25]

A strategic narrative provides the purpose of military action, connects strategies with society, and articulates the desired political end states.[26] By comprehending the nature of strategic narratives, planners can form a more coherent picture of the operational environment. Without a sound grasp of the current and desired environments, however, operational plans run a greater risk of being conceived on ill-defined goals or faulty rationale, leading to the misapplication of military force.

Going beyond sense-making, a strategic narrative's use of plots, characters, and conclusions allows for a logical progression from the observed to the desired environment within an operational design: "A strategic narrative is, in fact, strategy in narrative form."[27] Furthermore, Joint military doctrine requires planners draft a narrative that describes the two environments and outlines relationships and tensions, thus enabling a sound understanding for the command and all involved.[28]

The very act of operational design calls for a coherent strategic narrative. As planners consider the conflict's plot and characters, they can form contextual threads that link actions with the intended results. Concurrently, the strategic narrative's conclusion establishes the operational priorities and plays an outsized role in determining the criteria for conflict resolution. From an operational planning perspective, a strategic narrative's plot, character, and conclusion enable military action to shape an adversary's behavior toward achieving the desired environment.

Demarcating Legitimacy and Operational Action

Undeniably, few other events grab more attention than the commitment of military forces in a conflict.[29] Military conflict touches on public concerns in an extremely human way. Today, employing the military comes with an inescapable requirement to explain the necessity of force to domestic audiences through strategic narratives that maintain the legitimacy of action. Beyond just the physical, stories are how the public fundamen-

25. Culkin, "Role," 62–63; David Betz, *Carnage and Connectivity: Landmarks in the Decline of Conventional Military Power* (New York: Oxford University Press, 2015), 43; and Simpson, *Ground Up*, 32.

26. George Dimitriu and Beatrice De Graaf, "Fighting the War at Home: Strategic Narratives, Elite Responsiveness, and the Dutch Mission in Afghanistan, 2006–2010," *Foreign Policy Analysis* 12, no. 1 (2016): 6; Barry and Elmes, "Strategy Retold," 433; Alister Miskimmon, Ben O'Loughlin, and Laura Roselle, "Great Power Politics and Strategic Narratives of War," in *Strategic Narratives*, 59–60; and Jeremy Black, *War and the New Disorder in the 21st Century* (New York: Continuum, 2004), 3, 163–64.

27. De Graaf, Dimitriu, and Ringsmose, "How to Operate," 353.

28. CJCS, JP 5-0, IV-17; CJCS, JP 3-0, III-18; Erdeniz, "Operations Planning Revisited," 251, 253–54; and Reilly, *Operational Design*, 5.

29. Louis Klarevas, "The 'Essential Domino' of Military Operations: American Public Opinion and the Use of Force," *International Studies Perspectives* 3, no. 4 (2002): 418; and Thomas W. Smith, "The New Law of War: Legitimizing Hi-Tech and Infrastructural Violence," *International Studies Quarterly* 46, no. 3 (2002): 370.

tally understands its sense of safety and related security issues.[30] Strategic narrative plots that engage the emotions of fear and self-preservation can strongly impact security perceptions.

Alternatively, when domestic audiences fail to see the security necessity of a conflict, a nation can lose the strategic initiative. Since Vietnam, it has been generally recognized that domestic public opinion and media coverage have a constraining influence on military action.[31] The absence of domestic support for the Vietnam War effort was crippling, and since then, there has been a tacit understanding that American wars can be won or lost at home. Losing legitimacy over casualties caused or suffered during military efforts can effectively determine the negative outcome of a conflict without any decisive result on the battlefield.

The strategic requirement for continued support from domestic audiences demands strategies ensure military action and maintain legitimacy within the strategic narratives. Operational planners must consider the potential domestic, political, and resource hurdles for any military action.[32] In this sense, strategic narratives represent a source of power, because defining the meaning of events is a fundamental exercise in power.[33] Military action is difficult to justify outside of the strategic narrative framework, and mobilization of resources is almost impossible without a supportive story line. The strategic narrative should thus seek to frame the adversary in a way that logically connects the public understanding of the situation with military and political strategy.[34]

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30. Fabrizio Coticchia and Andrea Catanzaro, "The Fog of Words: Assessing the Problematic Relationship between Strategic Narratives, (Master) Frames and Ideology," *Media, War & Conflict* 15, no.4 (2022): 3; and Fabrizio Coticchia and Carolina De Simone, "The Winter of Our Consent? Framing Italy's 'Peace Mission' in Afghanistan," in *Strategic Narratives*, 222–23.

31. Jon Hurwitz and Mark Peffley, "How Are Foreign Policy Attitudes Structured? A Hierarchical Model," *American Political Science Review* 81, no. 4 (1987): 1113; Walter Lippmann, *US Foreign Policy: Shield of the Republic* (Boston: Little, Brown and Company, 1943), 51; Smith, "New Law of War," 358–59; and Thomas J. Christensen, *Useful Adversaries: Grand Strategy, Domestic Mobilization, and Sino-American Conflict, 1947–1958* (Princeton, NJ: Princeton University Press, 1996), 6–7.

32. Randall L. Schweller, "Unanswered Threats: A Neoclassical Realist Theory of Underbalancing," *International Security* 29, no. 2 (Fall 2004): 168–69; Christensen, *Useful Adversaries*, 12–13; Betz, *Carnage and Connectivity*, 125; and Colin S. Gray, *The Strategy Bridge: Theory for Practice* (New York: Oxford University Press, 2010), 167–68.

33. Jutta Weldes, "High Politics and Low Data," in *Interpretation and Method: Empirical Research Methods and the Interpretive Turn*, ed. Dvora Yanow and Peregrine Schwartz-Shea, 2nd ed. (Abingdon, Oxon, UK: Routledge, 2015), 230; Colin Hay, "Narrating Crisis: The Discursive Construction of the 'Winter of Discontent,'" *Sociology* 30, no. 2 (1996): 255; and Henrik Larsen, *Foreign Policy and Discourse Analysis: France, Britain and Europe* (London, UK: Routledge, 1997), 14.

34. Dimitriu and De Graaf, "Fighting the War," 6; Culkin, "Discerning the Role," 61; Barry Posen, *The Sources of Military Doctrine: France, Britain, and Germany between the World Wars* (Ithaca, NY: Cornell University Press, 1984), 13; Janice Gross Stein, "Rational Deterrence against 'Irrational' Adversaries? No Common Knowledge," in *Complex Deterrence*, 59–60; and Thomas J. Wright, *All Measures Short of War: The Contest for the Twenty-First Century and the Future of American Power* (New Haven, CT: Yale University Press, 2017), 162–64.

In a more modern example, the US military recognized the need to maintain legitimacy in the Kosovo campaign. It was generally accepted that no single bomb could win the war, but a single bomb in the wrong place could lose the war. The strategy logically focused on keeping the spotlight on then-President of Serbia Slobodan Milosevic and his crimes against civilians. The necessity to maintain this narrative significantly limited the number of approved targets available for the military's coercive bombing campaign. As the Kosovo campaign demonstrated, society's willingness to support militarized actions constantly relies on its perception of the virtue of the outcome.[35] Strategic narratives have a meaningful role in operational design as planners consider the limits of their operational leeway in developing courses of action within the context of maintaining continued legitimacy.

Military Force

Strategic narratives can bridge the gap between the intentions of military force, the threat of more force, and an opponent's perception of future outcomes to bring about a shift to the desired environment. There is a growing recognition of the need to connect strategic narratives with the nonkinetic side of military force to effect change in an adversary.[36] Operations Enduring Freedom and Iraqi Freedom provide salient examples that force alone does not bring about successful military operations. Now, when evaluating a conflict's outcome, physical destruction of a specific target has less impact than the perceived message derived from the use of force and the conceptional space it provides to political outcomes.

Within this context, force is intended to persuade adversaries to come to a negotiated settlement. The use of force sets the conditions to play on or change an opponent's perceptions to achieve negotiated ends.[37] As such, the strategic narrative becomes a primary objective; success or failure is derived from projecting one's narrative on the

35. Arnold Wolfers, " 'National Security' as an Ambiguous Symbol," *Political Science Quarterly* 67, no. 4 (1952): 488–89; Hurwitz and Peffley, "Foreign Policy Attitudes," 1109; Rocio Garcia-Retamero, Stephanie M. Müller, and David L. Rousseau, "The Impact of Value Similarity and Power on the Perception of Threat," *Political Psychology* 33, no. 2 (2012): 182–83; and Christensen, *Useful Adversaries*, 4–5.

36. Laura Roselle, Alister Miskimmon, and Ben O'Loughlin, "Strategic Narrative: A New Means to Understand Soft Power," *Media, War & Conflict* 7, no. 1 (2014): 73, https://journals.sagepub.com/; *Cyber-Enabled Information Operations, Hearing before the Senate Armed Services Subcommittee on Cybersecurity*, 115th Cong. (2017) (testimony of Rand Waltzman, senior information scientist at RAND Corporation), 2, https://www.armed-services.senate.gov/; Betz, *Carnage and Connectivity*, 92; and Joseph S. Nye Jr., "Public Diplomacy and Soft Power," *The Annals of the American Academy of Political and Social Science* 616, no. 1 (2008): 99–102.

37. Andrew J. Bacevich, *The New American Militarism: How Americans Are Seduced by War* (New York: Oxford University Press, 2013), 494; Robert J. Art, "American Foreign Policy and the Fungibility of Force," *Security Studies* 5, no. 4 (1996): 10–11; Paul Huth, Christopher Gelpi, and D. Scott Bennett, "The Escalation of Great Power Militarized Disputes: Testing Rational Deterrence Theory and Structural Realism," *American Political Science Review* 87, no. 3 (1993): 610; and Liddell B. H. Hart, *Paris: Or, the Future of War* (New York: E. P. Dutton, 1925), 31.

enemy to overcome their desire to fight.[38] The aim of military force in any conflict should be socially and politically oriented toward enticing an opponent to change their behavior.

Strategic narratives can be further employed to influence an opponent's perception of threat and their ability to maintain legitimacy in a conflict. In many of the recent historic victories of smaller forces over superior military powers, a common denominator was the ability of the smaller oppositional element to influence the opponent's internal political and social discourse.[39] A strategic narrative can be potentially employed in a way that generates internal division over the interests and legitimacy of a conflict to the point that it disrupts an opponent's ability to continue fighting. The objective then is to cultivate strategic narratives that have a high chance of disrupting an enemy's narrative in such a way that the narrative itself experiences internal dissonance.[40]

One benefit of a strategic-narrative-focused strategy is thus avoiding the circular argument that extra force means more persuasion. Strategic narratives should not necessarily be seen as a replacement for the use of force, but rather as being pervasively connected to all aspects of a military campaign.[41] Strategic narratives continue a dialogue with an opponent and ultimately reach a compromise that ends hostilities.

Conclusion

Strategic narratives produce conscious discernment of the world and events outside the logic of pure rational calculations. The pace of information dissemination creates a more interconnected society, which increases the importance of strategic narratives' influence on understanding. Everyone tells stories to make sense of the world; this storytelling is innate to everyday lives. But the concept can also be aggregated in such a way to help explain the actions of nations. Within today's dynamic informatized world, it is becoming more difficult to separate the narratives from rational-based interests and threats.

The US military can learn three significant lessons from recognizing strategic narrative's role in operational planning. The first is that strategic narratives form a source of power through their ability to define the meaning of events. Strategic narratives will likely be a particularly important component of competition and conflict between the United States and peer adversaries. Second, understanding that adversaries have their

38. Simpson, *Ground Up*, 61; Smith, *Utility of Force*, 276–77; Joseph S. Nye, "The Information Revolution and Soft Power," *Current History* 113, no. 759 (2014): 19–20; and Marshall McLuhan, *Understanding Media: The Extensions of Man*, 1st ed. (Cambridge, MA: MIT Press, 1994), 370.

39. Mack, "Nations," 177–78.

40. De Graaf, Dimitriu, and Ringsmose, "Shaping Societies," 4–5; Betz, "Communication Breakdown," 623; Waltzman, Testimony, 6; and Neils Röling and Marlene Maarleveld, "Facing Strategic Narratives: In Which We Argue Interactive Effectiveness," *Agriculture and Human Values* 16 (September 1999): 302, https://www.springer.com/.

41. Betz, "Communication Breakdown," 624; Kilcullen, *Accidental Guerrilla*, 313; Miskimmon, O'Loughlin, and Roselle, "Great Power Politics," 57–58; and William Maley, "The War in Afghanistan: Australia's Strategic Narratives," in *Strategic Narratives*, 82.

own strategic narratives is essential. Within any war, a military strategy should attempt to account for the dynamic strategic narratives that are involved in the conflict, and the adversary's strategic narratives need to be understood and overcome. Third, military force is difficult to justify without the strong reinforcement of a strategic narrative.

A few recommendations emerge from these implications. Further attention should be given to the need for greater civil-military integration when considering how strategic narratives are operationalized both in conflict and in confrontations that are below the level of war. Additionally, more research is required to understand how strategic narratives could affect democracies versus authoritarian regimes. A democracy might seem more susceptible to adversary narratives, but it also has a level of resiliency gained through deliberative processes. Conversely, authoritarian regimes seem more capable of controlling information, but this need to control the narrative can also become a weakness.

Finally, as full-scale conflicts between peer states become more devastating, focusing on strategic narratives could provide avenues to ameliorate tensions or resolve conflict faster. Military strategists and planners have made great strides in better understanding how to operationalize strategic narratives. Significant room remains, however, for further research and growth in perceiving the role of these narratives in military strategy. **Æ**

MEDICAL SUPPORT TO THE DoD ARCTIC STRATEGY

Elizabeth Anne L. Hoettels

The current Joint Health Services Support annex to the *DoD Arctic Strategy* has four critical deficits. No one individual or entity has ownership of the entire effort; affected departments have disparate foci on cold-weather medicine support; resources are not being coordinated with Joint operations and capabilities in mind; and individual services are not thinking Jointly when coordinating their service-level efforts. Waiting until conflict commences to remedy these issues will be too late. Improving the Joint Health Services Support annex to the *DoD Arctic Strategy* based on valid US planning assumptions and Ally, partner, and adversary strategies is the linchpin to facilitating Joint medical readiness capabilities that will safeguard US national interests in the Arctic.

A remote, harsh land, the Arctic is quickly becoming an arena of potential competition and conflict as sea ice vanishes due to climate change. The United States, an Arctic nation by virtue of Alaska, perceives the rising engagement and aggressive behavior by adversaries in the region as a potential threat to its national security. As recently as the October 2022 *National Strategy for the Arctic Region*, the United States has reiterated the importance of a peaceful, stable, and prosperous Arctic as an area of cooperation.[1] The updated national strategy was preceded in 2019 by the *DoD Arctic Strategy* and subsequent service-specific Arctic strategies.[2] Based on these service-focused documents, respective medical components are developing medical concepts for cold-weather medicine in a siloed fashion. This wastes resources and does not meet the intent of a Joint warfighting concept. The linchpin to facilitating integrated health services to support the *DoD Arctic Strategy* is an updated, Joint-focused Health Services Support annex.

While it may seem a challenge of glacial proportions, experienced medical strategists and planners should promptly revise the annex to facilitate Joint medical capabilities

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1. Joseph R. Biden Jr., *National Strategy for the Arctic Region* (Washington, DC: The White House, October 2022), https://www.whitehouse.gov/.

2. Department of Defense (DoD), Office of the Under Secretary of Defense for Policy (OUSDP), *Report to Congress: Department of Defense Arctic Strategy* (Washington, DC: DoD, June 6, 2019), https://media.defense.gov/.

that safeguard US national interests in the Arctic. It will be imperative to incorporate US strategic documents, Ally and partner strategies, and the military strategy of Russia, a highly likely adversary in a future Arctic conflict. In addition, the Joint Staff surgeon's office should designate Alaska Command (ALCOM) as the global synchronizer of Arctic medicine concepts, training, and equipment. This offers a route for genuine collaborative efforts. Finally, colocating a cold-weather medicine center of excellence with the Ted Stevens Center for Arctic Security Studies better promotes an all-of-government approach while allowing medics to understand policy at the strategic level.

Introduction

Often portrayed as the last frontier, the Arctic is an untouched, remote, and harsh land where only the most tenacious souls survive. It "produces an antipathy to control . . . particularly to any direct control," requiring strength to overcome it, a strength evident in America's founding characteristics.[3] Historically, the Arctic acquired special notoriety in Western military writing, which highlighted suffering, devastation, and defeat during campaigns in the high north.[4]

Although the land is unforgiving, it is also unique, mysterious, and rich in rare phenomena and natural resources, attracting those seeking to discover and exploit its wonders. Moreover, as climate change alters the once-timeless landscape, it is transforming into an arena with increased human presence and international competition. As the sea ice vanishes and permafrost thaws, Arctic and "near-arctic" states such as China are competing for trade routes, natural resources, and influence—some with adversarial intent. Naval borders once protected by the harsh environment are now vulnerable and require active defense.

Unlike Antarctica, which in its entirety is protected by international law that ensures peace and scientific cooperation, the Arctic has no such safeguards. Currently, the only international law that pertains to the region is the 1982 UN Convention on the Law of the Sea that declares a state's territorial sea extends from the shore up to 12 nautical miles, leaving decisions about the remainder of the Arctic Ocean to the Arctic Council—a forum comprising the United States, Canada, Denmark, Finland, Iceland, Russia, Norway, and Sweden.[5] According to NATO, as a result of the lack of international law, nations are establishing military presences in the area, creating challenging security concerns.[6] Today, states within and outside the Arctic Circle jostle for positions

3. Trent Hone, *Learning War: The Evolution of Fighting Doctrine in the US Navy, 1898–1945* (Annapolis, MD: Naval Institute Press, 2018).

4. Richard N. Armstrong and Joseph G. Welsh, eds., *Winter Warfare: Red Army Orders and Experiences* (Portland, OR: Frank Cass, 1997), 3.

5. United Nations Convention Concerning the Law of the Sea, BE, CA, GE, IT, JA, NE, IRL, US, UK, Montego Bay, Jamaica, signed December 10, 1982, effective November 16, 1994, United Nations, https://www.un.org/.

6. Kirby R. Dennis, "Preparing for the Unexpected: Enhancing Army Readiness in the Arctic," *Military Review* (July–August 2020), 7, https://www.armyupress.army.mil/.

to claim oil and gas reserves, fisheries, and mineral deposits with considerable economic value.[7]

Optimistically, this geopolitical competition creates the potential for the Arctic to become an area of cooperation. But more realistically, it will likely become one of tension and conflict, particularly with Russia. As an Arctic nation, the United States abides by its Arctic strategy that reiterates the requirement to be prepared to respond to conventional and asymmetric provocations to protect the region's political, economic, environmental, and other interests and international norms.[8]

The Obama administration was the first to publish a post-Cold War national Arctic strategy in 2013, which declared the need to safeguard peace and ensure stability.[9] In 2019, the Department of Defense published an Arctic strategy.[10] Each service subsequently produced its strategy, although these documents were not Joint-focused nor did they incorporate civilian support from the government or private sector, including that from the state of Alaska.[11]

In practice, services and components pursued trajectories to prepare for Arctic challenges based on individualized operational concepts and equipment desires. The respective medical departments of the Army, Navy, and Air Force were no exception, creating Arctic medicine training and equipping models without an integrated focus to support the *DoD Arctic Strategy*.[12]

United States military medical support in the Arctic is further complicated by the fact responsibility for the defense of Alaska and the area north of the Arctic Circle is transregional, crossing three US geographic combatant command boundaries—US Northern Command, US Indo-Pacific Command, and US European Command. Yet a consensus on what organization is the lead for coordinating Arctic medical concepts and operations does not exist. Medical assets from these geographic combatant commands and service components work on individual capabilities and request funding separately for their respective projects.

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7. Kjetil Bjørkum, "Arctic Space Strategy: The US and Norwegian Common Interest and Strategic Effort," *Strategic Studies Quarterly* 15, no. 3 (Fall 2021): 89, https://www.airuniversity.af.edu/; and Editorial Board, "Arctic Science Cannot Afford a New Cold War," *Nature* 586, no. 7827 (September 30, 2020): 7–8, https://doi.org/.

8. Dennis, "Unexpected"; Ronald O' Rourke et al., *Changes in the Arctic: Background and Issues for Congress*, R41153 (Washington, DC: Congressional Research Service [CRS], March 24, 2022), 1, https://sgp.fas.org/; and Biden, *Strategy for the Arctic*.

9. Barack Obama, *National Strategy for the Arctic Region* (Washington, DC: The White House, May 2013), https://obamawhitehouse.archives.gov/.

10. OUSDP, *DoD Arctic Strategy*.

11. Biden, *Strategy for the Arctic*.

12. US Army, *Regaining Arctic Dominance: The US Army in the Arctic* (Washington, DC: Headquarters, Department of the Army, January 19, 2021), https://www.army.mil/; Department of the Navy (DoN), *A Blue Arctic: A Strategic Blueprint for the Arctic* (Washington, DC: DoN, 2021), https://media.defense.gov/; and Department of the Air Force (DAF), *The Department of the Air Force Arctic Strategy* (Washington, DC: DAF, July 21, 2020).

The 2022 release of the US *National Security Strategy* and Russia's actions in Ukraine are compelling reasons to revise the Joint Health Services Support annex to the *DoD Arctic Strategy*. The existing annex has a number of deficits:

- While US Northern Command is the annex lead, no one individual, service, or command is orchestrating overall cold-weather medicine support efforts.[13]
- Many service-specific Arctic medicine initiatives supporting the DoD strategy for the area of responsibility have not garnered input from the Alaska Command surgeon general or Alaska Air National Guard components—organizations that will be on the front lines should conflict arise.
- Some medical concepts being fielded by specific services rely on historical combat operational ideas and are insufficiently integrated into future warfighting concepts to enhance an Arctic medical support posture commensurate with the theater's strategic importance.[14]
- Local Alaskan civilians, the indigenous tribal population, and coalition military partners with Arctic expertise are not included as participants in a meaningful way, in contravention of a vital aspect of the 2022 *National Security Strategy*—global alliances and strategic partnerships.[15]
- Larger cold-weather military medicine structural issues exist as well. These challenges create unnecessary friction and confusion in this environment.
- The Departments of Defense and Homeland Security have varying levels of focus on cold-weather medicine.
- Resources are not being coordinated and consolidated to create a Joint cold-weather operational vision and capability.
- Individual services do not tie their ideas to the Joint Warfighting Concept during collaborative meetings as evidenced by the lack of critical stakeholders in their efforts.

Without coordinated and integrated efforts focused on the same strategic problem, health services support in cold-weather operations may result in disjointed execution, impacting the US military's effective performance across all domains.

With the resurgence of attention on great power competition and the growing effects of climate change on the hemispheric poles and strategic military and economic interests, a renewed emphasis on military medical capabilities north of the Arctic Circle is needed. The Air Force designated novel tactical medical innovations and training to address challenges presented by subzero weather as "cold region expeditionary medical operations." The Below Zero medicine team from Alaska Command and Joint Base Elmendorf-Richardson presented these innovations and training to Air Force Medical

13. Author interview with Joint Forces Surgeon General, September 2021.

14. Dennis, "Unexpected."

15. Joseph R. Biden Jr., *National Security Strategy* (Washington, DC: The White House, October 2022), 2–3, 11, 17.

Service senior leaders in December 2020, illustrating the potential for operational medical platforms to excel in this environment.

Updating the Health Services Support Annex

The *DoD Arctic Strategy* and associated medical annex offer actionable ways to reach goals, set direction, and establish priorities to maintain a competitive advantage in the Arctic. Strategy, a collection of ideas for employing capabilities in a synchronized fashion, provides direction and focus, which are critical for any organization's success.[16] It is also a narrative of how entities—in this case medical assets—should operate to bridge the present to the future, laying the groundwork for clinical capability generation.

With a strategy and the resulting assigned responsibilities, actions become purposeful, saving time and resources in the process. Even so, without a single authority, the question of who owns the problem arises, even if all entities involved believe they own that problem. This situation leads to strategic misalignment. In military medicine, strategic misalignment can mean the difference between success and failure on the battlefield.

The current advancement of cold-weather medicine concepts by service-specific medical components suggests these organizations are either unaware the Joint-focused annex exists or, due to frozen cultural mindsets, are simply pressing ahead to maintain forward momentum and claim limited resources first. These individual efforts could also be rooted in a misunderstanding of strategy or the benefits that arise from aligning efforts based on the strategic Joint Warfighting Concept.

On Strategy

An analysis of the annex revealed that the words *strategy* and *strategic* lacked common understanding among stakeholders. Operationally, the terms have different connotations for different individuals and groups. The lack of a common understanding of the terms resulted in an inability to determine who was responsible for the annex at the strategic level. While the process of identifying the owner of the annex created an avenue for connecting a network of individuals working toward the same end goal, it also highlighted how the absence of standard working definitions presents challenges in constructing an integrated plan across operational and tactical levels.

According to Joint Publication (JP) 5-0, *Joint Planning*, strategy is a "prudent idea or set of ideas for employing the instruments of national power in a synchronized and integrated fashion to achieve theater, national, and multinational objectives."[17] In addition, strategies "articulate a story that operates in a competitive space to bridge the

16. Chairman of the Joint Chiefs of Staff (CJCS), *Joint Planning*, Joint Publication (JP) 5-0 (Washington, DC: CJCS, December 1, 2020), https://irp.fas.org/.

17. CJCS, JP 5-0.

present to the future within the duration of the strategy."[18] While the scope of military strategy—in this case, the *DoD Arctic Strategy*—is regionally focused, it must incorporate the other instruments of power and tie itself to national policy objectives to be effective. The approach must be iterative and comprehensive for successful outcomes, bridging the present to the future.[19]

Also, a military strategy incorporates assessments and capabilities, which include medical support required to justify future Joint Force requirements. The context of strategy in this article derives from these definitions. The annex should use the same meanings to ensure a shared understanding among stakeholders. By breaking down complexity and having common, Joint-focused terminology, medical planning teams can be more effective, resilient, and creative.

Building the annex based on a common framework provides an optimal structure to develop and convey ideas across organizations. Joint Publication 5-0 identifies Joint planning requirements for Joint health services under logistics. Specifically, it addresses the need for a common frame of reference and fundamental principles of patient movement, supplies, logistics, and resources, including support to military working dogs.[20]

It also requires establishing Joint medical assumptions that should be articulated in the annex. Joint Publication 4-02, *Joint Health Services*, states that coordination, such as that detailed in the Joint annex, addresses the complexity of medical functions by providing clearly defined roles and responsibilities to "effectively utilize scarce medical resources to their full potential and capability."[21] While there is no prescribed format, medical support can better present a more extensive array of capabilities to a Joint task force or geographic combatant commander by framing the annex in terms of a collective capacity.

Furthermore, JP 4-02 identifies the coordination and execution of these "responsibilities fall to the appropriate JFS [Joint Force Surgeon] level, such as the CCMD [Combatant Command] surgeon . . . until a single Service component or JFS lead is designated."[22] As the Arctic has no current mission for a Joint task force or appointed service lead, the ownership of the annex should reside with the USNORTHCOM surgeon general.

For the annex to be effective, medics must base it on a Joint concept. Working toward a common objective is nothing new for military healthcare specialists. During the last 20 years in the war on terror, medics demonstrated their effectiveness in accomplishing exceptional healthcare results in contingency operations. Still, the Joint mindset is in its infancy across much of the services, and the Joint Staff recognizes all

18. CJCS, *Strategy*, Joint Doctrine Note (JDN) 2-19, (Washington, DC: CJCS, December 10, 2019), II-2, https://www.jcs.mil/.

19. CJCS, JDN 2-19, I-1.

20. CJCS, JP 5-0, A-8.

21. CJCS, *Joint Health Services*, JP 4-02 (Washington, DC: CJCS, September 28, 2018), IV-1, https://www.jcs.mil/.

22. CJCS, JP 4-02, X.

service components have room to grow.[23] The annex must allow Joint medical assets to integrate while maintaining service-specific medical capabilities in contingency operations in the Arctic, where the security environment could be in flux and fraught with environmental challenges.

Assumptions

Before revisions to the Joint Health Services Support annex can commence, strategists and planners must establish assumptions. This process provides a shared operational context in which the premises for Joint medical support can be considered valid.[24] But it is crucial to understand assumptions also incur risk in a plan. When postulations fall outside an assumption, determining a new assumption requires reevaluating all known premises to ensure relevancy. Also, the premises must be revalidated throughout the process and into the future, especially as planning considerations change or events in the world evolve.[25] While not exhaustive, the following recommended assumptions will help medical strategists and planners craft effective Joint medical goals in support of the *DoD Arctic Strategy*.

Assumption 1: The United States will encounter formidable opposition to current capabilities, including in multidomain operations that will impact even nonthreatening evacuation missions.[26] Emerging technologies and integrated threats against air, land, sea, space, and cyberspace, in conjunction with aging weapons systems, will endanger the ability to exploit opportunities to triumph over adversaries.[27]

Assumption 2: Meeting the goal of evacuating casualties at the "golden hour"—the period where a trauma patient's chances of survival are greatest if they receive care—in high-intensive operations in the Arctic will be difficult. Current predictions of the number of potential casualties in light of tactical evacuation assets that can function in the Arctic are grim, and the possibility of contested evacuation due to weather, polar location, navigation, and communication capabilities will directly challenge survivability.[28]

Assumption 3: Despite pursuing a regionally postured naval force and coast guard, sea evacuation support may be limited as an alternate means of moving patients. The Navy does not have ice-hardened ships nor does it plan to pursue the capability. The

23. Todd Kennedy, "Joint Force Capabilities, Why They're Important," Buckley Space Force Base (website), n.d., accessed February 5, 2022, https://www.buckley.spaceforce.mil/.

24. Alan M. Hammons, "Facts and Assumptions at the Theater Strategic and Operational Levels of War—A JPG Primer," Small Wars Journal, March 9, 2018, https://smallwarsjournal.com/.

25. Hammons, "Facts and Assumptions."

26. Sanders Marble, "Larger War, Smaller Hospitals?," *Military Review* (July–August 2020), https://www.armyupress.army.mil/.

27. Air Force Enterprise Capability Collaboration Team, *Air Superiority 2030 Flight Plan* (Washington, DC: DAF, May 2016), https://www.af.mil/; and US Army Training and Doctrine Command (TRADOC), *The Operational Environment and the Changing Character of Warfare*, TRADOC Pamphlet 525-92 (Fort Eustis, VA: TRADOC, October 7, 2019), https://adminpubs.tradoc.army.mil/.

28. Marble, "Smaller Hospitals?"

Coast Guard currently has a limited infrastructure to support expanded medical operations.[29] In addition, any support using water is time-intensive.

Assumption 4: Communication and navigation capabilities may be hindered because existing US communication systems support operations in lower latitudes rather than the Arctic and Antarctic polar regions. Electromagnetic and inertial forces cause signal delays, while ionospheric gradients impact satellite capabilities to clarify navigation in real time, potentially affecting patient movement and evacuation abilities.[30]

Assumption 5: This environment will present congested logistics.[31] When adversaries target logistics modes and nodes in the supply chain, it may inhibit or constrain the supply chain, including all aspects of temporary class 8/medical logistics.[32] Moreover, enduring class 8/medical logistics hubs do not exist in the region.

Assumption 6: Arctic attacks will involve NATO members, potentially triggering mutual defense provisions under Article V of the treaty. Canada, Denmark, Iceland, and Norway are vital stakeholders in this arena. If Finland and Sweden join NATO, it is more likely the United States will be involved in an Arctic conflict.

These six assumptions allow medical strategists, planners, and stakeholders to commence planning with a degree of certainty about how future events in the Arctic may evolve. With these assumptions for US forces in mind, it is also essential to consider the strategies of the most likely adversary in the region—Russia.

Russia's Arctic Strategy

During the fall 2021 tactical- and operational-level planning meetings to cement Arctic medicine concepts, references to past ideas, tactics, and strategies of the United States and its adversaries were common. Using historical references as a starting point may be beneficial for contemplating integrated medical support for the *DoD Arctic Strategy*. Historical research can provide insight into policy objectives, the political and military structure at the time, military order of battle, the use of infrastructure, and physical landscape in which the United States and its opponents fought.[33]

Still, studying the history as to how current adversaries fought in World War II, Korea, and the Cold War and past medical successes merely provides an intellectual foundation upon which to build current concepts and practices. It is imperative to look at the operational and strategic concepts of how adversaries currently fight and will potentially fight in the Arctic to ensure a medical plan is aligned. Misinterpreting and

29. O' Rourke et al., "Arctic"; and US Coast Guard (USCG), *United States Coast Guard Arctic Strategic Outlook* (Washington, DC: USCG Headquarters, Office of Emerging Policy, April 2019), https://www.uscg.mil/.

30. Anna B. O. Jensen and Laura Ruotsalainen, "Challenges for Positioning and Navigation in the Arctic" (slide presentation, Nordic Institute of Navigation), accessed May 8, 2022, https://www.unoosa.org/.

31. Frank Wolfe, "Joint Warfighting Concept Assumes 'Contested Logistics,'" Defense Daily, October 6, 2020, https://www.defensedaily.com/.

32. Wolfe, "Contested Logistics."

33. Michael W. Jones, "Strategic Decision Making—A Case Study," *Military Strategy Magazine* 7, no. 2 (Summer 2020), https://www.militarystrategymagazine.com/.

misapplying history to future strategy can lead to inappropriate or under-resourcing and diluting attention or urgency in vital areas.

Russia—with 53 percent of the Arctic coastline and the largest population living within the region—is the primary Arctic Circle competitor for the United States, its NATO Allies, and its partners.[34] Yet the contest is not constrained to protecting a coastline and industrialized areas. To Russia, conquering the Arctic has great symbolic value. It represents the nation's historical imperialistic determination and offers tremendous prestige, thereby making it a core national interest.[35]

The Arctic is also a perceived area of weakness in its defenses, and this feeds into Russia's general paranoia. But by controlling the hydrocarbon treasures beneath the melting ice, Russia may once again become a global power. With a lack of a diversified economy, Russia sees the hydrocarbons as assisting the regime's survival against the evils the West exacts upon it, including countering recently imposed sanctions. Even if it requires coercive diplomacy and military confrontation, Russia will protect these assets to sell to other buyers such as China and India to ensure continued income flows.[36]

Moscow's current policy for the Arctic explicitly recognizes the potential for conflict, prevention, and adaptation, citing the necessity for a constant increase in military and security forces' capacity and surge capability to counter the threat.[37] The acknowledged threat was formidable enough for Russia to establish an entire command dedicated to the Arctic in 2014. In 2015, Russia launched a Center for Military Medicine in the Arctic focused on emerging diseases and evacuation.[38]

The Arctic Joint Strategic Command has focused on conventional deterrence and hybrid warfare including "low-intensity conflict, network-centric warfare, and sixth-generation warfare, combined with components of reflexive control" to launch offensives against NATO's northern flank.[39] Russia's Northern Fleet, charged with Arctic operations, is considered its most prestigious naval unit, indicating its value in Arctic operations.

Russia has also strengthened its cold-weather air defense and submarine capabilities to fight a high-tech conventional war but has "substantial and potentially usable

34. "Russia," Arctic Institute Center for Circumpolar Security Studies (Arctic Institute) (website), updated August 1, 2022, https://www.thearcticinstitute.org/.

35. Pavel K. Baev, "Russia's Arctic and Far East Strategies," in *Russia's Military Strategy and Doctrine*, ed. Glen E. Howard and Matthew Czekaj (Washington, DC: Jamestown Foundation, 2019).

36. Baev, "Strategies," 77; and Jonathan Jordan, "Russia's Coercive Diplomacy in the Arctic," Arctic Institute, July 6, 2021, https://www.thearcticinstitute.org/.

37. Elizabeth Buchanan, "Russia's 2021 National Security Strategy: Cool Change Forecasted for the Polar Regions," Royal United Services Institute (RUSI) (website), July 14, 2021, https://rusi.org/.

38. Е. А. Солдатов et al., "Медицинское обеспечение в Арктике: 2015 г," trans. Brian Hoettels, *Военно-медицинский журнал* 337, no. 5 (May 15, 2016): 44–51, https://journals.eco-vector.com.

39. Baev, "Strategies," 87; and Jānis Bērziņš, "Not 'Hybrid' but New Generation Warfare," in *Russia's Military Strategy*, 158.

nuclear weapons on standby and always on display" that President Vladimir Putin considers first-use in his playbook.[40] Russia's statement that it will use nuclear weapons in response to the West's support of Ukraine requires purposeful consideration. Based on previous military exploits in Chechnya and Syria, Russia's decision to use chemical weapons, including thermobaric munitions, cannot be ruled out.[41]

Still, Russia's view on modern warfare centers on the mind as the primary battlespace; information and psychological operations to intimidate and demoralize the attitudes of the enemy's military and civilian population will be the way of war in its future.[42] Medical operations in the Arctic can be impacted by Russian strategic concepts of warfare and pose varying challenges to treatment, transportation, and survival rates. The challenge will be to formulate medical ideas that "operate within these areas of warfare and [rapidly] provide clinical best practices in a thoroughly dynamic [Arctic] environment."[43]

Historically, the Arctic has posed significant challenges for medical response to military action, including conflict on home territory in Alaska. The following recommendations are intended to support an update to the Joint Health Services Support annex and offer additional ideas for support.

Annex-Specific Recommendations

Urgency

First and foremost, the USNORTHCOM surgeon general team should prioritize revisions to the Joint Health Services Support annex, especially in light of recent events in Ukraine.

Medical Strategists

Annex authors should be experienced strategists or planners, preferably with a relevant medical background in Arctic operations from all medical service components. Military medical strategists are the stewards of the process. They will understand how to include current and forward-thinking medical concepts to support the *DoD Arctic Strategy*. In addition, they know how to incorporate relevant future-focused objectives, identify and evaluate performance measures, and adjust operations as needed based on changes to the internal and external environments.

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40. Stephen Blank, "Putin's 'Asymmetric Strategy': Nuclear and New-Type Weapons in Russian Defense Policy," in *Russia's Military Strategy*, 258.

41. Blank, "Asymmetric Strategy," 267.

42. Bērziņš, "Not 'Hybrid,'" 166.

43. John M. Quinn et al., "NATO and Evidence-Based Military and Disaster Medicine: Case for Vigorous Warrior Live Exercise Series," *Central European Journal of Public Health* 28, no. 4 (December 18, 2020): 328, https://doi.org/.

Strategists also comprehend the peculiarities of a unique operational environment, the key stakeholders, the organizations involved, and how best to connect with the right people to ensure a collaborative effort at the strategic level. As a result of the planning process, these strategists become the focal point for communication, clarifying concepts and direction for all parties. Training new medical strategists builds key planning capabilities that can be sustained across military move cycles. Incorporating civilian positions into the team can also limit the loss of institutional knowledge, while a total force team brings diversity of thought.

Strategic Objectives and Milestones

Relevant strategic objectives with a Joint focus need to incorporate medical support requirements that mitigate threats in a contested Arctic environment, provide interoperability to meet a core set of Joint and perhaps coalition standards, and incorporate flexibility and sustainment considerations. Revisions to the annex should focus on a 2035 horizon; however, the annex should include milestones to ensure the conversion of plans into action along the way and provide a method for periodic reassessments, incorporating hard-won lessons.

At the same time, milestones or transition points must be closely monitored as they will drive a resourcing requirement of human capital.[44] Some groups or services, with eyes on the dangerous escalation in Ukraine, may want to go faster; monitors need to make sure that all efforts remain focused and services are held accountable to ensure on-time execution of capabilities.

Allies and Partners

Revisions to the annex should consider the strategic frameworks of other Arctic countries. For example, medical strategists can consider concepts from the 2020 Norwegian Government's Arctic Policy and the 2020 *Defense of Norway: Capability and Readiness*.[45] As a nation, Norwegians live, function, and thrive within the Arctic Circle and understand the country's significant strategic role within the region and as a NATO partner.[46] Moreover, they are very aware of Russia's strategic threat. Other top international defense forces with the shared goal of a stable and secure operating environment that also have Arctic expertise include Finland, Denmark/Greenland/Faroe Islands, Sweden, and Canada. Each of these countries includes healthcare in its

44. Pentagon briefing.

45. Norwegian Ministry of Foreign Affairs (MFA), *The Norwegian Government's Arctic Policy: People, Opportunities and Norwegian Interests in the Arctic* (Oslo: MFA, 2020), https://www.regjeringen.no/; and Norwegian Ministry of Defence (MoD), *The Defence of Norway Capability and Readiness: Long Term Defence Plan 2020* (Oslo: MoD, 2020).

46. Bjørkum, "Arctic Space Strategy," 89.

Arctic strategy documents.[47] Engaging with Sweden and Finland has increased importance with their recent applications to join NATO.

Doctrine

While some NATO definitions for care roles differ from US doctrine, the shared understanding and interoperability of medical support to the Arctic improves coordination and integration at the highest levels.[48] If established doctrine is insufficient, coordinated efforts between the services and coalition partners to enhance existing doctrine or develop new doctrine will cement fundamental principles and a standard frame of reference to solve cold-weather medicine problems. The ever-present possibility of an Article V or subthreshold event will require a unified commitment—including medical operations—to sufficiently execute multidomain or hybrid warfare, especially in resource-constrained environments.[49]

Supporting the Annex

Global Synchronizer

First, USNORTHCOM should request that the Joint Forces surgeon general designate Alaska Command as the global synchronizer for medical efforts to support the annex to ensure unity of effort within and across services and geographic combatant commands. The Alaska Command surgeon general's team connects with cold-weather medicine experts and liaisons under the Below Zero Medicine working group. This established platform negates having to create a new organization.

In addition, the ALCOM surgeon general understands the complex relationships of command, the missions of the organizations, and unique challenges within the region. Reassigning the team to another organization outside Alaska risks costly mistakes for those unfamiliar with the area's unique characteristics. As ALCOM is a Joint subordinate unified command, all services would have the opportunity to be represented and place liaisons in the area to more fully understand the region. Coordinated efforts eliminate redundancies and save resources for future or other requirements.

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47. Government of Canada, *Canada's Arctic and Northern Policy Framework* (Ottawa, ON: Government of Canada, June 14, 2019), https://www.rcaanc-cirnac.gc.ca/; *Denmark, Greenland, and the Faroe Islands: Kingdom of Denmark Strategy for the Arctic 2011–2020* (Copenhagen, Denmark: Ministries of Foreign Affairs of Denmark, Greenland, and the Faroes, August 2011), https://um.dk/; Finnish Government, *Finland's Strategy for Arctic Policy* (Helsinki, Finland: Finnish Government, 2021), 73, https://www.europeanpolarboard.org/; and Ministry for Foreign Affairs Department for Eastern Europe and Central Asia, Arctic Secretariat, *Sweden's Strategy for the Arctic Region 2020* (Stockholm, Sweden: Regerinskansliet, Government Offices of Sweden, November 10, 2020), https://www.government.se/.

48. CJCS, JP 4-02, II-1.

49. Quinn et al., "Disaster Medicine," 327.

Resource Constraints

Protecting scarce medical resources is significant, because historically, when the United States was in an interwar period, military budgets were constrained based on domestic assumptions that the status quo, if not less, could support contingencies.[50]

Concurrently, service-specific medical departments should overcome their tendencies to become self-serving and entrenched in their policy, doctrine, training, and equipping preferences during times of resource scarcity.[51] Instead, these medical departments must concentrate on reengineering processes and concepts of operation, exploiting existing technologies, and making sound organizational changes.[52] These were the commonalities seen amid the most effective interwar military organizations.[53]

Requirements

The Defense Department established a forcing mechanism to ensure integrated efforts, including medical, across all service departments' work toward strategy. Requirement requests must be in the form of a Joint Integrated Priority List.[54] Before approval, these requirements must link directly to the Joint Warfighting Concept 2.0.

Additionally, requirement requests must include sustainment considerations. When it comes to logistics, one service may have to fund the product line for the rest of the services; medical supplies and equipment will be no exception. Highly effective products already researched and developed by foreign partners must be considered for purchase and licensing. Exploring manufactured goods in use external to the medical industry to augment capabilities could provide additional options. Pursuing these acquisitions saves research and development funding which services can reallocate for novel capabilities, but such actions also respond to the *National Security Strategy*. Specifically, the United States recognizes that "our alliances and partnerships around the world are our most important strategic asset and an indispensable element contributing to international peace and stability."[55]

Optimal Geostrategic Location

Colocating a cold weather medicine center of excellence with the Ted Stevens Center for Arctic Security Studies in Anchorage, Alaska, supports an all-of-government approach to the *DoD Arctic Strategy*. The center's mission is to build "strong, sustain-

50. Brett D. Steele, *Military Reengineering between the World Wars* (Santa Monica, CA: RAND Corporation, 2005), 2, https://www.rand.org/.

51. Rebecca W. Hamilton et al., "How Financial Constraints Influence Consumer Behavior: An Integrative Framework," *Journal of Consumer Psychology* 29, no. 2 (2019), https://doi.org/.

52. A. W. Marshall, "Some Thoughts on Military Revolution - Second Version," memorandum for the record (Washington, DC: Office of the Secretary of Defense, Director of Net Assessment, August 23, 1993), https://stacks.stanford.edu; and Steele, *Military Reengineering*.

53. Steele, *Military Reengineering*, 4.

54. Pentagon briefing.

55. Biden, *National Security Strategy*, 11.

able, domestic, and international networks of security leaders" and promote and conduct "focused research on Arctic security to advance DoD security priorities in the Arctic region."[56]

For an all-of-government approach, having medical assets from each stakeholder physically at the center of action would allow teams to cocreate and co-construct avenues to support US activities in the Arctic. The concept is akin to NATO civil-military cooperation, a joint function comprised of command representatives who work together to establish cooperation with a diverse spectrum of military and non-military actors.[57] Locating a cold weather medicine center of excellence in Anchorage would foster interaction with stakeholders including Alaska government entities such as the National Guard, public health service, and the representatives of the indigenous community.

These organizations and individuals are vital to this approach. Working together minimizes negative impacts to operations, overcomes conflict, and builds shared understanding. In addition, incorporating Arctic partners in this mission will further US, Canadian, and Nordic cooperation, which again ties back to the *National Security Strategy* that acknowledges the "critical role" alliances and partnerships have played in national security policy over the last 80 years.[58]

Colocating a cold weather medicine center of excellence with the Ted Stevens Center, while building interagency connectedness, would increase the professional knowledge of the military medical staff as it becomes the intellectual backbone of cold-weather medicine.[59] The pursuit of continuous improvement-based education can successfully empower medics with the knowledge and resources to lead through mentally and physically demanding situations. Engagement in cold-weather medicine and operational concepts at a center of excellence could also provide an avenue to create a specialized military experience identifier that would allow services to quickly identify individuals with critical Arctic medical knowledge and capabilities.

Conclusion

The diverse and rugged landscape of the Arctic was the last frontier, a place of harsh climatic conditions as formidable for humans as any human adversary. As such, it has been a land where, over the centuries, militaries have suffered humiliating defeats due to inadequate preparation for extreme terrain and cold weather.

Armed with these lessons, military medicine can plan effectively for future fights in the Arctic, plans that include strategic thinking about this rapidly changing and increasingly important region. Medics can no longer rest on the laurels of the 98.2-percent

56. DoD, "DOD Announces Basing Decision for the Ted Stevens Center for Arctic Security Studies," press release, November 17, 2021, https://www.defense.gov/.

57. NATO, "2.1.1. Fundamentals," in *CIMIC Handbook*, Civil-Military Cooperation Center of Excellence (CIMIC COE) (website), last updated November 2, 2020, https://www.handbook.cimic-coe.org/.

58. Biden, *National Security Strategy*, 17.

59. Dennis, "Unexpected," 9.

survival rate from the past 20 years of war in the Middle East, especially since the United States' adversaries, including Russia, have grown militarily. Future Arctic wars will most certainly feature mass casualties, delayed evacuation times, and significant resource strains. These conflicts will challenge medics' training, knowledge, and spirit.[60] It is not an option for US military medical members to be less than fully prepared to operate in the harsh Arctic weather.

Capitalizing on the interwar years, the military can break through the ice and make headway on Joint cold-weather medicine concepts applicable to the Arctic and Antarctica. Thoughtful planning and novel revelations of US military strategic, operational, and tactical visionaries during previous interwar years led to success. These individuals and the organizations they led and worked in incorporated medical advances, waded through lessons learned, and envisioned adaptations to challenges that included weapons more powerful than their ancestors imagined. They also designed the system of military medicine used today.[61]

While the United States should remain focused on China, underestimating Russia's determination and military strategic goals will be detrimental, as the world has recently learned. Now a global pariah, Russia has stated its intent to pursue its imperialistic goals in the Arctic unilaterally despite statements by the other seven members of the Arctic Council that they would suspend engagement with Moscow.[62] Any notion of preserving polar collaboration and cooperation in the Arctic is melting. It is time to make the necessary improvements to Joint health services support to Arctic military contingency planning. **Æ**

60. Rebecca Lee and Jeremy Pamplin, "How Advanced Military Medical Technology Could Help in the Fight against COVID-19," War on the Rocks, March 30, 2020, https://warontherocks.com/.

61. Charles Van Way III, "War and Trauma: A History of Military Medicine - Part II," *Missouri Medicine* 113, no. 5 (September–October 2016), https://www.ncbi.nlm.nih.gov/.

62. Elizabeth Buchanan, "The End of Antarctic Exceptionalism?," The Interpreter, March 18, 2022, https://www.lowyinstitute.org/.

MISSION INJURY

THE FORCE AFTER AFGHANISTAN

KELLY ATKINSON

When confronted with a perceived military mission failure like that in Afghanistan, service members may reflect upon the personal and family sacrifices committed in support of the mission and may no longer be willing to make the same sacrifices for future missions. This dynamic can be referred to as mission injury. This article applies a feminist analytical framework to the lived experiences of military personnel during the Global War on Terrorism and worldwide operations against terrorism that continued after 2013 to engage the structural dynamics of military life that shape mission injury. Mission injury may lead to retention and recruitment issues that weaken the nation's military force against future threats. To mitigate this risk, the US military should implement institutional changes to the structure of military life in order to alleviate the personal and family sacrifices required by US military service.

The fall of Afghanistan has delivered a period of reflection for US service members who participated in two decades of the Global War on Terrorism and subsequent continued global military operations against terrorists after 2013 (hereafter collectively referred to as the war on terror). The precipitous collapse of the Afghan government upon the withdrawal of US forces sent shock waves through the population of military members who spent time in the country, supported combat operations from afar, or participated in the Department of Defense's institutional processes to sustain combat operations and aspirational nation-building efforts.

Americans see many service members' reactions to visible indicators of US failure in Afghanistan, from the footage of local Afghans swarming the US embassy in Kabul to the chaos on overseas US military bases as military personnel supported refugees boarding the last aircraft departing the country. Yet Americans must also recognize the comorbid invisible wounds burdening many service members in the enduring aftermath of the fall of Afghanistan. These wounds, borne from the structural and institutional processes shaping every experience of service members' lives since 2001, have lain hidden under the tumult of conflict and combat. Moving forward, America ignores these invisible wounds at its peril.

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This article examines the mission injury many service members may now be confronting upon the collapse of Afghanistan. In recent years, scholars and the military have increasingly focused on the moral injury sustained during wartime efforts, yet little attention has been paid to why individuals might suddenly question their overall purpose in the military and its institutional demands.[1] Specifically, when confronted with a mission's perceived failure such as that in Afghanistan, service members may reflect upon their personal and family sacrifices and may no longer feel willing to make the same sacrifices for future missions. The US military must assess what impact this mission injury may have on future force readiness.

To engage this compelling problem, this article applies a feminist analytical framework to the everyday lived experiences of military personnel involved in the war on terror from 2001 to 2021.[2] Feminist analysis argues "the mundane matters."[3] While traditional, Western international relations theory approaches to international security and power focus on state actors and international systems of order and control, feminist analysis engages and acknowledges the value of the everyday, lived experiences of individual actors.[4]

Exploring these quotidian dynamics reveals the burdens and costs that service members and their families bear as integral elements of military service. Usually lying beneath the surface, these burdens and costs have emerged and weigh heavily on many service members in this contemporary period of reflection following the fall of Afghanistan. As a result, service personnel may now question the mission of Operation Enduring Freedom and other war-on-terror military operations.

Mission injury's potential impact on the retention of military personnel requires an institutional response from the Department of Defense and US leaders. In a post-Afghanistan and post-COVID context, military members cannot be expected to subsume their mental health and work-life balance to the same degree they have over the past 20 years when members were compelled by ongoing, active operational campaigns overseas. Ultimately, the US military must conduct a holistic evaluation of the structural challenges attendant to military life in order to sustain a force poised to engage the national security threats of the future.

The United States must pay attention to the hidden burdens that shape military service, and it must redesign US military institutions to alleviate those burdens. Failure to do so risks losing the heart of a military force critical to supporting and defending US national interests in the decades to come.

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1. Ian Fishback, "Necessity and Institutions in Self-Defense and War," in *The Ethics of Self-Defense*, ed. Christian Coon and Michael Weber (New York: Oxford University Press, 2016).

2. Sasha Roseneil, "The Coming of Age of Feminist Sociology: Some Issues of Practice and Theory for the Next Twenty Years," *British Journal of Sociology* 46, no. 2 (June 1995).

3. Cynthia Enloe, "The Mundane Matters," *International Political Sociology* 5, no. 4 (December 2011).

4. J. Ann Tickner, "What is Your Research Program? Some Feminist Answers to International Relations Methodological Questions," *International Studies Quarterly* 49, no. 1 (March 2005).

A Theory of Mission Injury

The nation's military is navigating a period of reflection after the fall of Afghanistan, reflection that may result in mission injury for some service members. Mission injury arises from the questioning of a mission's worth in light of the personal and family sacrifices required to sustain that mission. Mission injury itself is the trauma that occurs when the military member determines these sacrifices were not worth the mission's outcome. The conceptual flow chart below outlines how mission injury might occur within a subset of the military population.

Of note, not every person has experienced the collapse of Afghanistan in the same way, and therefore not every service member may be experiencing mission injury. Yet among those who feel negatively affected by the collapse of Afghanistan, some may enter a period of reflection. This reflection may involve acknowledgment of moral injury, mission injury, or both, and either injury negatively impacts the strength of the nation's future military force. The solid arrows outline the mechanisms of mission injury central to this article (fig. 1).

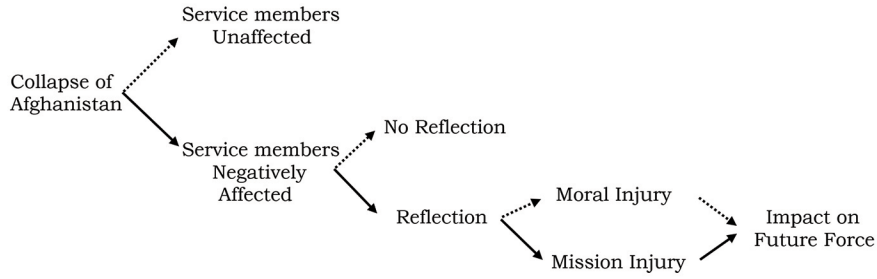

Figure 1. Mission injury mechanism

Importantly, mission injury is distinct from moral injury. Moral injury is "a particular type of trauma characterized by guilt, existential crisis, and loss of trust that may develop following a perceived moral violation."[5] Alternatively, mission injury is not tied to discrete, individual member actions but rather emerges from the member's evaluation of the strategic, institutional purpose of a military endeavor.

When service members view a mission as justified and valid, they tend to view sacrifices in support of that mission as necessary. Alternatively, when service members question the worthiness or potential success of a mission, as is the case for many concerning Afghanistan, they may become reluctant to make the sacrifices institutionally required for supporting that mission.[6] If this occurs, then they may leave military

5. J. D. Jinkerson, "Defining and Assessing Moral Injury: A Syndrome Perspective," *Traumatology* 22, no. 2 (2016): 122.

6. James Dobbins, "Afghanistan Was Lost Long Ago," *The RAND Blog*, RAND Corporation, August 30, 2021, https://www.rand.org/.

service in pursuit of an institutional environment that does not demand such personal and family sacrifices, such as a career in the private sector.

This retention challenge may also cause recruitment issues if potential service members observe a personnel exodus and decide against joining the military as a result. As an institution, the Department of Defense can mitigate the risk to retention and recruitment posed by mission injury through restructuring the institutional dynamics of military life to accommodate the well-being of service members and their families.

What personal and family sacrifices contribute to the aforementioned mission injury process? The next section includes an imagined editorial letter that evokes the burdens of military life under current institutional dynamics to illustrate the experience of mission injury among some service members. In 1990, Cynthia Enloe asked "Where are the women?" to unearth the invisible yet constant work women perform in every context.[7] This letter similarly employs a feminist analytical framework to reveal the hidden work and sacrifices attendant to military service during sustained war-on-terror combat operations from 2001 to 2021.

This letter explores the questions many service members are asking in the post-Afghanistan context in order to evaluate their personal and family sacrifices given the perceived failure of US efforts in Afghanistan.[8] This dialogic approach follows J. Ann Tickner's recommended feminist analytical methodology for "overcoming silences and miscommunications, thus beginning more constructive dialogues."[9] Ultimately, exploring the everyday, "intimate and structural dynamics" of military life in this manner not only offers opportunities to understand their impact on personnel bearing the weight of service but also equips the institution to offer solutions to the challenges inherent to those dynamics.[10]

Letter to the Editor: "When You Thank a Veteran, 2022"

Veterans Day was different this year. Normally, as veterans and service members we spend the day reflecting on our service and enjoying quality time with family and friends, but this year was different. Since the fall of Afghanistan, we are hurting—a deep, disorienting hurt we have not experienced in the 20 years since the terrorist attacks on September 11th, 2001. When you extend your thanks to members of the US military,

7. Cynthia Enloe, *Bananas, Beaches and Bases: Making Feminist Sense of International Politics*, 2nd ed. (Berkeley: University of California Press, 2014).

8. Special Inspector General for Afghanistan Reconstruction (SIGAR), *What We Need To Learn: Lessons from Twenty Years of Afghanistan Reconstruction* (Arlington, VA: SIGAR, August 2021), https://www.sigar.mil/.

9. J. Ann Tickner, "You Just Don't Understand: Troubled Engagements between Feminists and IR Theorists," *International Studies Quarterly* 41, no. 4 (December 1997): 613.

10. Rachel Pain, "Everyday Terrorism: Connecting Domestic Violence and Global Terrorism," *Progress in Human Geography* 38, no. 4 (2014): 531.

please know that we are working through two decades of memories and lived experiences hidden until now. And we are struggling.

Over the past 20 years, we have faced combat and war in the service of our nation. Some of us entered the fire directly, digging the dirt and sand from our fingernails and tasting the acrid tang of metal in the back of our mouths as we drove across the desert or flew over foreign lands. Others waged war from afar, watching distinct figures on screens explode into fireworks of white light at the press of a button from thousands of miles away. When our leaders realized the trauma and stress scarred us the same, we welcomed the offers of therapy dogs and wondered if anything would wipe from our psyches the memory of torn-open bodies and destroyed lives.

We built networks of support to ward off the strain and distress. And then we moved. We moved time after time—new relationships, schools, doctors, babysitters, veterinarians, and hair stylists. Time after time, spouses gave up their careers, and our kids tearfully left yet another group of friends. After a while we stopped planting roots, resigned to the upheaval, focusing on success at work, hoping our families were all the support we needed.

But then, in the disruptions and the moves, we lost not only our networks but also in many cases our very families. Years deployed or traveling on temporary duty and sending love through a screen meant that sometimes we returned home as different people, to different people, and earned separation, divorce, or estrangement as a prize.

And still we keep losing each other. There, colleagues and friends became victims of IEDs, crashes, and attacks. But here, somehow, the losses seem to hurt more. Have we failed when spouses, parents, or friends come home to discover the unimaginable? At home, we should not miss the signs, even though we know it is not in our power to save them. Time works against us. We advocate for counseling and mental health, but we crash into the unfounded yet pervasive stigma in the military against such services.

Yet through it all, we have persevered, believing in our mission and our nation. Trauma and disruption were part of the deal, and somehow it was worth it because our cause was just. Our leaders told us we were doing God's work, and we believed them. We had to. But now, we question. Was our sacrifice worth the cost? Did we miss our children's births and parents' deaths for nothing? Were we truly fighting the axis of evil, or were we causing its spread? We never had to ask ourselves these questions before, when we were defending our homeland from terror. But we ask them now. And we have no answers.

The cumulative burden of our service weighs heavy on us all. Despite the yellow ribbons and patriotic parades, the truth of two decades of war has been ours to see, not yours. And we would not wish that burden upon you. We chose this life so that you wouldn't have to. We just didn't know the full cost when we started this journey so long ago. So please forgive us if, when you thank us for our service, we are circumspect in our reply. We are hurting and tired. We feel sorrow for all we have seen and done. And for the first time, we wonder if we should have done it at all.

A Feminist Sociological Analysis

The imagined editorial letter above aims to capture the everyday challenges military members may have experienced over the past two decades, from visceral combat operations overseas to the quiet, daily struggles of sustaining personal relationships and local support networks at home.

This framework distinguishes the visible costs of military service during the war on terror from the invisible costs of the same. Visible costs are the commonly acknowledged challenges of military service, from overseas deployments to the geographically separated execution of combat operations.[11] The visible challenges to military service have long received institutional support, as they rightly should. For example, the growth of drone operations in the war on terror has generated important attention to the fact that "operators of Unmanned Aerial Vehicles within the military have increasingly been recognized as potential sufferers of immense stress and trauma as a result of the conditions they are exposed to."[12]

In addition to these aspects, the US military and broader US society must also recognize the invisible negative outcomes that compose the structural dynamics attendant to military life: frequent moves, missed family and personal events due to deployments and temporary duty assignments, high divorce rates among military personnel, impediments to military spouses achieving career advancement or maintaining relationships, and persistent mental health struggles.[13] These embedded challenges of military life introduce negative outcomes to mental health and resilience similar to the visible, combat-related experiences among military personnel.

Furthermore, with the collapse of Afghanistan some service members may be reflecting on these embedded challenges for the first time. With this reflection comes the question: were the costs to family, stability, and mental health justified if the mission ended in defeat? In the midst of combat operations it is often necessary to subsume concerns about work-life balance and family needs within the demand to embody the

11. Kristian Søby Kristensen, "Tourists or Vagabonds? Space and Time in the War on Terror," *Alternatives* 33, no. 2 (2008); and Cherie Armour and Jana Ross, "The Health and Well-Being of Military Drone Operators and Intelligence Analysts: A Systematic Review," *Military Psychology* 29, no. 2 (2017).

12. Jacob Holz, "Victimhood and Trauma within Drone Warfare," *Critical Military Studies*, published ahead of print, July 29, 2021, 1, https://doi.org/.

13. Benjamin Karney and John S. Crown, *Families under Stress: An Assessment of Data, Theory, and Research on Marriage and Divorce in the Military* (Santa Monica, CA: RAND Corporation, 2007); Sebastian Negrusa, Birghita Negrusa, and James Hosek, "Gone to War: Have Deployments Increased Divorces?," *Journal of Population Economics* 27, no. 2 (2014); Patricia K. Tong et al., *Enhancing Family Stability during a Permanent Change of Station: A Review of Disruptions and Policies* (Santa Monica, CA: RAND Corporation, 2018), https://www.rand.org/; and Terri Tanielian et al., *Invisible Wounds: Mental Health and Cognitive Care Needs of America's Returning Veterans* (Santa Monica, CA: RAND Corporation, 2008), https://www.rand.org/.

"warrior ethos."[14] Yet when the warrior mission ends, these concerns resurface, and the period of reflection begins.

This reflection may lead to mission injury, where service members question whether the failed military mission remains justified given the costs to personal and family health required to pursue this mission over two decades of war. Furthermore, this mission injury may result in service members unwilling to further sacrifice personal and family well-being for the sake of the mission, leading to retention issues within the military force. Moreover, reflecting upon the stability sacrificed in support of the military mission can lead to a negative evaluation of the military's strategic mission itself and of the institution requiring these sacrifices.

Mission injury may involve moral injury, but it reaches beyond the individual level to include the systemic as well. Service members experiencing mission injury may reflect critically upon the institutions the military created to support and sustain the war on terror: what structures did the Defense Department build to sustain 20 years of combat, and were those systems just?[15] In the midst of combat operations, service members might not consider these issues, particularly when the motivating cause for the operations remains untarnished. When the mission supported by the operations fails, however, the period of reflection unearths such concerns.

Mission Injury: An Example from the Intelligence Community

One example of potential mission injury involves processes of intelligence oversight. When supporting operational missions through the distributed common ground system, intelligence personnel follow specific procedures outlined in the 2018 Air Force Guidance Memorandum to Air Force Instruction 14-104, *Oversight of Intelligence Activities*.[16] These procedures and the intelligence oversight program itself involve "a balancing of two fundamental interests: obtaining the intelligence information required to protect national security while protecting individual rights guaranteed by the Constitution and outlined within the laws of the United States."[17]

Required to demonstrate understanding of this program when conducting missions, intelligence personnel could feel justified in their collection missions as long as they met oversight stipulations. Few questioned the legality of their operations as long

14. Christopher Coker, *The Warrior Ethos: Military Culture and the War on Terror*, LSE International Studies series (London, UK: Routledge, 2007).

15. Tine Molendijk, Eric-Hans Kramer, and Désirée Verweij, "Moral Aspects of 'Moral Injury': Analyzing Conceptualizations on the Role of Morality in Military Trauma," *Journal of Military Ethics* 17, no. 1 (2018).

16. "Air Force Distributed Common Ground System," USAF (website), October 2015, https://www.af.mil/.

17. Secretary of the Air Force, Air Force Guidance Memorandum to Air Force Instruction 14-104, *Oversight of Intelligence Activities* (Washington, DC: Department of the Air Force [DAF], October 4, 2018), 2, https://irp.fas.org/.

as they fell within oversight requirements, and as a result, operators' consciences remained clear.

Yet with the perceived failure of these missions in Afghanistan, service members may now question these oversight procedures. A closer examination of Air Force Instruction 14-104 reveals the approval authorities for intelligence oversight procedures are embedded within the Air Force chain of command. This makes sense given the general nature of bureaucratic processes, and there is certainly coordination with the appropriate federal legal offices as part of these procedures.

But the situation still raises interesting questions: if Air Force leadership were motivated to produce operational intelligence in support of the war on terror, and these same leadership structures governed the oversight procedures guiding this intelligence collection, then were these oversight stipulations truly setting boundaries? Or did Air Force leadership construct oversight processes that functioned to sanction the intelligence collection they deemed critical to conducting operations? If the service constructed its own checks and balances, were these safeguards anything more than panaceas to justify its actions in support of US national interests?

Given the perceived failure of US efforts in Afghanistan, the service members who conducted operations to support these efforts may now question the legal and ethical dynamics of their actions and the mission involved.[18] At the same time, compounding this questioning, reflecting on the personal and family sacrifices required to pursue these failed efforts may lead to mission injury. Taken together, if unaddressed, this questioning about motives and sacrifices introduces fault lines in the foundation of the nation's military force.

Mitigating Mission Injury

Practices of rendition, indefinite detention in Guantanamo Bay, and National Security Agency surveillance overreach are significant black marks against US operations since 2001. The theoretical mission injury associated with the structural dynamics of military life presented here certainly falls beneath that extreme threshold.[19] Yet if military leaders do not acknowledge and account for the potential damage that mission injury poses to the strength of force resilience today, the military risks a compromised force for future conflict.

When considering mission injury facing some service members in the aftermath of the fall of Afghanistan, the United States cannot simply transform the nature of war to erase the burden of service. After all, the role of the military is to manage and execute

18. Sarah Kreps and John Kaag, "The Use of Unmanned Aerial Vehicles in Contemporary Conflict: A Legal and Ethical Analysis," *Polity* 44, no. 2 (2012).

19. Margaret L. Satterthwaite, "Rendered Meaningless: Extraordinary Rendition and the Rule of Law," *George Washington Law Review* 75 (2007): 1333; Michael J. Strauss, *The Leasing of Guantanamo Bay* (Westport, CT: Praeger Security International, 2009); and Timothy H. Edgar, *Beyond Snowden: Privacy, Mass Surveillance, and the Struggle To Reform the NSA* (Washington, DC: Brookings Institution Press, 2017).

violence on behalf of the state.[20] That mission will never cease. Instead, the military must mitigate the trade-offs that service members experience between preserving personal and family health and completing the military mission. If mission injury involves reflecting upon the sacrifices made at the altar of military life, then mitigating mission injury must involve alleviating or eliminating these sacrifices when they are not strictly necessary for accomplishing the military mission but are simply products of path-dependent institutional processes, where institutions reinforce established processes as a means to survive.[21]

The Department of Defense has already begun to acknowledge the demands of military life in an effort to alleviate some of these sacrifices.[22] The 2022 National Defense Authorization Act contains provisions to support and sustain military spouse careers and to increase parental leave to 12 weeks for service members.[23] Department leadership is now more vocal on the critical role of mental health support for service members, and efforts to support military parents as they balance work with family are important steps in the right direction.[24]

Even so, these initiatives represent piecemeal policy adjustments and often emerge as the hard-won outcomes of volunteer action instead of institutionally driven systemic changes, particularly since past efforts to revise the entirety of the military force structure—particularly the standards set for women—perished in the churn of bureaucratic power struggles.[25] When the military personnel system still revolves around antiquated models of the nuclear family functioning to support a male military member through the unpaid labor of a female spouse running the household, as echoed in longstanding policy preventing service academy cadets from maintaining dependents, the system still requires substantial changes to reflect the personal and family needs of contemporary military personnel.[26]

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20. Samuel P. Huntington, *The Soldier and the State: The Theory and Politics of Civil-Military Relations* (Cambridge, MA: Harvard University Press, 1981).

21. James Mahoney, "Path Dependence in Historical Sociology," *Theory and Society* 29, no. 4 (August 2000).

22. DAF, "Department of the Air Force: Fortify the Force" (Washington, DC: DAF, n.d.), accessed July 13, 2022, https://www.aflcmc.af.mil/.

23. National Military Family Association (NMFA), "NDAA Breakdown for Military Families," NMFA (website), accessed December 28, 2021, https://www.militaryfamily.org/.

24. Zachary Vaughn, "Mental Health Is 'Health' Says SECDEF: AF Academy Tackles Suicide Prevention," US Air Force Academy (website), September 28, 2021, https://www.usafa.af.mil/; and Patricia Kime, "Defense Bill Lets Active-Duty Marine and Army Moms Defer Deployment for a Year after Birth," *Military Times*, December 18, 2019, https://www.militarytimes.com/.

25. Kelly Atkinson and Alea Nadeem, "Warrior Braids and the Air Force Women's Initiative Team—the Invisible Labor Behind Diversity, Inclusion, and Institutional Change," Wild Blue Yonder, May 17, 2021, https://www.airuniversity.af.edu/; and Jonathan Guyer, "Burying the Evidence: How the Military Concealed Its Best Chance at Solving Its Sexual Assault Problem," *American Prospect*, November 18, 2021, https://prospect.org/.

26. Melissa Hemphill, "I Had to Relinquish Parental Rights, Then Adopt My Child to Stay in the Air Force Academy. The Rules Must Change," *Washington Post*, October 15, 2021.

To mitigate mission injury within this period of reflection, the nation and the Department of Defense must institute a comprehensive redesign of how military life is constructed in order to support and sustain a robust force postured for future conflict. Adopting a constructivist framework—which acknowledges the created nature of institutions—to engage organizational design empowers leaders to break free from path-dependent constraints and reform DoD institutions to accommodate contemporary goals and priorities for military members and their families.[27] Timing and sequence matter, and in the post-Afghanistan period, DoD leaders can capitalize on this critical juncture to redesign institutions to address mission injury and its negative ramifications.[28]

Policy recommendations for incorporating these critical institutional changes are as follows. First, the Defense Department must continue to update its institutional processes in support of mental health services and family stability for all service members. From mental health support addressing issues of post-traumatic stress disorder and moral injury, to critical mental health initiatives supporting military couples and families, these efforts are crucial to health and wellness for service members facing the unique demands of military life.

Moreover, with reduced overseas operations for the first time since 2001, the military must consider jettisoning the archaic permanent-change-of-station cycle that disrupts service member lives every few years in favor of more stable, long-term assignment cycles that engender community connections and family cohesiveness.[29] Additionally, the Department of Defense must continue to increase access to child care for military families so that service members and their partners can excel in their careers buoyed by available child care services. These important structural changes will mitigate some costs to personal and family health caused by the current instability of military life.

Most importantly, DoD leadership must accept the reality that service members desire stability and support in their lives. Just as America embraced the requirement to support veterans and transitioning service members since 2001, the US military must pursue a similar institutional and cultural shift to bolster support services for those serving.[30] The military can no longer assume consistent retention in an all-volunteer force based upon value-driven motivation to serve in combat operations.[31]

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27. Alexander Wendt, "Constructing International Politics," *International Security* 20, no. 1 (Summer 1995).

28. Orefeo Fioretos, "Historical Institutionalism in International Relations," *International Organization* 65, no. 2 (Spring 2011).

29. William M. Hix et al., *Personnel Turbulence: The Policy Determinants of Permanent Change of Station Moves* (Santa Monica, CA: RAND Corporation, 1998).

30. Wesley H. McCormick et al., "Military Culture and Post-Military Transitioning among Veterans: A Qualitative Analysis," *Journal of Veterans Studies* 4, no. 2 (2019).

31. Karen K. De Angelis and David R. Segal, "Building and Maintaining a Post-9/11 All-Volunteer Military Force," in *The Impact of 9/11 on Politics and War*, ed. Matthew M. Morgan (New York: Palgrave Macmillan, 2009).

Instead, the military must apply a constructivist approach to its institutional design, embrace the change agents operating within the system to improve the structure, and posture the force for the future fight.[32]

On its own, the mission injury from the collapse of Afghanistan may not pose sustained challenges to military readiness. Coupled with the shock of a black swan pandemic, however, the consequences are more dire.[33] As tempting as it may be to bury its head in the bubble of COVID-induced retention rates, when the pandemic is finally past, the military may face an exodus of service members suffering from mission injury and seeking a more supportive work environment to enable personal and family balance.[34]

The new blended retirement system may well accelerate this exodus as military personnel no longer need to dedicate 20 years of service to obtain retirement benefits, choosing instead to seek the flexibility that industries have adopted to combat pandemic restrictions.[35] Considering this contemporary context, military leaders must apply a strategic vision to gauge the long-term risks of mission injury on the strength of the US military force. Ultimately, the costs of Afghanistan's collapse to the well-being of service members cannot be ignored: when the mission no longer justifies the sacrifice, then the sacrifice must be mitigated in order to sustain the mission. **Æ**

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32. Atkinson and Nadeem, "Warrior Braids."

33. Will Atkins, "Defense Policy Resilience in the Face of Black Swans and Grey Rhinos," in *American Defense Policy*, ed. Miriam Krieger et al., 9th ed. (Baltimore, MD: Johns Hopkins University Press, 2021).

34. Ryan N. Strength, "How Are the Air Force Pilot Retention Measures Working in the Mobility Air Forces?" (graduate research paper, Air Force Institute of Technology, June 2020).

35. Beth J. Asch, *Setting Military Compensation to Support Recruitment, Retention, and Performance* (Santa Monica, CA: RAND Corporation, 2019).

IRAN, ISRAEL, AND THE STRUGGLE FOR THE SKIES OVER THE MIDDLE EAST

Joshua Dryden

Israel and Iran have been engaged in an expanding conflict across the Middle East since the late 1990s. Iran continues its long-standing support of proxy forces that surround Israel, and Israel persists in its defense with a variety of air, ground, and sea capabilities, undermining Iran's power-projection efforts. Facets of this protracted conflict have been studied deeply, but this article addresses a gap in existing literature by examining Iranian attempts to undermine Israeli airpower strategy through weapons developments and deployments across the region. This analysis reveals lessons for an advanced air force facing a similar asymmetric challenge.

In March 2021, Israeli F-35s intercepted an unidentified aircraft speeding toward Israeli airspace. After identifying the aircraft as a hostile drone, the pilots shot it down, resulting in the first confirmed air-to-air kill for an F-35.[1] Upon subsequent investigation, Israeli authorities discovered the aircraft was one of three Iranian drones destined for Hamas-controlled territory in the Gaza Strip. In addition to collecting intelligence as they passed over Israeli territory, the drones carried weapons for Palestinian fighters.

This incident, conducted within the context of a broader struggle between the two rivals, is part of an increasing attempt by Iran to contest Israel's long-held supremacy in the skies over the Middle East. The two countries have been engaged in an expanding conflict across the Middle East since 2006. Iran has attempted to entrench its influence in the Levant by surrounding Israel with a ring of proxy forces, and Israel has relied on a range of capabilities to sabotage Iranian capability developments and undermine Iranian power-projection efforts.

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1. Thomas Newdick, "Israel Shows the F-35's First Aerial Kill in Newly Declassified Video," *Warzone*, March 7, 2022, https://www.thedrive.com/.

While cyberattacks and Mossad assassinations have garnered recent headlines, the focus of the conflict between Iran and Israel is best understood as one in which Iran seeks to deny Israel freedom of action in the air, while Israel attempts to counter these efforts.[2] This shift started gradually in the early 2000s but has grown more pronounced as Iran has improved its capabilities and Israel has increased its willingness to risk escalation.

Although Israel and Iran have been engaged in air combat operations—with the Israeli Air Force (IAF) on one hand and Iranian drones, air defenses, and missiles on the other—the current literature largely neglects to address the centrality of airpower in this conflict. Some analysts have pointed to the potential for Israel to lose air superiority but have attributed this to US sales of advanced weapons to Arab states while dismissing the threat posed by Iran's antiquated fighter aircraft.[3] Analyses by Israeli authors in particular have addressed the role of airpower in the ongoing Israeli campaign against Iranian targets in Syria but have examined the topic from the perspective of deterrence, evaluating the effectiveness of Israeli strategy.[4]

Likewise, Iran-focused literature has pointed to significant improvements in Iranian air defense, ballistic missile, and unmanned aerial vehicle (UAV) capabilities, but without reference to Iranian proliferation to proxies or challenges to the IAF.[5] To date, the sole study that directly addresses Israel's shrinking freedom of maneuver in the air domain has focused only on changes in Lebanon, obscuring the broader trend across the region.[6] No study has directly addressed the challenge Iranian weapons advances pose to the IAF through the lens of a contest for the air domain.

This paper attempts to address the gap in existing literature by examining Israeli airpower strategy in light of Iranian weapons developments and deployments across the region. For the purposes of this paper, airpower is defined as the use of the air do-

2. David Vielhaber and Philipp C. Bleek, "Shadow Wars: Covert Operations against Iran's Nuclear Program," *The Nonproliferation Review* 19, no. 3 (2012), https://doi.org; and Amos Harel, "Tehran Assassination: Latest Move in Secret Israel-Iran War," *Haaretz*, May 24, 2022, https://www.haaretz.com/.

3. Yiftah Shapir, "Is Israel's Air Superiority in Danger?," *Israel Defense* (Summer 2017), https://www.israeldefense.co.il/.

4. Itai Brun, *From Air Superiority to Multidimensional Strike: The Use of Airpower and Its Place in Israel's Overall Concept of War* (Tel Aviv: Institute for National Security Studies, [INSS], 2022) [in Hebrew], https://www.inss.org.il/; Itamar Lifshitz and Erez Seri-Levy, "Israel's Inter-War Campaigns Doctrine: From Opportunism to Principle," *Journal of Strategic Studies*, published ahead of print, August 10, 2022, https://doi.org/; and Michael Herzog, "Iran Across the Border: Israel's Pushback in Syria," Policy Notes 66, Washington Institute for Near East Policy (Washington Institute) (website), July 25, 2019, https://www.washingtoninstitute.org/.

5. Hadi Ajili and Mahsa Rouhi, "Iran's Military Strategy," *Survival* 61, no. 6 (2019), https://doi.org/; and Farzin Nadimi, "The Counterintuitive Role of Air Defense in Iran's Anti-Status Quo Regional Strategy," Policy Watch 2748, Washington Institute, January 11, 2017, https://www.washingtoninstitute.org/.

6. Assaf Orion, "Don't Look Down: The Struggle over Lebanon's Airspace," Policy Watch 3626, Washington Institute, July 7, 2022, https://www.washingtoninstitute.org/.

main to attain strategic objectives and the denial of such use by the adversary.[7] This definition, based on principles expounded by early airpower theorists, allows for an examination of Iranian efforts to challenge Israel in the air domain without itself fully controlling the domain. When Iranian weapons advancements and proliferation to proxy forces are juxtaposed against recent Israeli operational activities, the interplay of these factors in the ongoing conflict illuminates lessons for an advanced air force facing an asymmetric challenge.

Airpower in Israeli Military Strategy

By challenging Israel's decades-long dominance in the skies over the Middle East, Iran's efforts to contest the air domain as part of its broader strategy against Israel represent a departure from the status quo. Although the Israeli Air Force started the War of Independence in 1948—also known as the Arab-Israeli War of 1948—with severe shortfalls in aircraft and personnel, by the end of 1949, Israel enjoyed a qualitative advantage over its opponents. This was due largely to the technical expertise and combat proficiency of the volunteers who fought on the Israeli side.[8]

The IAF built upon this initial success in subsequent conflicts, repeatedly demonstrating the importance of airpower and its mastery over regional opponents. Israeli airstrikes in the opening of the June 1967 Six-Day War ensured air superiority throughout that conflict.[9]

Likewise, while the Israeli Air Force was unprepared in the initial onslaught of the Yom Kippur War in 1973, it demonstrated its worth through close air support contributions, even as attempts to destroy Arab air defenses fell short of expectations.[10] The IAF contributed significantly to Israel's victory in 1973, but the conflict also reinforced the importance of air superiority as the force lost over 100 aircraft, the vast majority of those to surface-to-air fire.[11] Following the Yom Kippur War, the Israeli Air Force routinely reasserted its superiority in clashes over Syria and Lebanon.

Beyond declared wars and border clashes, Israel's leaders have turned to airpower to counter developments in adversarial states as well as to combat nonstate actors. In the post-1973 period, the IAF was dispatched to destroy an Iraqi nuclear reactor (1981) and a nascent Syrian weapons of mass destruction program (2007).[12] Likewise, Israel has used airpower to monitor restive populations in the Palestinian territories

7. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (Maxwell AFB, AL: Air University Press, 2019), 24; and William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military* (Tuscaloosa: University of Alabama Press, 2009), xii.

8. Benny Morris, *Righteous Victims: A History of the Zionist-Arab Conflict, 1881–2001* (New York: Vintage Books, 2001), 217, 234–35, 241, 244.

9. Morris, *Righteous Victims*, 311, 316–18.

10. Brun, *Air Superiority*, 66–72.

11. David Rodman, *Sword and Shield of Zion: The Israel Air Force in the Arab-Israeli Conflict, 1948–2012* (Brighten, UK: Sussex Academic Press, 2022), 32.

12. Morris, *Righteous Victims*, 507; and Oliver Holmes, "Israel Confirms It Carried Out 2007 Airstrike on Syrian Nuclear Reactor," *Guardian*, March 21, 2018, https://www.theguardian.com/.

and in Lebanon as well as to strike Palestine Liberation Organization, Hamas, Hezbollah, and Palestine Islamic Jihad targets.[13]

Furthermore, since the early 2000s the Israeli Air Force has been preparing for potential strike options against key sites in Iran. While other services will play supporting and defensive roles at home, the IAF's ability to maintain freedom of maneuver will be critical to any attack against Iran.[14] This has been routinely reinforced by Israeli exercises, training, and statements focused on preparing for long-distance precision airstrikes against Iran.[15] The recent iteration of these preparations in June 2022 demonstrates the continued centrality of airpower to Israeli efforts to deter Iranian nuclear developments.[16]

Throughout its history, Israel has routinely turned to the IAF to solve strategic challenges. But the IAF relies on freedom of maneuver in order to sustain the sort of high-impact, low-casualty options that policymakers require. When that freedom of maneuver is curtailed, as it was during the Yom Kippur War, the IAF takes losses that can undermine its value proposition. Despite this risk, airpower remains one of the few viable options for Israeli policymakers as the country faces a growing threat from Iran.

Iranian Airpower Pre-Revolution to Operation Iraqi Freedom

The Islamic Republic of Iran has been forced to adjust its approach to the air domain as it developed a distinct asymmetric strategy following the 1979 revolution.[17] Prior to the revolution, the Iranian military was closely tied to the United States, and during that time, the Shah purchased vast quantities of the latest American military equipment. Noteworthy among these purchases were cutting-edge American aircraft, including fighters such as the F-4, F-14, and the F-5, and a host of multirole assets such as maritime patrol craft, military transports, and helicopters.[18]

Following the revolution, however, the Iranian military no longer had access to those advanced systems. The Iraqi military invasion in September 1980 destroyed much of Iran's military hardware, including numerous aircraft, in the initial strikes.[19] Without the ability to purchase parts and replacement aircraft, the Iranian military was initially forced to revert to the ground domain, where the barrier to entry was lower for fielding new recruits, and the benefits of human wave attacks could more quickly be brought to bear.

13. Rodman, *Sword and Shield,* 21.

14. Brun, *Air Superiority*, 165–66.

15. Emanuel Fabian, "Israeli Air Force Simulates Widescale Strike on Iran Nuclear Facilities," *Times of Israel*, June 1, 2022, https://www.timesofisrael.com/.

16. Fabian, "Israeli Air Force."

17. Gawdat Bahgat and Anoushiravan Ehteshami, *Defending Iran: From Revolutionary Guards to Ballistic Missiles* (Cambridge: Cambridge University Press, 2021), 8.

18. Bahgat and Ehteshami, *Defending Iran*, 76.

19. Afshon Ostovar, *Vanguard of the Imam: Religion, Politics, and Iran's Revolutionary Guards* (Oxford: Oxford University Press, 2016), 64.

The Iran-Iraq war brought a paradigm shift to the Iranian way of war; the success of human-wave tactics and the influence of the Islamic Revolutionary Guards Corps (IRGC) brought asymmetry to the forefront which functioned to delay, at least initially, the development of the advanced technology necessary to dominate the air domain.[20] Given the challenges of procuring weapons from the global market over the subsequent years, the Islamic Republic focused on producing weapons domestically.[21] While Iran procured some Chinese and Russian aircraft after the late-1980s, and Iraqi pilots flew aircraft into Iran to avoid their destruction at the hands of the US-led coalition in 1991, none of these developments significantly altered the obsolescence of the Iranian Air Force.

Finally, the Iranian regime's focus on its self-ordained role as defender of the Shiite community quickly led to its preference to work through proxy forces in places like Lebanon, Iraq, Palestine, and Yemen.[22] These developments prompted Iran to de-emphasize military development in the air domain through the early 2000s, relying instead on ballistic missiles, proxy forces, and sea-denial capabilities to make up for the lack of air capabilities.

Refocusing on the Air Domain

Iranian threat perception after the US invasion of Iraq in 2003 led the regime to shift military focus increasingly to the air domain to defend against potential US aggression.[23] This was accelerated following the election of Mahmud Ahmadinejad to the presidency in 2005, and further reinforced by fears of a US-Israeli strike against the nascent Iranian nuclear program in subsequent years. While former Israeli Prime Minister Ehud Olmert's cabinet spoke of an Israeli preemptive strike as a last resort, in a 2006 interview, his deputy defense minister made it clear that, for Israel, "even the last resort is sometimes the only resort." [24]

Iran's Airpower Approach

Borrowing heavily from its asymmetric approach to land warfare (human-wave attacks and proxy forces) and maritime warfare (small-boat swarms), Iran formed an independent air defense force in 2008 to provide a similar focus in the air domain.[25] Since that time, Iran has invested heavily in improving its air and air defense forces,

20. Ostovar, *Vanguard*, 74–79.

21. Defense Intelligence Agency (DIA), *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance* (Washington, DC: Government Printing Office, 2019), https://www.dia.mil/.

22. Afshon Ostovar, "The Grand Strategy of Militant Clients: Iran's Way of War," *Security Studies* 28, no. 1 (2019).

23. Bahgat and Ehteshami, *Defending Iran*, 30–32, 35–36; and DIA, *Iran Military Power*, 12.

24. Yaakov Katz, "Meridor: Stop Talking about Iran," *Jerusalem Post*, December 7, 2006, https://www.jpost.com/.

25. Bahgat and Ehteshami, *Defending Iran*, 106.

while remaining true to its preference for asymmetry in military operations.[26] The result has been a unique approach to contesting the air domain, one that closely follows concepts pioneered by the early twentieth-century British maritime strategist Julian Corbett.[27]

Iran's view of the air domain appears to parallel Corbett's approach to sea control: it recognizes contesting the domain does not require Iran to exercise full control over it. Corbett challenged the logic behind the tendency to view sea control as binary—either one has control or one does not, and control shifts to one's opponent—pointing to "the error that if we are unable to win the command [of the sea] we therefore lose it."[28] Corbett instead saw sea control as inherently dynamic and argued merely contesting control could deny an adversary freedom of maneuver.

This approach to airpower is quite different from that of traditional airpower theorists like Giulio Douhet, who advocated that "command of the air" required one to "prevent the enemy from flying while retaining the ability to fly oneself."[29] Iran appears to have adopted Corbett's logic in its approach to the air domain, realizing its objectives do not require control of the domain, nor do they require investments in advanced fighter and strike aircraft. Iran needs merely to contest the air domain by imposing costs on its adversaries while maintaining the ability to leverage the domain in a limited set of circumstances at times and places of its choosing. This approach has allowed Iran to build effective capabilities to contest and exploit the air domain, while also exporting low-cost capabilities to its proxy partners across the region as part of its broader "forward defense" strategy in places like the Levant.[30]

Asymmetric Capabilities

Iranian efforts to build an asymmetric set of capabilities to contest the air domain have largely centered on three complementary components. The first is its ground-based air defenses. Iran's ground-based air defenses are largely focused on denying adversaries freedom of movement in the air and on imposing costs. These capabilities take the form of air surveillance equipment, radar sites, and electronic detection capabilities, as well as surface-to-air missiles and electronic warfare equipment. Recent Iranian advancements have focused on highly mobile, frequency-diverse systems to improve survivability and effectiveness against advanced fighter aircraft.[31]

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26. DIA, *Iran Military Power*, 23.
27. Julian S. Corbett, *Some Principles of Maritime Strategy* (London: Longmans, Green and Co., 1918).
28. Corbett, *Principles,* 209.
29. Douhet, *Command of the Air*, 24.
30. Amr Yossef, "Military Doctrines in Israel and Iran: A Doctrinal Hybridity, *Middle East Journal* 75, no. 2 (2021); and Shahram Akbarzadeh, William Gourlay, and Anoushiravan Ehteshami, "Iranian Proxies in the Syrian Conflict: Tehran's 'Forward-Defence' in Action," *Journal of Strategic Studies*, published ahead of print, January 4, 2022, https://doi.org/.
31. Ajili and Rouhi, "Iran's Military Strategy"; and Nadimi, "Counterintuitive Role."

The second component of Iranian capabilities are surface-to-surface missiles. Given Iran's lack of modern combat aircraft, ballistic and cruise missiles have become a centerpiece of its strike capabilities, allowing Iran to leverage the air domain in a limited manner to deliver offensive power and deter regional adversaries.[32] But surface-based missiles require targeting information to determine locations for fixed and mobile targets as well as to conduct hit-and-damage assessments after a strike. For this, Iran has built the third component of its air capabilities, unmanned aerial vehicles (UAVs).

Unmanned aerial vehicles provide Iran with an inexpensive but effective means of intelligence, surveillance, and reconnaissance (ISR) as well as strike capability.[33] Iranian efforts to expand and integrate all three capabilities have accelerated in recent years as have the testing and deployment of these capabilities beyond Iran's borders.[34]

Capability Development

Iran initiated development of the aforementioned air domain capabilities during the Iran-Iraq war, moving from development to deployment over the next two decades. While few outside Iran initially paid attention to these advances, by the early 2000s, Iran was exporting air defense, missile, and UAV technology to its allies and proxies.

Iranian proxies employed these new capabilities in regional conflicts over the ensuing years. Lebanese Hezbollah used Iranian-supplied UAVs alongside rockets and missiles during the 2006 war with Israel.[35] Houthi forces in Yemen likewise employed Iranian-supplied UAV and missile technology in attacks against Saudi refineries in 2017.[36] Meanwhile, Iran continued to perfect its mobile ground-based air defenses, dramatically demonstrating advances in those capabilities by downing a US RQ-4 UAV operating over the Persian Gulf in June 2019.[37] The events since 2006, especially the shootdown of the RQ-4, indicate Iran's willingness to escalate, leveraging its improved capability to contest the air domain.

As Iran refined and improved its air defense, UAV, and missile technologies, it transferred these advanced systems to proxies in Syria and Lebanon. In a key milestone in 2009, Iran transferred radars to Syria to provide advanced warning of an Israeli air incursion toward Iran.[38] Iran had long supplied weapons—especially rockets

32. DIA, *Iran Military Power*, 30–31.

33. Bahgat and Ehteshami, *Defending Iran*, 183–191; and Andrew Bowen, Carla Humud, and Clayton Thomas, "Iran's Transfer of Weaponry to Russia for Use in Ukraine," IN12042 (Washington, DC: Congressional Research Service, November 4, 2022), 2, https://crsreports.congress.gov/.

34. DIA, *Iran Military Power*, 41; and Nadimi, "The Counterintuitive Role."

35. Liran Antebi, "Unmanned Aerial Vehicles in Asymmetric Warfare: Maintaining the Advantage of the State Actor," in *The Quiet Decade: In the Aftermath of the Second Lebanon War, 2006–2016*, ed. Udi Dekel, Gabi Siboni, and Omer Einav (Tel Aviv: Institute for National Security Studies, 2017), 84.

36. Bahgat and Ehteshami, *Defending Iran*, 191.

37. Ajili and Rouhi, "Iran's Military Strategy," 139.

38. Charles Levinson, "Iran Arms Syria with Radar," *Wall Street Journal*, June 30, 2010, https://www.wsj.com/.

and small arms—to Lebanese Hezbollah and other proxies, but following the 2006 war, Iranian arms transfers included increasingly sophisticated weapons. These systems included air defenses, advanced surface-to-surface and antiship missiles, and UAVs, all with the potential to shift the balance of power in the region.

These capabilities presented a growing challenge to both Israeli air defenses over the homeland and Israeli freedom of maneuver in the skies over the Levant.[39] As Iranian weapons proliferation expanded, Israel determined it needed a new approach to respond to this escalating threat.

The Battle in the Levant: Israel's Campaign between Wars

Israel grew increasingly alarmed over the Iranian weapons transfers, and an internal debate raged over how best to respond. Israeli military and political leaders settled on a doctrine known as the "campaign between wars/*m'aracha bein ha-milchamot*" (referred to by the Hebrew acronym, מ"בם or MABAM) as Israel's response to Iranian provocations.[40] This doctrine represented a shift away from the traditional Israeli bifurcation of preparing for war and conducting war by adding a third component, sustained low-intensity conflict to prevent adversaries from building capabilities during peacetime.

Iranian weapons proliferation was the impetus behind the campaign between wars, but the key motivating factor revolved around Iranian attempts to challenge the Israeli Air Force's freedom of maneuver over Lebanon. The inaugural action in Israel's campaign between wars was a January 2013 airstrike on a convoy of advanced SA-17 surface-to-air missile systems near Damascus that were being transferred to Lebanese Hezbollah.[41] This first strike was followed by others throughout 2013, and by 2016, the Israeli offensive expanded from Lebanese Hezbollah targets to Iranian targets and personnel in Syria.[42]

Israel's MABAM concept was designed around airpower as the primary strike capability, paired with highly accurate and timely intelligence on target locations and composition.[43] The strategy looks quite similar to that of the war of attrition between Israel and Egypt in the late 1960s. In that war, Israel pursued limited objectives to curtail an Egyptian arms buildup along the Suez Canal, largely through the application of airpower.[44] The campaign between wars follows the same strategic logic and has in

39. Levinson, "Syria."

40. Gadi Eisenkot and Gabi Siboni, "The Campaign between Wars: How Israel Rethought Its Strategy to Counter Iran's Malign Regional Influence," Policy Watch 3174, Washington Institute, September 4, 2019, https://www.washingtoninstitute.org/.

41. Lifshitz and Seri-Levy, "Doctrine," 8.

42. Herzog, "Across the Border," 4.

43. Brun, *Air Superiority*, 176.

44. Morris, *Righteous Victims*, 347–63.

fact grown to rival the war of attrition in scale, with the IAF conducting hundreds of strikes and dropping over 5,500 munitions as of early 2022.[45]

While the MABAM strategy has been accompanied by developments in UAVs and air defenses, the focus remains offensive with the IAF playing the signature role. In spite of upgrades, Israeli air defenses remain susceptible to saturation, making them a last line of defense as the primary focus has been attacking Iranian-supplied capabilities on the ground before they are employed.[46] Israeli leaders remain convinced of the viability of the MABAM doctrine and have shown a willingness to risk escalation by striking Iranian personnel and Iranian-aligned targets in Syria and Lebanon.[47]

The air-domain-centric nature of this conflict is not lost on Iran or its proxies. Iranian forces continue to adapt and experiment with new methods to challenge the IAF to some success. In 2018, Iranian assets launched a UAV into Israeli airspace. In response, Israel launched fighter aircraft to attack the UAV control van in Syria, where air defenses succeeded in shooting down an Israeli F-16I during the engagement.[48]

More recently, in early 2022, Israeli news sources reported that advanced Iranian air defenses first deployed to Syria in 2021 had begun firing on IAF aircraft during strike operations.[49] Thus far the new Iranian systems have not succeeded in engaging Israeli Air Force assets. Despite the outcome largely favoring the IAF to date, Israeli leaders remain concerned the enduring threat of Iranian UAVs, air defense systems, and increasingly accurate surface-to-surface missiles will erode Israel's hard-won freedom of maneuver in the air domain, while also providing Iran and its allies with a viable means of retaliation and deterrence. Analysts note the necessity of successful strikes without IAF casualties as central to the campaign-between-wars concept and point to fears of increasingly effective surface-to-air missile threats as an eventuality Israel must address.[50]

In February 2022, senior Israeli officials admitted Lebanese Hezbollah had successfully flown UAVs into Israeli airspace and Israel was struggling to counter the combined UAV-ballistic missile threat.[51] Likewise, partly in recognition of the challenge of countering UAVs in the air, Israeli assets conducted an attack against an Iranian drone

45. Anna Ahronheim, "Thousands of Airstrikes Carried Out by Israel in Past Five Years," *Jerusalem Post*, March 29, 2022, https://www.jpost.com/.

46. Emanuel Fabian, "In 'Game Changer,' Israeli Laser-based Air Defense Shoots Down Drones," *Times of Israel*, April 14, 2022, https://www.timesofisrael.com/.

47. Herzog, "Across the Border," 5.

48. Brun, *Air Superiority*, 177.

49. Anna Ahronheim, "Iran Has Used Advanced Air Defense Batteries against Israel in Syria," *Jerusalem Post*, March 6, 2022, https://www.jpost.com/.

50. Herzog, "Across the Border," 5–6; and Brun, *Air Superiority*, 177.

51. Yaniv Kubovich, "Israel is 'Having a Hard Time' Curbing Hezbollah Threat, Defense Officials Admit," *Haaretz*, February 20, 2022, https://www.haaretz.com/.

facility near Kermanshah in that same month using short-range quadcopter drones to destroy dozens of the Iranian UAVs on the ground.[52]

As Israel has been forced to acknowledge the threat to its airspace and adapt to defend it from incursion, Iran has grown increasingly confident in its asymmetric airpower capabilities. These changes in the rivalry dynamic were clearly showcased following Israel's assassination of an Islamic Revolutionary Guards Corps colonel in May 2022. Iran responded by revealing a secret UAV base and new capabilities, including UAVs able to launch cruise missiles.[53] Israel in turn assumed a heightened air defense alert against potential Iranian UAV and missile attacks, indicating the seriousness with which it views these threats.[54]

Implications and Lessons

While developments in the Iranian-Israeli rivalry have not led to a major war, Iranian actions have influenced Israeli strategic thinking. Importantly, Israel implemented its MABAM doctrine and also updated its airpower tactics. Israeli press sources report that in 2022 Israel modified strike tactics in Syria to account for the increased threat from Iranian air defenses.[55] Israel now uses larger formations in order to limit the window of risk by striking more targets simultaneously. This likely also allows Israeli fighters to provide better mutual support and warning against air defenses and to assist with verifying targets and gathering bomb hit assessments.

The changes in doctrine and tactics have thus far been successful, but the broader trend toward a more contested environment is one Israeli political leaders must now consider. The prospect of IAF casualties may undermine political will to continue MABAM strikes in Syria. Israel may mitigate this by enhancing capabilities to suppress enemy air defenses, but this is only a partial solution. The more difficult choice facing Israeli leaders is whether the gradual erosion of the IAF's freedom of maneuver requires escalation to restore Israeli air dominance. If Israeli leaders abandon efforts to fly over Syria, they must recognize the repercussions for Israeli deterrence. If Iran can deny IAF freedom of maneuver in the Levant, it stands to reason these same tactics and capabilities may also render the threat of Israeli airstrikes in Iran untenable.

Regardless of how Israel chooses to adapt its strategy, the IAF must also address a second challenge by adjusting aerial surveillance to account for increasingly contested skies. This process has already started in Lebanon where Lebanese Hezbollah antiair-

52. Farnaz Fasshi, Ronen Bergman, and Eric Schmitt, "Iran's Attack was Response to Secret Israeli Attack on Drone Site," *New York Times*, March 16, 2022, https://www.nytimes.com/ .

53. "Iran Shows off Underground Drone Base, but Not Its Location, State Media Report," Reuters, May 28, 2022, https://www.reuters.com/; and "Top Commander Underlines Iran's Drone Power," Fars News Agency, Iran, May 28, 2022.

54. Emanuel Fabian, "Iran Blames 'Zionists' for Killing Officer, Vows Revenge; Israel Boosts Air Defenses," *Times of Israel*, May 30, 2022, https://www.timesofisrael.com/.

55. Ahronheim, "Air Defense Batteries."

craft initiatives have forced Israel to reduce ISR overflights by more than 70 percent in 2021 compared to previous years.[56]

As Iran and its proxies increasingly deny or degrade airborne ISR, Israel must find other methods to secure the highly accurate intelligence necessary for MABAM operations. This may come in part through modified tactics, but two alternatives are likely to provide better outcomes in the long run. The first option is a return to human intelligence sources, long a strength of Israel's intelligence organizations. The second option is to look to new domains, especially space and cyber, to stay ahead of Iran's growing capability to contest the air domain.

The best answer likely lies in a combination of the two, with human intelligence providing information on target locations and adversary intent, while timely space and cyber capabilities provide vital updates. The outgoing IAF commander recently acknowledged the challenge for intelligence collection, noting that improving intelligence collection efforts in the air and space domain was ongoing in response to the difficulty operating over Lebanon.[57]

Conclusion

In the second decade of the twenty-first century, airpower has come to the forefront of the Iran-Israel shadow war. Israel has long recognized the centrality of airpower to its national security and historically has used it effectively to maintain a favorable balance of power in the region. Iran, having grasped that airpower is an Israeli center of gravity, has employed an asymmetric approach to contest this domain. Iran leverages air defenses, UAVs, and surface-to-surface missiles to contest Israeli operations in the Levant as well as to deter Israel from attacking the Iranian homeland. Israel views these developments with alarm, especially Iran's export of these capabilities to its proxies in the Levant.

Both countries have sought an advantage while thus far avoiding a broader regional war. Nonetheless, Israel is already recognizing the significance of this challenge and has been forced to adapt its approach strategically and tactically. While both nations view airpower as a critical aspect of their protracted conflict, they have shown a willingness to risk escalation in order to attain their individual objectives.

This conflict provides lessons for air forces facing an asymmetric threat. Conventional air forces should account for increasingly proliferated threats from both peer competitors and asymmetric opponents following Iran's approach. The most relevant initial lessons appear to be related to changes in Israeli intelligence collection and strike-package composition.

Air operations will continue to rely on high-quality intelligence, but in a contested domain, the methods used to collect that intelligence will increasingly shift outside

56. Roy Sharon, "Retiring Air Force Commander Tells of Preparations for Attack on Iran in Exclusive Interview," Kann News [in Hebrew], April 5, 2022, https://www.kan.org.il/; and Orion, "Don't Look Down."

57. Sharon, "Attack on Iran."

that domain. Renewed focus on human intelligence and a shift to space- and cyber-based intelligence collection provide plausible solutions. Yet the challenge should encourage a broader rethinking of airborne ISR as asymmetric threats appear poised to increasingly deny airspace to collection assets. For strike operations themselves, an emphasis on avoiding and suppressing ground-based threats reinforces the centrality of timely intelligence, both for warning and for targeting. It also encourages a renewed focus on strike packages with integrated suppression of enemy air defense assets.

As the IAF has demonstrated, airpower remains a valuable tool in an increasingly contested domain. The Israeli Air Force has remained relevant by adapting to the new reality, and other advanced conventional forces would be wise to incorporate these lessons. **Æ**

RUSSIA'S OFFENSIVE COSMOSTRATEGY

Anne Maurin

Cosmostrategy, a term rooted in the notion of geostrategy, concerns strategic maneuvers in a given space environment. Russia, a leading historical spacefaring nation, has a cosmostrategy that bears scrutiny as its purported lagging outer space industry is somewhat at odds with the sudden flurry of space-launch activity in 2022. In fact, Russia's space fleet, while precarious, is mostly complete. Moreover, Moscow is buying time by engaging in a guerrilla strategy in space—nonkinetic offensive actions in orbit—so that it can bolster its capabilities and remain a leading military space power.*

On March 2, 2022, during the early days of the war with Ukraine, Dmitry Rogozin, then-head of Roscosmos (Russia's federal space agency), decried an execution of cyberattacks launched at its satellite infrastructure, going so far as likening them to casus belli.[1] Subsequently, a month later, the United States in turn accused Russia of jamming its own navigation satellites, with US Space Force Vice Chief of Space Operations General David Thompson claiming that "Ukraine may not be able to use GPS because there are jammers around that prevent them from receiving any usable signal."[2] To reflect in hindsight, these two cases all but demonstrate that even a partial paralysis of space assets could become an unavoidable event in the midst of a large-scale conflict.

Considering this new strategic shift, it is precisely the study of "cosmostrategy" that may grant a better understanding to this unfamiliar context. Like its name suggests, cosmostrategy stems from the term "geostrategy." The latter, to recall, is the study of

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1. Interfax, "*Rogozin: kiberataki na rossiyskiye sputniki—eto casus belli* [Rogozin: Cyber Attacks on Russian Satellites Are Casus Belli]," Interfax—*Agentsvo voennyxh novostei*, March 2, 2022, https://www.militarynews.ru/.

2. See NBC Nightly News, "Russia Is Jamming US-Provided GPS Signals in Ukraine," NBC, April 4, 2022, https://www.nbcnews.com/.

strategic maneuvers in a given geographical environment for the purpose of acquiring command over the said environment, where it can be exploited for power purposes.[3]

In conjunction, cosmostrategy designates these maneuvers to outer space and the cosmos. The study has been awarded its marker of legitimacy as outer space becomes more and more indispensable by the day, not only for implementing military and economic strategies, but also for everyday use.

Indeed, since the 1990s, military operations have relied on civilian, military, or dual-use satellites that constantly fine-tune information regarding terrains and operational situations, all while facilitating the conduct of actions in a coordinated, faster, and more precise manner. Considering the valuable resources they provide, satellites must be protected at all costs against numerous threats, both human and natural. Such threats only increase with the growing congestion of orbits due to collision risks. To use the expression of Julien Gracq in his *Carnets de Grand Chemin* [*Notebooks of the Great Road*—a French philosophical work on the linkages of Earthen landscapes], further developed by Yves Lacoste in his *Dictionnaire de Géopolitique*, outer space has become a "dangerous landscape."

Cosmostrategy, when applied to Russia, gains quite the nuance. During the past decade, experts have been asserting that Russia has been lagging behind industrially, especially in relation to outer space. Yet the media and open-source networks around the world regularly reveal troubling conduct by Russia in this theatre. Indeed, while Russia's satellite range remains incomplete, recent months have witnessed a turnaround, most likely due to the ongoing conflict with Ukraine.

In particular, from February 5, 2022, onwards, there have been five military launches, four of which have been satellites with the fifth remaining a test. As a result, within but three months, Russia has launched more military satellites than in all of 2021. Hence, the enigma inevitably emerges as to how Russia manages to maintain an offensive military strategy in space with seemingly limited resources.

Yet contrary to popular opinion, Russia's space fleet is in fact relatively complete, albeit precarious, which, as a result, allows the country to maintain its space defense strategy. To detail, its nonkinetic offensive actions in orbit encompass a guerrilla strategy with the power to cause harm. Subsequently, it is able to buy more time to gradually reinstall its offensive capabilities in space and remain, under all costs, a military space power.

Russia in Space on (Nearly) All Fronts

On April 12, 2021, the 60th anniversary since Yuri Gagarin's first flight to space, President Vladimir Putin stated that in the twenty-first century, Russia must adequately sustain its status as one of the leading nuclear and space powers, due to the

3. F. Debié et al., "*À quoi sert la géostratégie* ?," *Géostratégie, Stratégique* no. 50 (1991), http://www.institut-strategie.fr/.

fact that the space industry is directly linked to its defense. This only highlights even more so the strategic importance of space for the Russian Federation.

For it to be possible to conduct an autonomous cosmostrategy, spatial access is first and foremost essential. Today, Russia possesses several launch pads, known as cosmodromes. The oldest is located outside of Russian territory in Baikonur, Kazakhstan—which ironically impedes on its increasing priority of and endeavors toward self-sufficiency. Vostochny was opened recently in the Siberian Far East, a few hundred kilometers from the Chinese border.

Plesetsk, originally a strategic missile base, is another cosmodrome located 800 kilometers north of Moscow in the Arkhangelsk region. This area is fully enclosed and defended by the *Vozdushno-kosmicheskye sily* (VKS), the Russian Aerospace Forces. From there, missiles and rockets carrying military payloads are regularly launched. Kapustin Yar, and to a lesser extent Iasny, are also launch sites for military satellites. Lastly, up until March 2022, Russia was present on the North American continent thanks to the Soyuz launch pad at the Guiana Space Centre.[4] Every one of these infrastructures make it possible for Russia to position its satellites, spacecrafts, probes, etc. across a wide range of orbits.

A Seemingly Complete but Precarious Russian Military Space Park

Quantitative Aspects

In general, it is difficult to identify Russia's exact battle order in space. The military, civil, commercial, or dual usage (i.e., combining civil or commercial use with military) of space objects in the Russian Federation is often ambiguous. Nevertheless, there are approximately 120 Russian satellites of all categories—civil, commercial, dual, and military—that are operational in orbit. (Of note, the term "operational" in this article refers to the satellite appearing to be operational on April 7, 2022, according to open-source databases. This figure may seem to fall short of Russia's self-claimed amount of 160 by June 2022.) This is a quite low number that lies in stark contrast with the high rate of space launches by other space powers, state or otherwise. For Starlink, tens or even hundreds of nanosatellites are regularly launched on a daily basis. The same is the case, although to a lesser extent, for OneWeb or even for China. On the contrary, the number of Russian military or dual-use satellites in service is estimated to be at around 80. This is excluding any civilian or commercial programs whose use, according to Russian law, must be made available to the state according to its needs, particularly the operational ones.[5]

4. Following the widespread sanctions against Russia in response to the conflict in Ukraine, Roscosmos closed its Soyuz launch pad in French Guiana and recalled all its employees to Russia.

5. Russian Federal Law: Zakon RF ot 20.08.1993 N 5663-1 (red. ot 11.06.2021), *O kosmicheskoi deyatelnosti* [The Concept of Space Activities], Article 2.

Of note, the above estimate of 80 is relative, as it depends on various databases, namely the Union of Concerned Scientists (UCS) Database, which is updated regularly. For a more precise account of the operational status of certain satellites, this article refers to the database created by astrophysicist Jonathan McDowell, which lists a launch date (LDate) and a date on which the satellite is known to be no longer operational (TDate) for each object launched into space since 1957. It is then necessary to assume, and thereby difficult to verify, that in the absence of a TDate, the satellite remains potentially still operational.

Qualitative Aspects

Although access to space is guaranteed, Russia's space component is quantitatively reduced. Many satellites are gradually becoming obsolete as the number of military launches can no longer catch up, thereby creating gaps in some constellations. The current analysis of its space fleet, either military or civilian, shows that Russia is far below the standards it had upheld during the Cold War; the country increasingly struggles to hold on to its position as a space power.

The rare budget increases for the renewal of its satellite programs, the lack of essential components due to economic sanctions, corruption, and embezzlement, as well as the difficulties in program monitoring and management have led to repeated deficiencies and delays in many of its programs. The only area where Russia had a monopoly—up until spring 2020—was manned space flight. However, this privilege is now shared with the private US actor, SpaceX. Nonetheless, military space remains a priority for Russia, particularly in a tense geopolitical context.

The space component of optical and radar Earth military observations is undoubtedly the weakest pillar constituting Russia's space capabilities. Optical Earth observation is provided by two post-Soviet programs, Persona and Bars. Although quite old and with a rather low resolution (around 50 centimeters for Persona), five satellites continue to be operational in sun-synchronous orbits, which allow a wide view.

Radar observation capability, which has imaging advantages that can penetrate cloud layers and remain unaffected by weather conditions, is almost nonexistent. There is no certainty that the Kondor satellite, dedicated to this task, is still operational. However, said capability could be reacquired with the Neitron.1 satellite (launched on February 5, 2022) that purportedly has both optical and radar imaging capabilities. Regardless, Russia's military forces can still rely on its civilian and commercial constellations, which are most likely already providing their images for state use: Kanopus and Resurs, or GEO IK2 for mapping.

Beyond surveillance and observation missions, the Russian Aerospace Forces also manages space-based early warning capabilities, namely, the EKS constellation, comprising four satellites launched between 2017 and 2021, as well as electromagnetic and

signals intelligence. The Lotos satellites intercept radio signals, making it possible to locate and identify possible military targets, mobile or otherwise.[6]

The Pion satellites are new-generation electronic listening devices, of which only one is currently in orbit, launched on June 25, 2021. It has a radar, making it essential in supporting land or naval operations and in detecting targets that do not emit radio signals.[7] The ELINT component (KREN in Russian) is moving upmarket after being in the hands of a high-risk state. It has had three satellite launches since 2021. Such a high number may be hinting at Russia moving to prioritize this component and secure its space capabilities in this area. Further supporting this hypothesis are the Akvarel and Repei programs,[8] which are both already in development to ensure ELINT's replacement.

Another key military space priority is the maintenance of an autonomous Russian satellite navigation constellation. The Glonass program, designated for this purpose, began in the 1980s. Today, Russia's navigation component consists of approximately 24 satellites. This is the minimum amount needed to obtain a relatively accurate position without the use of other global navigation satellite systems (GNSS). New Glonass satellites had been launched every year or so. Yet the most recent launch was back in October 2020. Lack of launches since then may play a factor in hindering future performance levels.

Finally, Russia's communications component is the largest in number of all—61 operational satellites in all fields. Commercial constellations are developed by companies whose majority shareholder is Roscosmos (Gonets, Yamal, Ekspress, etc.). The Loutch constellation supposedly serves as a relay linking terrestrial- and space-based communications, namely the International Space Station. This constellation may seem small at first glance, as it only comprises four satellites. However, it originally housed the Loutch-Olymp spy satellite, which regularly undertakes SIGINT missions on foreign satellites, particularly French ones.[9]

The military communications component involves 29 satellites. Military telecommunications—data transfer, etc.—are provided by the Blagovest constellation composed of four operational satellites, launched between 2017 and 2019. The constellation of 16 Rodnik satellites—launched between 2009 and 2018 in low orbit of 1,500 kilometer apogee—offers the Russian government, military, and its intelligence services the possibility of having a protected communication relay. In addition to the old Raduga satellites, smaller modern constellations, such as the Meridian with six satellites launched between 2010 and 2022, are operating within the Molniya orbit. They enable military communications to be established in uninhabited or difficult-to-

6. A. Zak, "Soyuz launches an ear in the sky," Russianspaceweb.com, updated on April 7, 2022, http://www.russianspaceweb.com/.

7. B. Hendrickx, "The Status of Russia's Signals Intelligence Satellites," The Space Review, April 5, 2021, https://www.thespacereview.com/.

8. Hendrickx, "Signals Intelligence."

9. Statement by French Minister of the Armed Forces Florence Parly on space defence, given in Toulouse, France, on September 7, 2018.

access areas, such as the Arctic, Siberia, and the Russian Far East, between ships, aircraft, and ground or mobile stations.

All these space assets are intended to be integrated into a high-performance combat system. The Russian Ministry of Defence (Minorobony) regularly publishes, as it did during the intervention in Syria, diagrams explaining the use of its space components on a battlefield.[10] However, considering the actual state of its constellations, along with the apparent difficulty its armed forces are having in optimizing their C2, doubts are raised regarding the system's level of functioning. Firstly, the number of satellites is too low for each to function perfectly in continuation. Moreover, Russia's spacecraft were not always operational nor were there a sufficient number to cover across several theaters. Media articles and analyses published throughout the conflict in Ukraine also highlight this problem.[11]

On the other hand, these difficulties that Russia encountered in its invasion of Ukraine could very well be what will accelerate the many programs that were months or even years behind schedule. Roscosmos's Rogozin is increasingly referring to these problems in an effort to prioritize defense space programs. On April 11, 2022, the day before Cosmonautics Day (the annual commemoration of Gagarin's flight, with 2022 being its 60th anniversary), he made the following statement in an interview for the *Rossiyskaya Gazeta* channel:

> In a situation where it is necessary to aid our armed forces, we have rather modest resources at our disposal. This worries me personally. Therefore, a decision has been made: to devote all attention—which previously [we] did not regard as a primary importance in this particular situation—towards ensuring that allocated funds are entirely directed towards the creation of new spacecrafts. We need to double our orbital constellations. Let's pour all our resources into this: design, organisation, production, technology, and funding. We need to see everything, hear everything, and be able to transmit all necessary information.[12]

Indeed, the conflict in Ukraine seems to have accelerated the launch of military satellites to complete certain constellations. On February 5, 2022, the Russian armed forces placed a Neitron satellite into orbit to allegedly capture radar imagery. On March 22, 2022, Russia announced the launch of a Meridian-M military communications satellite into the Molniya orbit, a distant, ultra-elliptical orbit of more than a 40,000 km apogee.

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10. Found on https://syria.mil.ru/split.htm, a website dedicated to monitoring the operational situation in Syria.

11. M. Krutov and S. Dobrynin, "*Slepaya Rossiya. Armiya Putina proigryvaet sputnikovuyu voïnu* [Russia Blinded. Putin's Army Is Losing the Satellite War]," Radio Svoboda, April 8, 2022, https://www.svoboda.org/.

12. Editor's translation of N. Yachmennikova, "*Rogozin: Nash prioritet segodnya–orbital'naya gruppirovka nablyudeniya i svyazi* [Rogozin: Our Priority Today Is an Orbital Observation and Communication Constellation]," *Rossiyskoy gazety*, April 11, 2022, .https://rg.ru/.

On April 7, 2022, the Russian Ministry of Defence declared that it had placed a Lotos-S1 military eavesdropping satellite into low-Earth orbit. With the first launch of the Angara heavy launcher on April 29, 2022, came the opportunity to put into orbit the Ministry of Defence's space object, Cosmos-2555. Some sources initially identified this to be an EMKA observation satellite (about 0.5 meters in accuracy), which now has no object in orbit. However, it now appears to be gradually plunging towards Earth and disintegrating in the atmosphere. This suggests instead that it was more so a test for a far-orbiting satellite launch. Even more recently on May 19, 2022, again from Plesetsk, a Soyuz 2.1a put into orbit a new optical observation satellite for the Bars constellation.

To juxtapose, 2021 only saw three Russian military satellites launched, while the first half of 2022 already had five military objects launched into space. This pace is only expected to continue in the coming weeks and months. The bottlenecks hindering many military programs—often put on hold for various political, administrative, industrial, and civil reasons—seem to be rapidly dissipating. This change of tempo, borne after the abandonment of many scientific space programs, has led to a twofold observation: Russia is now acknowledging the insufficient level of its constellations and is thus realigning its priorities toward military space.

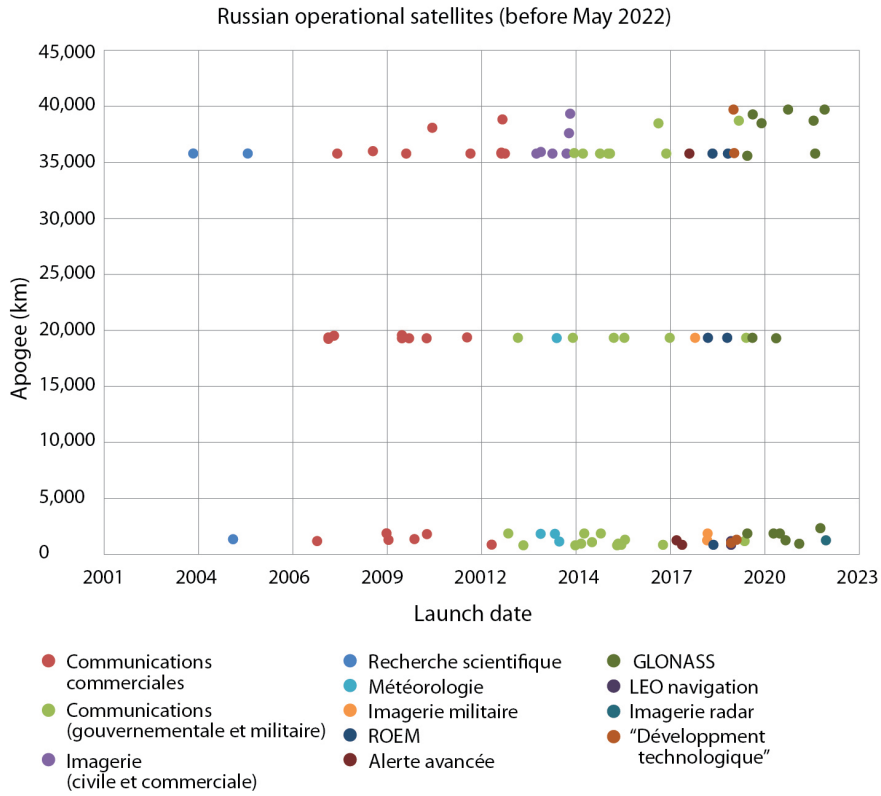

Figure 1. Launch date and apogee of Russian operational satellites

Cosmostrategy: The Study of Russian Maneuvers in Space

In Russia's inventory, a handful of satellites whose characteristics remain unknown stand out for their unusual uses: maneuvers in space, orbital rendezvous, and its self-professed "technological development" missions. Similarly, activities left unclaimed occur regularly, especially during periods of geopolitical tensions or conflicts such as the jamming of navigation satellites, US GPS, internet relays, and communications used in the Ukrainian crisis. Ground-based and space-based operations attempt, nearly always indirectly, to harass or temporarily paralyze state or private entities. As these activities are not often easily attributable, their perpetrators continue to be shadowed by a question mark. Nevertheless, a new front line is emerging, despite its relatively obscure nature.

Inspector Satellites: Intelligence Agents in Orbit

On May 23, 2014, a Rokot rocket from Plesetsk placed several military satellites, including three Rodniks, into low orbit. In addition, observers noticed that in close proximity to these three communication satellites was the presence of another unidentified object. This situation is reflective of a similar occurrence from a few months earlier.[13] Initially thought to be debris, the object had seemingly performed a number of maneuvers in a progressive manner, changing its apogee and perigee by a few kilometers. It was eventually listed and numbered as Cosmos-2499.[14] Undoubtedly, its maneuvers led to many unanswered questions about this entity's role. However, neither Roscosmos nor the Ministry of Defence provided any details to Anglo-Saxon researchers and officials, who perceived these activities as a threat to the proper functioning of their own spacecrafts.

The movements of Cosmos-2499 are worth considering for several reasons. Such a capability that Russia is deploying is not directly meant to be aimed toward foreign assets. Indeed, such actions would be outrightly considered as aggression. Rather, these maneuvers are meant to provide the opportunity to perform tests and carry out training in preparation to execute a space offensive, should the occasion call for one.

Developing the capacity to move a mobile object in space and project it from one orbit to another remains an essential technique to have at hand. Cosmos-2499, in particular, can change its trajectory to move closer toward a target. As a result, it is purported to be able to intercept images and communications from its target to eventually photograph and transmit the intercepted information to ground stations. In addition, this type of survey satellite is predicted to also possess the capability of launching a high-speed projectile or even a satellite from space. Such an ability to launch a projectile from an orbiting spacecraft requires a high degree of technical sophistication. Needless

13. A. Zak, "Kosmos-2499: Is It a Spy or an Assassin...or Both?," Russianspaceweb.com, April 30, 2017, http://www.russianspaceweb.com/.

14. Zak, "Kosmos-2499."

to say, it fosters added fears of the possibility of a new, emerging paradigm where space itself becomes weaponized.

From 2014 to 2016, Cosmos-2499 was noted to have performed several maneuvers around the Rokot launcher's rocket stage, Briz. Cosmos-2499 approached Briz to position itself in a parallel orbit of close proximity, before finally overtaking it at low speeds. This kind of space rendezvous requires a scrupulous accuracy in the piloting of the hunter satellite, so that it may accurately adapt its trajectory to that of the hunted object. However, Cosmos-2499 is not the only satellite type that holds a monopoly on such capabilities. Other devices have also been identified, and subsequently categorized together under the name Nivelir by Western experts. According to observer and astrophysicist Jonathan McDowell:

> In 2017 Russia started launching a new series of satellites which performed proximity operations and released subsatellites. The satellites were launched by Soyuz-2-1v from Plesetsk. These satellites appear to be follow-ons to those launched along with communications satellites on Rokot missions in 2013-2015 (Kosmos-2491, 2499, 2504). The US government has suggested that the satellites represent tests of space weapons. Bart Hendrickx has suggested the satellites are part of the Nivelir program.[15]

Indeed, after the three aforementioned satellites, Cosmos-2519, -2521, -2523, -2535, -2536, -2542, and -2543—some of which were nicknamed as "Russian dolls"—were noted to have performed the same modes of action. These were placed into orbit between June 23, 2017, and November 25, 2019, both from Earth and from space. Since then, a number of orbital maneuvers have been carried out, either around launch vehicle stages and debris or from domestic and foreign satellites.

From 2013 and onwards, about four of the 11 Nivelir satellites launched are believed to be currently operational in space. The others seemed to have been deactivated or repositioned into the atmosphere. It is possible, however, that the deactivated ones may "awaken" in the coming years. In addition, there seems to have been other maneuvers that had been intentionally coordinated. Notably, these include the approach of Cosmos-2542 in January 2020 and August 2021 and Cosmos-2543 in December 2019 and June 2020 to the US imaging satellite, USA-245.

A case in point is the Cosmos-2543 fighter, which, after its rendezvous with the USA-245 satellite, ejected an object in June 2021, before being immediately registered as the S45915. The Russian Ministry of Defence was severely criticized, especially by the United States, which denounced these movements as offensive actions. However, the Minorobony repeatedly insisted that these missions were carried out within the

15. J. McDowell, "Nivelir (Kosmos-2519 et al.): A New Series of Russian Military Satellites," Jonathan's Space Report, accessed June 1, 2022, https://www.planet4589.org/.

framework of satellite maintenance and experiments, similar to when Cosmos-2542 itself had launched the -2543 satellite on December 6, 2020.[16]

This capacity to launch from space—an environment that is difficult to observe—calls for the necessity of a permanent and continuous monitoring of Russian space objects. It is no longer solely a question of assessing the danger of natural debris, but also of monitoring the possible increase in the number of Russian satellites in space.

Much speculation has also arisen regarding the potential capabilities of a handful of Russian inspector satellites, which constitute but a small percentage of the Russian space fleet. Recent events have signaled that Russia's strategic thinking is veering towards adopting an asymmetric and discreet military response. With neither the necessary quantitative resources nor the desire to wage an ostentatious war in space, the Russian Aerospace Forces are hence defaulting to a semblance of guerrilla warfare to destabilize opposing space powers via exercises or actual interventions.[17] This strategy is illustrative of Marshal Alexander Suvorov's famous maxim: fight not by numbers but by skill.

Nevertheless, Russia is not the only country equipped with fighter satellites. The United States (the X-37B shuttle) and China also possess similar instruments. Yet, these operations from Moscow—comparable to slipping a "pebble into a shoe" as evoked by geographer Isabelle Sourbès-Verger who specializes in space—not only grants additional time for Russia, but also allows the country to continuously showcase its presence in this increasingly contested environment. This ballet of inspectors is but an adamant reminder for the West that Russia still maintains nuisance capabilities in space, despite deceitfully projecting the image of neglecting its offensive means during the past decades. Notwithstanding all the difficulties that Russia is facing in maintaining its status as a space power, Moscow continues to present itself as a worrisome threat.

War or Peace? From Secret Missions to Confrontations in Orbit

All in all, the capabilities developed from inspectors would still be insufficient in the event of a high-intensity conflict. Here, belligerents would endeavor to weaken all

16. Editor's translation: "Today, as part of the ongoing testing of new space technologies, the Ministry of Defence of the Russian Federation conducted an experiment to separate a small spacecraft from a unified multifunctional space platform. The purpose of the experiment is to continue endeavours to evaluate the technical status of domestic satellites. The visualisation information is transmitted to ground processing facilities to determine the technical status of the satellite under study." See Russian Ministry of Defence, "*Minoborony Rossii prodolzhaet ispytaniya novoi kosmicheskoi texhniki* [Russian Defense Ministry Continues Testing New Space Technology]," Russian Ministry of Defence, statement made on December 6, 2019, at 17:23.

17. A parallel can be drawn with "cybernetic guerrilla warfare" as seen in J. S. Mongrenier, *Le monde vu de Moscou: Dictionnaire géopolitique de la Russie et de l'Eurasie postsoviétique* (Paris: Presses Universitaires de France, 2020), 183.

orbital components of their adversaries. Beyond inspection missions and closing-in maneuvers, electronic warfare operations would be carried out in addition, including those involving antisatellite weapons (ASATs) and laser weapons. These would maneuver more or less from Earth, although an offensive capability directly in orbit is gradually being developed overall. Russia specifically, despite its limited resources, is also involved in these areas.

Electronic Warfare Extending All the Way into Space

Should there ever be a destruction of an object in orbit, an adversary could consider this as casus belli. On the contrary, the use of electronic warfare is much more discreet, allowing its user to achieve significant results without necessarily leading to a declaration of war. Regarding this issue, Hendrickx writes that "electronic warfare is probably perceived by Russia as a relatively inexpensive, asymmetric response to Western military technological development."[18]

A two-point mission has thus gradually emerged in the discourse among Russia's governmental, military, and industrial authorities. On the one hand, such a mission permits the protection of the country's national interests, while on the other hand, it has the ability to paralyze or even suppress enemy radio-electronic systems. Russia's electronic warfare program, published in 2013 with projected developments up until 2020, had already indicated the need to deploy multifunctional electronic warfare programs in space, although they are currently mostly deployed on the ground. At the time, they were meant to enable reconnaissance and the suppression of radio-electronic systems, employed by radar, navigation, and communication systems.[19]

John Venable, a defense policy researcher at the US-based Heritage Foundation, wrote in February 2022 in finer detail that Russia's space portfolio includes a sophisticated offensive capability that can jam sensors in space and blind them.[20] Moscow is currently implementing jamming systems that can be deployable from the ground, which would threaten not only GNSS capabilities, but also internet and communication relays used in a particular region.

These electronic warfare systems can be extremely mobile as they are apparently mounted onto trucks, including the Krasukha 4, which is capable of jamming satellite waves, including GPS. The Murmansk-BN electronic warfare system is another high-performance system, which was abandoned in the 1990s, but then revived and deployed in 2018. Some specialized press articles, such as http://www.avia-pro.fr (but no doubt reframed by Russian media), report that the system disrupted the operation of F-35s

18. B. Hendrickx, "Russia Gears Up for Electronic Warfare in Space (part 1)," The Space Review, October 26, 2020, https://www.thespacereview.com/.

19. M. Doskalov, "*Perspektivy razvitiya sistemy radioelektronnoi borby rossiskoi federatsii na period do 2020 goda* [Prospects for the Development of the Russian Federation's Radio-Electronic Warfare System for the Period until 2020]," Defense complex of the Russian Federation, May 21, 2013, http://federalbook.ru/.

20. T. Novelly, "The First Shots in a Ukraine Conflict May Be in Space," Military.com, February 15, 2022, https://www.military.com/.

during a NATO exercise in the Baltic Sea at the end of 2021. The communications of these fighters, notably via satellite relays, could have been completely obstructed and cut off. These electronic warfare systems could be put into use by Russia in the ongoing conflict with Ukraine.

In April 2022, the United States accused Russia of blocking a satellite navigation signal (presumably Navstar) that had been covering Ukraine.[21] Even shortly before the start of the conflict, similar accusations were already made against Russia, after issues with GPS signals over the Baltic region and northern Europe had arisen. SpaceX officials also decried Moscow for similar acts carried out against its Starlink system. These activities had sought to prevent the functioning of the private entity's internet coverage that it was providing to Ukraine. Thankfully, an update to the system restored its capabilities.

These acts by Russia and their subsequent accusations by the West only demonstrate Moscow's premeditated planning of such spatial operations. The evident motive to act below the threshold of war may indeed be considered as a strategic choice to avoid escalation. It may also be interpreted that Russia is well aware of its weakness should there be retaliatory strikes launched against its own assets upon the execution of an overly aggressive maneuver. With limited means at its disposal, it currently has to settle for solely the ability to momentarily paralyze the specific functions of its adversary, as in the case of the conflict with Ukraine. However, should Russia wish to remain as a leading space power, these modes of action will not be enough to satisfy such an ambition.

Russia's Offensive Capabilities in Space

To significantly improve its offensive capabilities in space, Russia is already presently designing or even developing other programs. These are at times detected by experts, owing to statements and industrial fact sheets presented in the Russian media. In this particular context, initiatives in the field of directed energy (laser) weapons, especially against satellites, or ASAT missile propulsion from Earth, air, or space can be especially highlighted.[22] According to the 2021 version of the annual *Global Counterspace Capabilities* report, Russia has been endeavoring since the 2010s to rebuild its ASAT capabilities either from Earth or co-orbitally in order to acquire an operational ASAT range.[23]

However, furthering this development will only be feasible if military space becomes a true priority at the budgetary level. The destruction in direct ascent (i.e., with

21. NBC Nightly News, "Jamming."

22. B. Weeden and V. Samson, eds., *Global Counterspace Capabilities—An Open Source Assessment* (Washington, DC: Secure World Foundation, April 2021), https://swfound.org/.

23. Editor's Translation: In response to Russian launching an antisatellite missile in November 2021, the Chief of Staff of the French Air Force, General Stéphane Mille, stated in an interview with French newspaper *Le Monde* on December 1, 2021, that Russia had demonstrated that it was now capable of acting in space across the entire spectrum of conflict.

a Nudol missile fired from Earth) of one of Russia's former low-Earth orbit electronic listening satellites on 15 November 15, 2021—now inoperative—is emblematic in this respect. The firing of the Nudol proves that Russia no longer intends to act in a discreet and irregular manner. It nevertheless violates two taboos: the generating of a substantial amount of debris and the potential placing of weapons of mass destruction into orbit.

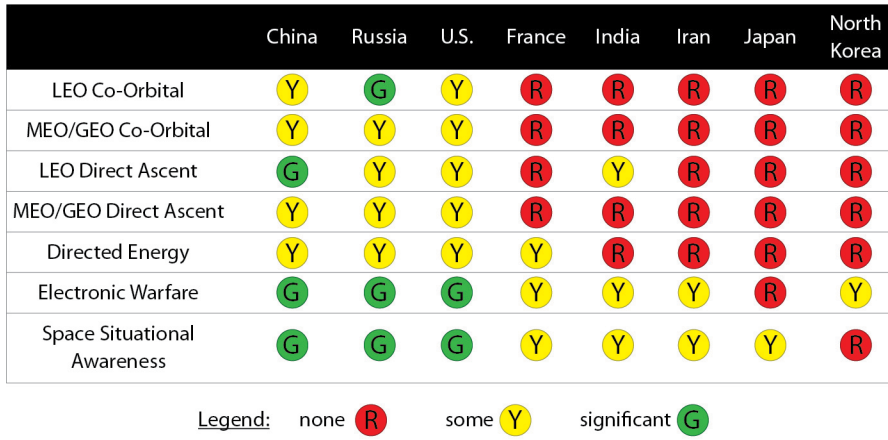

Figure 2. Comparison of global antisatellite capabilities (Source: Global Counterspace Capabilities—An Open Source Assessment, ed. 2021)

Conclusion: What Kind of Offensive Cosmostrategy Will Russia Adopt Moving Forward?

Political and military statements are regular reminders that space is entirely subordinate to the security and defense interests of the Russian Federation. Of particular interest is Rogozin's televised speech broadcasted on the *Perviy Kanal* channel as a part of the 60th anniversary celebrations for Gagarin's first flight. The head of Roscosmos describes that even though the objective is to be one of the top three space powers, Russia intends to fully ensure its nation's strategic shield and defense via the use of space. Indeed, he insists that this is because Roscosmos is the entity that creates the material basis for strategic nuclear forces. This, Rogozin explains, makes it all the more vital for the country to construct itself in its own spirit, by way of its own independence and sovereignty.

Regardless, the consideration of outer space as a military theater is nothing novel. In fact, several Soviet strategists as early as the 1960s referred to this theater in the same way as they did for land, sea, and air.[24] This is not to mention that the use of outer space remains strongly connected to the implementation of nuclear components

24. V. D. Sokolovsky, *Soviet Military Strategy*, trans. H. Dinerstein, L. Gouré, T. Wolfe (Santa Monica, CA: RAND Corporation, 1963), 21, https://www.rand.org/.

due to ballistic technology. Indeed, the propulsion technology of a rocket finds its origins from that of a missile. Fittingly, both the terms for missile and launchers in the Russian language are identical: *raketa*.

Since the fall of the Soviet Union, several Russian publications have sought to either adapt military space to new forms of armed conflict or to incorporate it into high-intensity wars. In 2000, in the conclusion of a strategic history text whose editing was overseen by General Vasilii Zolotarev, space was described as the main arena of struggle.[25] Specifically, the text outlines that military operations would likely begin in space long before the deployment of any large-scale strategic operations on land, in the air, or at sea. The main objective in such a case, the publication claims, would therefore be the mutual destruction of military and support assets in space, including the execution of a covert destruction of these assets.

More recent is a critical article, found in a Russian military strategy journal, that was published in March 2022 by Colonel Yuri Krinitsky, professor at the Tver Military Aerospace Defence Academy. The author argues that it is essential to recognize outer space as a "niche to be occupied" through the development of all necessary weapons and equipment. In Krinitsky's view, the foremost priority in the conquest for aerospace superiority would be acquired not only by blinding, suppressing, and defeating air defenses, as well as infrastructure facilities on the ground and in the air, but also by similar effects on the enemy's spacecrafts and orbital systems.[26]

Yet considering the above, Russia's space sector is, on the contrary, in crisis, while the Russian Aerospace Forces' space operational assets remain precarious. In short, a gap exists between Russia's strategic thinking and the veritable reality. If Russia manages, despite the imposed-upon sanctions, to mobilize and recreate an effective and offensive space battle order, then it may very well obtain the means to pursue its envisioned strategy.

However, it currently does not have the most modern, technically advanced, or precise arsenal. It uses rustic tools that are indeed functional, but whose technical performance is nevertheless oftentimes inferior to that of other major space powers, particularly the United States. As such, it is rather its ability to act across the entire space spectrum and to subsequently attack (should it be necessary) that actually guarantees its place in the exclusive club of space powers.

From the conflict in Ukraine, the results in space reveal that Moscow is currently adhering to a form of pragmatism that carefully considers the escalation risks at hand, should either US or European spacecraft indirectly serving Ukrainian forces be destroyed. Russia's "special operation" in Ukraine does not witness any activities of a kinetic nature

25. V. A. Zolotarev et al., eds., *Istoriya voennoĭ strategii Rossii (Rossiĭskaia voyenno-istoricheskaya biblioteka)* [History of Russia's Military Strategy (*Rossiĭskaia* Military History Library)] (Moscow: Poligrafresursy, 2000), 534–35.

26. Y. Krinitsky, "*Napravleniya razvitiya form i sposobov deystviy voysk (sil) vozdushno-kosmicheskoy oborony* [Directions for the Development of Forms and Methods of Action of Troops (Forces) of Aerospace Defense]," *Voyennaya mysl'* [Military Thought], no. 3 (2022), https://vm.ric.mil.ru/.

from its side. This is most likely because Moscow wishes to establish a certain level of consistency with its intentionally woven narrative, which adamantly refers to the conflict in Ukraine as a simple operation and not as a war. For the former, the use of destructive measures against its competitor is not required, at least not theoretically.

To be precise, the targeted adversary, the Ukrainian state, does not own a space program; only its latent adversaries—mainly NATO member states—do. Because the latter are not deemed as cobelligerents, should their space assets and infrastructure be destroyed, there would be a gross misalignment with the Russian authorities' account of events.

Indeed, such an operation would have an extremely high escalation risk. As it is highly dependent on its space sector, be it at the military, private, or societal level, Russia would be at a disadvantage with much to lose should it plunge into a high-intensity war in space. Inevitably, it could neither protect itself nor retaliate in a substantial manner. This element most likely encapsulates Russia's overall communication strategy, which remains strongly committed to international institutions against the weaponization of space. As such, the options of employing asymmetric and covert maneuvers continue to be Russia's most preferred method to inflict harm upon its adversaries.

The situation moving forward will continue to witness an increasing amount of advanced offensive equipment placed into orbit, functioning as an insurance policy of sorts for major space powers to hold on to their positions. The lessons learned from the conflict in Ukraine could catapult a reorientation of Russia's space programs toward an "all-military" approach. On March 3, 2022, Rogozin announced on Rossiya 24 that the Russian space program, against the backdrop of sanctions, would be adjusted to prioritize the creation of satellites in the interests of Russia's defense. The recent launch of military satellites at such an accelerated rate seems to be in line with this statement. Consequently, two aspects must then be carefully monitored: the renewal of offensive space capabilities, and of course, the competence of Russia to put them into use. ***Æ***

BOOK REVIEWS

War Transformed: The Future of Twenty-First-Century Great Power Competition and Conflict

By Mick Ryan. Naval Institute Press, 2022, 312 pp.

In a crowded field of books anticipating future warfare, Mick Ryan's *War Transformed: The Future of Twenty-First-Century Great Power Competition and Conflict* stands apart for seeking to avoid a breathless emphasis on change. Rather, *War Transformed* seeks to remain grounded in continuity while stressing areas that military institutions should seek to reform (66).

This approach can be seen in Ryan's opening anecdote of violence breaking out between India and China in June 2020, a twenty-first-century outburst characterized by some of the same weapons used by cavemen, like clubs. Ryan similarly explains that Russia's 2014 invasion of Ukraine "shows how war never really disposes of any old ideas or capabilities. It just combines them in different and sometimes new ways" (81).

Ryan, a recently retired Australian army general, first explores the relationship between revolutions and military change to situate his work within the fourth industrial revolution of the "acquisition" of knowledge (5). Concurrently, Ryan challenges technological determinists by contending that technology is "largely a level playing field" that may offer only the most "transient" of advantages (172). A more lasting advantage can be secured by appropriately hitching the technology to a suit of supporting ideas, institutions, and properly trained and educated military professionals (7). This point is at the heart of the work's argument.

Regarding specific technologies, Ryan suggests that artificial intelligence, robotics, quantum computing, biotechnology, energy weapons, hypersonics, space technology, and additive manufacturing will probably be the most important technologies to watch. None of this will greatly surprise the reader with a passing acquaintance in future warfare. But then again, the work's strength is not its deep dives into technology but rather its balanced approach to future warfare.

As such, Ryan incorporates discussions of larger disruptive global patterns of demographic change and demography and urbanization and identifies seven trends for future warfare agnostic to any specific technology. These trends include (1) a "new appreciation of time"; (2) the "battle of signatures"; (3) "new forms of mass" that require more creative approaches; (4) more "integrated thinking and action"; (5) an increased reliance on human-machine teams; (6) a reevaluation of how one targets a nation's psyche; and (7) the need for nations to reduce dangerous supply chain dependencies (82–84).

Ryan's discussion of time highlights his approach's strengths and weaknesses. Well-versed in the literature on modern and future warfare, Ryan draws on maneuver theorist Robert Leonhard's breakdown of time into four categories: duration, frequency, sequence,

and opportunity. Of those, Ryan believes that duration and frequency will be of greatest importance. Regarding duration, Ryan unsurprisingly stresses the tension between the preference of Western nations for shorter conflicts and the ability of some of its opponents to work against Western preference. More interesting is Ryan's emphasis on frequency, by which he means the "pace at which things occur" (86). The author allows that events may occur faster and that speed potentially "deepens the strategic reach of military activities," a point at which the author vaguely refers to cyber and information war by way of example (87).

Yet Ryan notably stops short of embracing hyperwar, arguing that "[a]cting at the right time will always be more important than acting at speed" (88). In a five-page section, the author introduces several issues for consideration, offering a springboard from which the interested reader can pursue the topic in greater depth.

About halfway through the book, Ryan introduces another set of themes to explore the five best historical ways to gain an advantage: geography, mass, time, technology, and intellectual advantage (169). Since some of these categories overlap with his previously discussed set of themes, the author then pivots to focus largely on the last category, a logical choice since he spent his last assignment in the army before retirement commanding the Australian Defence College.

Ryan seems to suggest that China has moved ahead in the area of intellectual advantage. He certainly pulls no punches in taking Western militaries to task for mushy thinking, such as for using terms like "grey zone" (70, 211). He finds such phrases to be problematic in allowing for a shared understanding needed to counter potential opponents. But he does not always apply the same rigorous standards to his quoting and unpacking of Chinese and, to a lesser extent, Russian military thinking (34, 86–87, 124, 149).

But other examples of Western jargon receive a pass, such as multidomain operations. Ryan notes that peer and near-peer adversaries have "invested in new operational concepts that are designed to attack Western systems and joint forces where they are weak" (134). He further recognizes that China has "assessed that a key weakness in Western military organizations is the operating systems that link forces in the different domains" (143). But Ryan also insists that Western militaries must "pit" their advantages against their adversaries' weaknesses. But, in this case, multidomain operations may just constitute a known weakness that may not offer enough of an offsetting advantage.

Again, continuing his emphasis on cognitive advantage, Ryan suggests the need for almost constant adaptability in professional military education (196). Disappointingly, this section lacks compelling examples of how he oversaw such change within the Australian Defence College, particularly regarding how to better prepare military leaders to seize the advantages of artificial intelligence.

He also never quite balances how one remains grounded in key patterns of continuity given his countervailing emphasis on "spark[ing] continuous change" (143, 155). This is a delicate balancing act that desperately needs more discussion as there are real limits in quality when institutions pursue constant change.

The author also sees an unexpected boon from the COVID-19 pandemic in professional military education: the provision of more online, continual learning. But Ryan does not demonstrate that this format actually improves learning outcomes (203). Likewise, he stresses continual learning but does not offer practical suggestions regarding how overworked officers can jam professional military education into their weekends with anything more than the most cursory and cynical engagement.

For those already conversant in issues surrounding future warfare, Ryan's work offers an excellent synthesis of some key literature that will help to identify gaps or areas worthy of further study. For those not up to date on these debates, the work is still highly accessible. Amid a slew of books offering technological silver bullets, Ryan provides a steady

and wide-ranging approach that can be mined for additional study depending on one's familiarity with the topic at hand.

Heather Venable, PhD

The Insurgent's Dilemma: A Struggle to Prevail
By David H. Ucko. Oxford University Press, 2022, 328 pp.

David H. Ucko explores new trends in insurgent strategy by looking at how insurgency is transforming in a symbiotic relationship with state vulnerabilities. He describes the insurgent's dilemma as the challenge in violently fighting state authority and establishing power while avoiding a devasting state response during the process.

The book opens with Ucko reframing analysis about insurgency by focusing on its political features rather than the military aspects. He highlights how the successful insurgencies during the Cold War focused on specific state vulnerabilities, but this changed as the international community and states have transformed. Ucko also describes how foreign states were key to insurgency victories, but insurgencies have succeeded with only a few definitive victories between 2000 and 2015 (26). This relative lack of success, he argues, prompted changes in the insurgent's strategies and, in doing so, necessitates changes for states to counterinsurgencies.

The first half of the book examines three types of insurgencies, which demonstrate a shift from more traditional analysis. Ucko begins by analyzing localized insurgency in which a group does not attempt to change the regime but engages in subversion locally and avoids significant armed retaliation from the state. Exploring urban and rural cases in Brazil, Iraq, Mali, Mozambique, Nigeria, and Turkey, he describes the vulnerabilities this type of insurgency poses to the state with its internationalization and threat to government legitimacy by localizing the battle to the neglected areas of the countries.

Building from this, Ucko defines infiltrative insurgency as involving a group that co-opts state structures through the exploitation of political and social divisions while covertly using violence as it engages in legitimate politics from within to dismantle a democratic system. He analyzes historical case studies with the Nazi Party in interwar Germany and more contemporary cases involving Bolivia, Colombia, Greece, Iraq, Nepal, Northern Ireland, and Pakistan, demonstrating how this approach allowed armed movements to legitimize their aims and twist democracy even when the movement failed (111).

Then, Ucko analyzes ideational insurgency that he describes as online influence and recruitment narratives that seek to build power amid sporadic violence. Drawing on case studies of information operations from the Islamic State and online activity from far-right violent extremists, he describes their efforts to mobilize against the state through the formation of a digital counterstate and the movement of fringe ideas into the mainstream (141).

The second half of the book proposes state responses to these three types of insurgencies and highlights the need to focus state efforts beyond military responses. Ucko offers several state courses of action against localized insurgency, drawing from lessons learned in Afghanistan, Colombia, El Salvador, Haiti, Iraq, and Sri Lanka to demonstrate how the state must enter neglected areas and establish legitimacy. He highlights the need to not only control, clear, and hold territory in rural areas, but also to establish conditions for institutionalizing informal structures. Moreover, he notes that urban areas require special consideration about the types of force necessary, allowing state connections with the population so urban insurgents' political functions can be replaced by the state (183).

Next, Ucko looks at state responses to infiltrative insurgency and the importance of the responses, such as ostracizing, integrating, and proscribing groups, as well as distinguishing between competition and existential threats (188). Using case studies from

Colombia and Northern Ireland, he describes ethical and strategic aspects of the responses, such as the dangers of inclusion, to encourage moderation and discusses the problems of simply banning the parties from political participation.

Lastly, Ucko reviews state responses to ideational insurgency with attention to censoring, policing, and regulating internet activity by noting the trade-offs and challenges of each approach. Largely focused on the United States, he also looks at countermessaging and the need for states to adjust as well as the importance of media literacy against disinformation and propaganda. He notes the significant difficulty the state faces in responding to ideational insurgency and the role of the private sector, such as social media companies deplatforming and removing violent internet content.

This book successfully describes the ways insurgency has transformed and provides ideas for state responses to some transformations. Ucko details how insurgents had more victories before the end of the Cold War, which prompted strategy shifts to fight the state's advantages and attack vulnerabilities. During the Cold War, states relied on military might to fight insurgencies, but suppressing opponents with firepower is not enough in a contemporary globalized and digitized world. Hence, the book explains not only how states need to rethink insurgencies but also how they must establish analytic frameworks about these trends for effective responses.

The Insurgent's Dilemma does have some shortcomings. Notably, several of the case studies examined were superficial, reciting some basic contours about actors and events when providing comparative analysis to movements in other countries or time periods. Moreover, the book expands the definition of insurgency by including online narratives, social media posts, and computer hacking as forms of insurgency. This significantly changes the scope of insurgency beyond conventional definitions and potentially blurs lines between dissent and violence, especially for countries where political opposition, including demands for democracy, are branded as terrorism. Nonetheless, readers interested in the future of insurgency, disinformation, and contemporary challenges to democratic nation-states will find this a valuable study.

Ryan Shaffer

Klimat: Russia in the Age of Climate Change
By Thane Gustafson. Harvard University Press, 2021, 336 pp.

Climate change will be the defining issue in this century's international politics. It will shift international trade, drive conflicts, and—at least for some low-lying Pacific islands—be an existential threat.

Thane Gustafson's *Klimat: Russia in the Age of Climate Change* seeks to predict the effects on Russia. The book charts a perilous course for the Russian economy and society in the next 30 years, a course beset by the storms of shifting international markets and the shoal waters of poor domestic economic management. That course is only possible without any surprise, world-changing events beyond the COVID-19 pandemic that had begun as Gustafson completed his book. Civilization is now, however, beset by another world-altering event: Russia's February 2022 invasion of Ukraine. *Klimat* is only more compelling as a result.

Gustafson argues that climate change's net effects on Russia will be negative (6). There will be benefits, such as marginal improvements in agricultural productivity in parts of Russia and greater access to Arctic waterways, but these will be surpassed by the costs. Melting permafrost will degrade infrastructure across 70 percent of Russia's landmass (210). Droughts, floods, and extreme weather events will make parts of Russia less habitable and economically productive. This will drive economic migration, pushing rural populations into already crowded cities.

Gustafson argues that external actors control the economic impact of climate change on Russia, compounding this problem for Russian policymakers (7). Russian export revenue comes overwhelmingly from hydrocarbons, precisely those resources the world must wean itself from to limit the impact of climate change. Russia's economic output—and its tax revenue—is at the whim of governments actively seeking to move their economies away from oil and gas (15, 52). Changes in European policy toward fossil fuels, such as a carbon border tax, would strongly affect Russian exports. Similarly, any change in Chinese demand could radically change Russia's economic fortunes.

Gustafson predicts that in the short-term, Russia will continue to benefit from its hydrocarbon resources as the global energy transition slowly builds speed. To the early 2030s, the global demand for fossil fuels will continue to increase and Russia will remain in a strong economic position (13). From the 2030s to 2050, however, the global energy transition will gain steam and Russian exports of oil, gas, and coal will fall precipitously (13). The result will be a Russian economy short of export revenues, a state short of tax incomes, and a society struggling to cope with the effects of climate change.

All told, Gustafson paints a bleak picture of Russia's economic future. This future has grown bleaker in the wake of Russia's 2022 invasion of Ukraine. Sanctions on Russia's central bank have obliterated the currency reserves that Russia has developed over the last 20 years. This will reduce Russia's ability to offset the costs of climate change. Shell and BP—major British oil companies—withdrew their Russian investments. The four largest international oilfield servicing firms also left Russia. With these departures, Russia loses the capital to finance development of its fossil fuel reserves and the technical knowledge to exploit them. This will seriously constrain Russia's ability to benefit from its natural resources even to the early 2030s horizon that Gustafson predicts. Furthermore, Europe plans to cut Russian gas imports by 66 percent this year and intends to have complete energy independence from Moscow well before 2030. The 10 years of strong fossil fuel exports that Gustafson predicts seem to have burned up, leaving Russia in a much weaker position.

This is not to criticize Gustafson's work, which provides a sober analysis of the structural factors that will govern Russia's experience of and ability to respond to climate change. The point is to highlight the precarity of Russia's economic position until 2050 and its vulnerability to Kremlin mismanagement and outside events. Few predicted Russia would invade Ukraine in 2022, and fewer still predicted the unprecedented scale of economic sanctions the United States, the European Union, and others enacted in response.

Russia could only overcome the structural problems that Gustafson highlighted if incredibly skilled and lucky political leaders in the Kremlin worked with all parts of Russian civil society and coordinated with their counterparts in other countries. Instead, Russian President Vladimir Putin launched his country into a war that puts Russia in opposition to its primary hydrocarbon customers and the source of the high technology the future Russian economy needs.

In understanding the world that will emerge after the Russo-Ukraine War, readers will appreciate *Klimat* for the insights it provides on Russia's future, climate change, and the future of international relations.

Ian T. Sundstrom

Innovating Victory: Naval Technology in Three Wars

By Vincent P. O'Hara and Leonard R. Heinz. Naval Institute Press, 2022, 336 pp.

Vincent P. O'Hara is the author or co-author of more than 10 books, mainly on topics of World War I and II naval warfare. In this latest book, *Innovating Victory: Naval Technology in Three Wars,* O'Hara has teamed up with Leonard R. Heinz, an experienced

designer of wargames and simulations with emphasis on tactical naval problems. The authors use their expertise to explore six case studies that analyze technological developments in the twentieth century.

O'Hara and Heinz studied the development of weapons (mines and torpedoes), tools (radio and radar), and platforms (submarines and aircraft). The guiding idea was not to focus on technical details but to explore "the process by which each technology's possibilities were first recognized, tested, then used, or not used, to best advantage" (2). Aside from the specific technologies, the book also considers the effects of human factors, such as prior established practice, politics, and policy. The goal was to divine any principles that governed the process and determine whether those principles applied across platforms, technologies, and nations. The authors also wanted to know whether any identified principles led to victory irrespective of the time in history or the specific technology pursued. This would help answer the question of whether those principles were generalizable enough to apply to developing technology today.

The book is organized into eight chapters. The lead chapter, "Use, Doctrine, Innovation," provides an overview of the previously mentioned human factors. This is followed by six chapters exploring the historical development of mines, torpedoes, radio, radar, submarines, and aircraft. The closing chapter, "Conclusions," lays out what the authors discovered as principles. Based on the scope of the bibliography and the well-documented endnotes, it is apparent that the chapters are thoroughly researched. The bibliography is well-organized, showing that the authors made liberal use of official histories and primary documents and hundreds of articles, chapters, and books by well-respected scholars. Moreover, the chapters are provided with useful illustrations, pictures, and graphics that emphasize the authors' points.

Within each of these chapters, they do a commendable job of producing a pleasantly readable condensed history that compares development success and failure across several nations, including the United States, United Kingdom, Russia (and the USSR), Italy, France, Germany, Japan, and the Ottoman Empire.

Obviously, radio, radar, and aircraft are not technological developments exclusive to naval warfare, so the authors find it necessary to discuss the development of these key innovations in broader terms that includes the development of land-based systems. Those cases readily showed the complications that arose from politics, interservice rivalry, national competition, and policy decisions—particularly concerning the priority of capital investment. These human factors all contributed equally, or more so, than the science and engineering to the development of these technologies into effective weapon systems.

What stands out in some cases is how quickly these technologies went from discovered physical phenomena, to ideas, developed prototypes, workable innovations, and dominating advantages in a period of only a few decades, while in others the basic technology existed for more than a century before countries found a way to use it effectively in naval warfare. For example, Guglielmo Marconi demonstrated the operation of his radio in 1896, and by 1897, the Italian navy had trialed ship-to-shore communication. Naval commanders on both sides used radio extensively in the Russo-Japanese War from 1904–5. As use of the new technology became widespread, its liabilities also became manifest. By 1914, all major navies used radio communications but also learned to listen to adversary radio transmissions. Knowing that radio transmissions were easily intercepted, the navies developed cyphers and encryption, used jamming techniques, and developed direction finding to determine locations of enemy forces. O'Hara and Heinz conclude that each new technology offered a window of advantage that could be exploited until countermeasures were developed. Sometimes that window was open long enough to win a war.

In other circumstances, technology was only slowly exploited. An example documented by O'Hara and Heinz is China's use of mines dating back to the tenth century during the Sung dynasty. Mines were placed in the river channel to block traffic or emplaced to protect a small harbor. Japan began to use mines offensively in the early twentieth century against the Russian fleet during the Russo-Japanese war. Mines were used both offensively and defensively during World War I, where they were produced and laid by the tens of thousands. Mines are relatively cheap to manufacture, can be laid by many platforms either covertly or overtly, and cannot be ignored. Mine countermeasures are difficult to employ. Sweeping for them is a tedious and uncertain process.

A point that O'Hara and Heinz make to explain this differential in development time is that there is an emotional current to developing technology. Mines, mine layers, and mine sweepers do not evoke the emotional attachment that flows to aircraft, ships of the line, and submarines with crews admired for their bravery and exploits. This emotional preference influences which technologies receive priority for development. Exciting technology garners the most attention and investment. This can create a blind spot for older technology that is used in a novel way. A technology might be considered boring but that does not mean it is ineffective.

Technological advantage in warfare is often due to integration and codevelopment with other technologies. Radio begat radar. But radar and radio intelligence became advantages only after navies learned how to compile and analyze information so that it could be acted upon tactically. Here it was apparent that top-down, centralized oversight of technological development was most useful when scientific and engineering attention were needed along with large amounts of capital. Wealthy national governments could provide those commodities better than anyone else. Once the technology existed, however, bottom-up experimentation and lessons learned were the quickest ways to develop effective exploitation methods. Thus, the US Navy developed the combat information center and began to modify ships to include a dedicated space for consolidating information and controlling combat.

Submarines became effective along with improvements in radio and torpedoes. They became particularly deadly, and almost a war-winning application, when policy shifted the submarine's focus to targeting national trade by sinking merchant shipping without following the traditional rules of prize capture.

Similarly, aircraft needed to communicate with their ships, find targets, and deliver ordnance. They became most effective when the purpose-built ship—the aircraft carrier—was designed specifically to launch, recover, and maintain aircraft. Torpedoes had to be hardened to withstand the impact with the water when launched at the speeds necessary to keep aircraft aloft. Tactics had to be developed to find the enemy, report the location and direction, direct other aircraft to attack the enemy, and finally to return to their own fleet and be recovered.

A theme that runs throughout the book is the idea of network effects. One radio is a novelty. Many radios in a network allow rapid communications for a variety of tasks and common understanding of the situation. Other technologies are similar. For instance, many radio direction-finding antennas provide more accurate locations and greater resilience against damage. Many mines are far more effective in constraining ship movement than a few that can be avoided. If Germany had fielded 50 more submarines when World War II began, the outcome may have been quite different. The limited application of technology produces a small effect, but massive proliferation produces a great effect.

The military professional might not be surprised by these lessons, but they are worth noting, and many of the assumptions and biases demonstrated in the cases are still prevalent today. It is also important that one does not learn the wrong lessons from these historical snapshots.

The book, including the index, is only 300 pages. The authors examined several nations but only six technologies and two platforms. That limitation raises concern over how generalizable the lessons are. Many more cases, covering more diverse technologies over longer spans of history and including differing cultures will be required before achieving the goals that the authors set out for this book.

Given the limitations of the cases presented here, the authors did a commendable job of creating an accessible and readable volume that points out some potential pitfalls to avoid and techniques for developing technological advantage in wartime. The target audience is not the Department of Defense acquisition professional or the cadre of doctrine writers who will not be surprised by any of the book's findings. Military enthusiasts, whether professional or amateur, however, will enjoy the book and should add it to their military history library.

Phillip G. Pattee, USN, Retired, PhD

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