

Miniaturization as a Grail in the Third Nuclear Age

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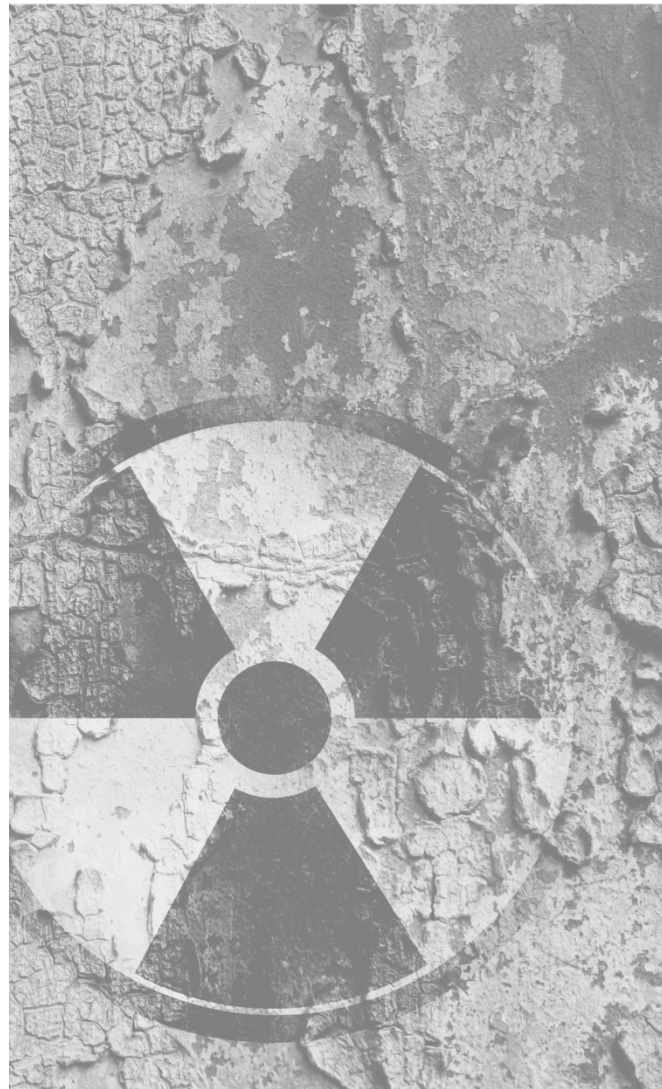
STRATEGIC MULTILAYER ASSESSMENT

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Miniaturization as a Grail in the Third Nuclear Age

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ABSTRACT

Instability of the international system and order is arising from competition among great powers, who possess large, thermonuclear arsenals, and from greater multipolarity of both established and aspirational nuclear weapons states to exercise their own aims for possessing “tactical-size” yields. The capacity of the United States arsenal to deter a nuclear attack on its partners and/or allies—as affirmed in the combined 2022 National Defense Strategy and Nuclear Posture Review—will be challenged in an emerging Third Nuclear Age by threats of nuclear weapons use with far lower yields (i.e., tactical or non-strategic nuclear weapons) than those of the Cold War. The First Nuclear Age clearly began in 1945 and was characterized by the bipolarity of US-Soviet relations. The collapse of the USSR ended this era, but a Second Nuclear Age had already started, overlapping with the first. This intervening period proliferated the bomb to rising powers, regimes with starving populations, and those with revisionist agendas; it began sometime after China’s first test in 1964 and has matured through the present aspirations of North Korea and Iran. Still, the world has remained free of nuclear weapons use in conflict for nearly 78 years, driven by fears of global catastrophe from megaton exchanges.

The emerging Third Nuclear Age, however, will be dominated by more probable threats of low-yield nuclear use in regional conflicts rather than the classic dyadic promise of mutually assured destruction. We predict high-precision, low-yield nuclear weapons that are measurable by the hundreds or even tens of tons will become as strategically important to adversaries engaged in their own violence escalation with neighbors as the existing US nuclear arsenal is to deterrence of city-evaporating power. In the emerging Third Nuclear Age, the capacity for Washington to respond to threats of such limited nuclear use in conflicts that do not directly threaten the homeland will depend on the credibility of strategic messaging for assured US capabilities to respond in kind through retaliatory nuclear use—with conventional force or in other domains, such as cyber. We anticipate the proliferation of low-yield nuclear options during this new era to generate challenges to the credibility of at least in-kind US nuclear response options, given a perceived paradox of American ethics and *jus in bello* principles entwined in scenarios of strategic nuclear use. We also expect regional belligerents to reconsider limited first-use as viably below the US appetite for an assured, devastating response.

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At present, the durability of nuclear non-use governance is perhaps the weakest it has been over the 78-year legacy of its history; US President Joe Biden has stated this (Madhani & Miller, 2022), and we are inclined to agree. Russia's nuclear threats against Ukraine and those who might aid her have been driven ever more intensely as liberal democracies shift the balance of power through critical transfers of advanced weaponry (O'Brien, 2023). Fearing defeat, Russia's nuclear threats are increasingly less coercive and more of a last resort to avoid defeat.

Arguably, the viability that the next nuclear age will remain free of use in conflict is less viable than during the Cuban Missile Crisis or any Cold War moment of historical near miscalculation because current advantages of violating non-use norms² are more salient and technologically more feasible for a greater number of potential actors than ever before. Viable scenarios of adversarial nuclear use do not require complete failure of classic deterrence measures that have been established to prevent mutually assured destruction (MAD)³ or even risk to the United States homeland; yet such engagements would nonetheless demonstrate an abrogation of the international order based upon rules and doctrine established by the United States. Such a shift would represent a failure of using any form of deterrence theory to underwrite nuclear non-use as globally normative behavior when the magnitude of risk is orders below MAD.

The bipolarity of the Cold War gave a false impression that nuclear proliferation occurred only in the context of US-Soviet relations. As Paul Bracken described in his seminal work, *The Second Nuclear Age* (2012), the focus on bilateral arms control regimes missed why countries from Egypt to Libya sought the bomb. The emergence of this new period was not immediately clear, and only in hindsight can broad proliferation be more clearly observed. Encouraged by economic and diplomatic carrots to disarm, many states of the intervening period eventually gave up their weapons programs. Yet, in 2023, Iran still seeks the bomb, and North Korea works to refine its arsenal. They must see a remaining strategic value that is separate from either prestige or an arms race. While global state actors almost certainly remain unequivocally deterred from a direct radiological or nuclear attack on the United States, those who possess even nascent nuclear weapons may find opportunity in limited attacks during third-party conflicts where US defense commitments lack treaty formality or indisputable resolve.

Even in situations where the US government has overt, concrete declarations of mutual aid or defense, the power of nuclear use as an inviolable taboo may provide conditions for adversaries to exploit gains from the employment of limited nuclear weapons. In the absence of an assured retaliatory threat for

² Whether a "tradition" or a "taboo," the absence of nuclear weapons employment since WWII has generated numerous academic explanations of non-use. For each, see T. V. Paul's *The Tradition of Non-use of Nuclear Weapons* (2009) and Nina Tannenwald's *The Nuclear Taboo* (2007), respectively. In the most extreme, Tannenwald's constructivist taboo would support dismantlement of all nuclear weapons because global society has arrived at a point where violating non-use is simply unimaginable. In this paper, we adopt a more realist perspective that such a taboo may be heavily internalized in Washington and among allied capitals, but we cannot rest on equal assumption of internalization among adversaries. Defining the origin of non-use as tradition, taboo, or some combination thereof is less pertinent than effectively sustaining the absence of nuclear employment by deterring would-be violators.

³ Imagining alternative scenarios below the MAD threshold does not discount the need for dissuading a near-peer attack. As long as nuclear weapons exist, we are unlikely to find a satisfying shift from the classic Cold War paradigm. For the long-held view that MAD simply cannot be replaced, see Robert Jervis's "MAD is the best possible deterrence," published in the *Bulletin of American Scientists* in March 1985.

violating non-use, actors may regard low-yield or “tactical” nuclear weapon use as unlikely to provoke immediate US response at the megaton weapon scale. The United States’ adherence to the rules-based order and proportionality may in fact be the Achilles heel of credible deterrence and the demise of non-use as the perdurable norm.

This paper elucidates two drivers that set the stage for such disruption to the international order in an emerging Third Nuclear Age: one is technical, and the other is the increasing multipolarity of the contemporary geopolitical environment. First, advances in delivery precision and payload miniaturization have blurred lines between conventional weapons and those considered to be “weapons of mass destruction” (WMD). Current nuclear arsenals—from Pakistan (Ahmed, 2016) to Russia (Demirjian, 2022)—hold warheads with destructive yields on par with very large conventional bombs, such as the 11-ton yield of the GBU-43B—colloquially known as “the mother of all bombs” (MOAB).⁴ In contrast to the Cold War arsenals of yesteryear, current delivery systems can be discriminately aimed at defensible military targets (e.g., an airfield) to incur minimal, if any, collateral damage to the surrounding civilian population.⁵ Moreover, nuclear fallout and permeating environmental degradation are not compulsory effects of every nuclear explosion, despite common misconception (Lowther & Huessy, 2019). Second, strategic competition among nuclear weapons states (NWS) has paralyzed political resolve to unequivocally punish violations of normative international behavior (*Outside Perspectives on Nuclear Deterrence Policy and Posture Update*, 2019).

Russia’s resort to war in Ukraine based upon patently false *jus ad bellum* (US Department of State, 2022) claims contrasted decades of progress for sovereignty and peace on the European continent and emboldened alternatives to the international order that can be leveraged by fear of nuclear risk escalation. In doing so, a defined prompt to revisit and revise *jus in bello* principles has emerged as contrary to the US-led international order focus on non-use, counterproliferation, and disarmament. Russia may, at present, present the loudest threat of nuclear use, but Pyongyang has long been at work to improve the range, accuracy, and reliability of its missile program. Simply *having* the bomb, especially a very large thermonuclear device, is a bygone relic of the past: being able to *use* the bomb is the new grail.

While accountable democracies may sustain their avowed opprobrium against any WMD use, categorizing all yields and employment strategies of chemical, biological, radiological, or nuclear (CBRN) weapons as tools of mass destruction precludes objective assessment of the most dangerous disruptions to the international system. Despotic rulers and authoritarian regimes have employed chemical and biological weapons to exterminate villages and punish dissidence despite condemnation by the US and its allies. Whether articulated as norms, taboo, or some merit of “law” among sovereign

⁴ The US Air Force GBU-43B is a conventional, guided ordinance that delivers the explosive power of 46 gigajoules (GJ) or about 11 tons of trinitrotoluene (TNT). Why build nuclear weapons that mimic the ordinary power of conventional explosives? A single 0.03 kiloton nuclear explosion would require three MOABs delivered from custom-designed, propeller-driven C-130 transport/bomber planes (Zachary, 2008). The compelling power of the nuclear payload is the tremendous yield relative to small physical size and related flexibility for delivery from cruise missiles and long-range stand-off systems that could not otherwise carry the weight of equivalent yield from conventional explosives.

⁵ Modeling nuclear effects requires study of terrain, atmospheric conditions, and weapon design. Some effects can be generalized, however, for discussion. The most dispersed effects from a 1 kt detonation would be ionizing radiation at less than 2 km, while blast effects would be limited to less than 1/5th that range, according to the *NATO Handbook on the Medical Aspects of NBC Defensive Operations* (FM 8-9, 1996) and calculations from Samuel Glasstone et al in *The Effects of Nuclear Weapons* (rev. 1974). By contrast, the runway at USAG Humphreys in South Korea is more than 2 km.

states, prohibitions of WMD use have nonetheless been violated, and the rules governing armed conflict have been repeatedly ignored (Kimball & Davenport, 2021). Despite international condemnation, Bashar al-Assad, Kim Jong Un, and Vladimir Putin all remain in power. The gravest threat to peace and global security remains, therefore, not that a single nuclear weapon may be used but that violators of non-use norms will demonstrate their ability to withstand military, economic, or diplomatic repercussions. Because abundant WMD violations have already been incurred by actors with poor track records in other forms of normative geopolitical behavior, such as respecting human rights (Human Rights Watch, 2020) or bans on cluster munitions (United Nations, 2022), it is plausible that similar contrarian actors that possess nuclear weapons would use them—just as sarin, chlorine, Novichok, and VX have been used in the last decade (Bennett, 2017; Organisation for the Prohibition of Chemical Weapons, 2018; United Nations, 2021)—particularly when emboldened by the lure of limited collateral effects produced by low-yield nuclear weapons and the perceived absence of existential peril from any international retaliation.

In reality, a so-called “nuclear winter” will not be initiated the moment a singular nuclear weapon is used, nor is it that global humanity would be at more risk from a low-yield nuclear attack than from all the chemical weapons used to date in Syria. More concerning than a rogue NWS abrogating nearly 78 years of non-use is the perception that the US-led international order cannot (or will not) respond to such a limited event for fear of violence escalation. In a world of strategic competition and greater multipolarity, any gray area around whether a violation of non-use would be swiftly punished would further diminish the view of WMDs as generally opprobrious and loosen post-WWII counterproliferation regimes, thereby instigating a dangerous new world order that undercuts US security capabilities and interests. How the US prepares to respond in such shifts of the international order remains a policy gap that we only opine should receive attention by acknowledging this emerging Third Nuclear Age.

The rise of counterproliferation and arms control regimes in the post-World War II era has driven global normalization of a generalized (social, as well as political) stance against WMD (*Advancing a Bold Agenda for Nuclear Disarmament*, 2019) and, to a lesser extent, the mere possession of such weapons (Merriam-Webster, n.d.; United Nations, n.d.). However, in this Third Nuclear Age (viz., the emerging, post-Cold War return to multipolarity among NWS), distinctions between WMD and low-yield “tactical” or “non-strategic” weapons are less clear. If correctly identified, revisions to policy that advance a more flexible US nuclear arsenal paced against contemporary nuclear threats from Russia, China, North Korea, and Iran could better sustain the durability of non-use below the threshold of global thermonuclear war.

Whether current US nuclear capabilities can deter beyond a direct homeland attack, or if they will have an enduring deterrent value in establishing and enforcing norms for desirable international behavior in the Third Nuclear Age, remains a core area of concern highlighted by our research. While checking the behavior of nuclear-equipped Russia and China remain top priorities in the latest National Defense Strategy (2022), a 2018 Congressional Research Service (CRS) report, entitled *Renewed Great Power Competition* (updated in 2021), identified whether the Department of Defense’s (DoD) plans for non-strategic (i.e., theater-range) nuclear weapons are aligned with the security challenges of the 21st Century’s multi-polar moment as a potential policy and oversight issue for Congressional consideration. As exemplified by this CRS report, it is difficult to decouple Cold War frameworks from modernizing warheads and their delivery mechanisms (e.g., precision) at a juncture when the United States is headed toward some form of confrontation with other NWS, moreover, when the kind of decades-old strategic

deterrence envisioned by Thomas Schelling remains the most accustomed theoretical framework for understanding nuclear use. Yet, large thermonuclear arsenals that this mindset supports have neither deterred lesser powers—such as Tehran or Pyongyang—from seeking nuclear capabilities nor prevented NWS great powers from engaging in at least regional aggression (e.g., Russia’s violations of sovereignty of Ukraine and China’s assertions of dubious historical claims to whole of the South China Sea).

While the taboo of nuclear use has remained firm within and among liberal democracies, the behaviors of states that reject other commonly accepted norms—and that have little or no dependency on the polling opinions of their citizenry—suggest a lack of universal internalization of non-use standards. Low-yield, high-precision WMD employment strategies that do not abide by restraints upon their use then emerge as attractive tools for adversary military operations, both in combat and as deterrence measures. Technical capabilities of weapons precision and payload miniaturization have effectively upended moral qualms that undergirded many taboos against any use, ostracized violators, and sustained counterproliferation regimes since WWII (Paul, 2009). Thus, WMD employment that stays within other normalized behavior of the international system may be regarded as palatable options for states already wavering on the military utility of limited nuclear use. The United States may still choose not to employ WMD in this way, even when such use can be considered logical and proportional; however, global actors that do not heed other international norms or internalize any such use as taboo may seek to exploit the gains of limited WMD use.

Historic revolutions in military affairs (RMAs) were not immediately recognizable at the time new technologies entered inventories but rather became evident when armies implemented “major changes in the way they prepare and conduct operations in war” for increased effectiveness (Krepinevich, 2002). The realization of a revolution’s gains, therefore, does not necessitate the creation of a new type of weapon or scientific study but only a willingness and the bureaucratic reforms to shift paradigms from existing methods of warfare. Such an envisioned adoption of CBRN employment, however, is not equivalent to an erosion of international norms or ethics that prohibit indiscriminate targeting, disproportionate effects, or gross collateral damages. Instead, the next RMA will be in the realization that CBRN effects on the battlefield (and as tools of deterrence) can favorably limit the feared outcomes associated with this entire category that, to date, has been injudiciously labeled as weapons of “mass” destruction.

Since the Cold War, the US has maintained an arsenal of nuclear weapons with multi-megaton yields that were intended to deter similarly equipped NWS from a direct attack on the homeland and/or US allies. The existing nuclear weapon stockpile, however, did not deter Russian aggression in either Georgia or Ukraine, nor did dubious Chinese assertions in the South China Sea and ongoing threats against Taiwan. The latest Nuclear Posture Review (2022) acknowledges the need for “flexible” nuclear options. We opine, however, that assuming the appropriate posture must not simply equate the contemporary renewal of the great power competition seen from Russia and China with a return to the Cold War paradigm of strategic deterrence alone.

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