Special Commentary

A TACTICAL NUCLEAR MINDSET

DETERRING WITH CONVENTIONAL APPLES AND NUCLEAR ORANGES

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

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

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

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

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

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

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

Strategic Environment

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

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

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

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

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

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

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

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

Modern Battlefield Nuclear Effects: Certainty, Efficiency, and Convergence

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Efficiency: Nuclear Still Reigns Supreme

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

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

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

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

Modern precision means far fewer bombers are needed for a target set, or, in the case of nuclear weapons, a single bomber can now service several targets. Figure 1 shows how a single five-kiloton nuclear weapon exploded above a tactical airfield would disable aviation operations by destroying aircraft and infrastructure, but not the runway. It should be noted that the depiction artificially concentrates airfield assets, which creates a generous calculation.

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19. Air University, Center for Aerospace Doctrine, Research, and Education, *The United States Strategic Bombing Surveys: (European War), (Pacific War)* (Maxwell AFB, AL: Air University Press, 1987), https://archive.org/.

20. Editors of *Encyclopaedia Britannica*, "Atomic Bombings of Hiroshima and Nagasaki: World War II (1945)," Britannica (website), updated May 21, 2023, https://www.britannica.com/; Lowther et al., "Low-Yield Nuclear Weapons"; and Colin Innes, "Hiroshima Bomb: The Day Michiko Nearly Missed Her Train," BBC News, August 6, 2020, https://www.bbc.com/news/.

21. "Pearl Harbor Attack: Overview," Military.com, n.d., https://www.military.com/; and John M. Curatola, "'Black Thursday' October 14, 1943: The Second Schweinfurt Bombing Raid," National World War II Museum (website), October 17, 2022, https://www.nationalww2museum.org/.

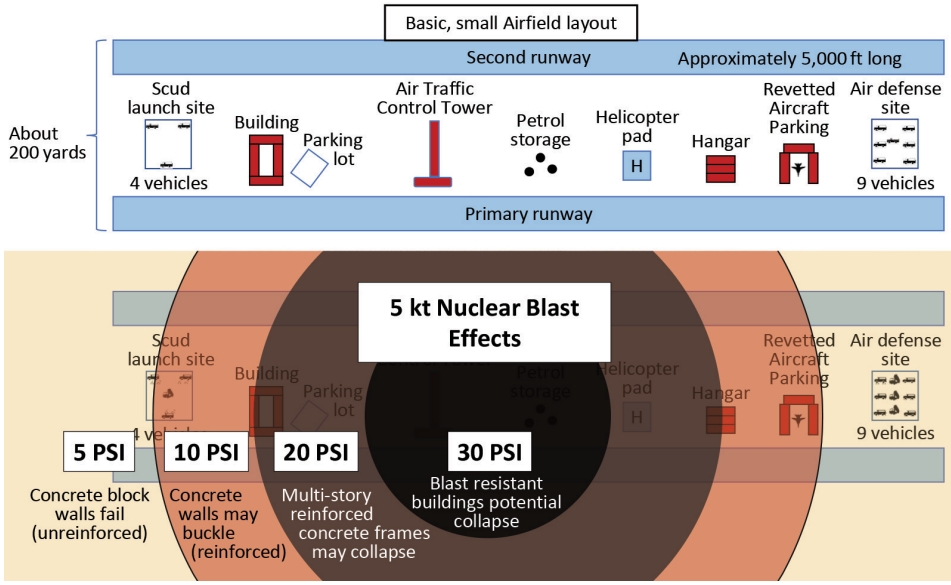

Figure 1. Blast effects of five-kiloton nuclear strike (fallout free height of burst)

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

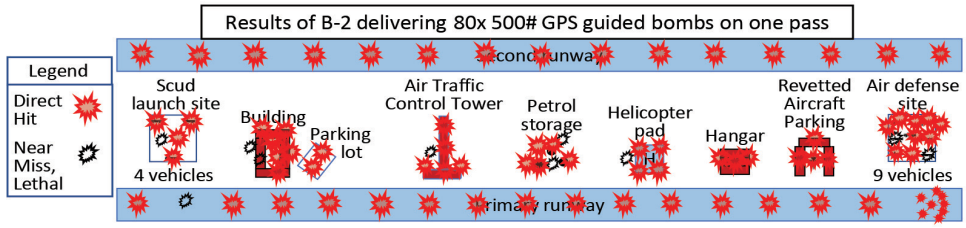

Figure 2. Diagram of B-2 test strike of 80 Joint direct attack munitions

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

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

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

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

Convergence: Technological Conventional-Nuclear Integration

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Second- and Third-Order Effects

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Conclusion

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

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

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

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

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

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

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

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