

Meeting the Challenges of the New Nuclear Age: Nuclear Weapons in a Changing Global Order



Steven E. Miller, Robert Legvold,
and Lawrence Freedman

AMERICAN ACADEMY OF ARTS & SCIENCES

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Contents

- v **Acknowledgments**
- 1 **The Rise and Decline of Global Nuclear Order?**
Steven E. Miller
 - 3 Unmanaged Competition, 1945–1970:
Racing to Oblivion?
 - 11 Managed Rivalry, 1970–2000:
Building an Architecture of Restraint
 - 19 The Tide Turns, 2000–2018:
The Erosion of the Nuclear Order
 - 26 Conclusion: New Realities, New Challenges
- 28 **The Challenges of a Multipolar Nuclear World
in a Shifting International Context**
Robert Legvold
 - 29 An Evolving Nuclear Order in a
Changing International Setting
 - 33 Ambiguities, Discrepancies, and Dangers
in an Asymmetrical Nuclear Universe
 - 39 Crisis Stability
 - 49 If Deterrence Fails
 - 53 On “Victory”
 - 56 The Shadow of the Future
- 62 **The Interplay Between the International System
and the Global Nuclear Order**
Lawrence Freedman
 - 63 The Cold War Order
 - 67 Post–Cold War Disorder
 - 69 The Nuclear Order and the Political Order
- 76 **Contributors**

Acknowledgments

This is the third Occasional Paper of the project on Meeting the Challenges of the New Nuclear Age, an initiative of the American Academy of Arts and Sciences.

The project focuses on the dangers and opportunities presented by an increasingly complex world shaped by nine states that possess nuclear weapons. The initiative is concentrating its efforts in three areas: 1) a rapidly shifting geopolitical environment and its impact on relations between and among the states that now make up a multipolar nuclear world; 2) the technological frontiers being approached or crossed in cyber operations, artificial intelligence, non-nuclear strategic weaponry, space, bioweapons, and enhanced missile defense and their implications for strategic stability, nuclear norms, and nuclear concepts such as extended nuclear deterrence; and 3) in managing this new nuclear world, the role and prospects of nuclear arms control as well as alternative mechanisms for governing and reducing the prospects for nuclear use. In the first phase of the project, we have focused on some of the core questions generated by the changes in this new environment.

This publication, *Meeting the Challenges of the New Nuclear Age: Nuclear Weapons in a Changing Global Order*, examines the multi-layered and rapidly changing interface between the nuclear order and the international system. The essays that follow investigate how changes and potential instability among nuclear weapons states are affecting the broader geopolitical landscape.

In a thoughtful and historically rich discussion, Steven Miller illustrates the risks and challenges originating in a multipolar nuclear order. Robert Legvold, cochair of the project, explores how a variety of factors add to the complexity of managing a changing nuclear order. Finally, Lawrence Freedman offers an in-depth analysis of the main interplay between global security and nuclear stability.

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The Rise and Decline of Global Nuclear Order?

Steven E. Miller

The first half century of the nuclear age witnessed the gradual construction of a global nuclear order designed to mitigate nuclear dangers, inhibit arms racing, and prevent the spread of nuclear weapons to additional states. Spurred by the experiences, the dangers, the crises, the near misses, and the frightening risks on display in the early years of the Cold War, sustained efforts were made, in McGeorge Bundy's vivid phrase, "to cap the volcano."¹ The time had arrived, Bundy wrote in 1969, for the two great nuclear superpowers "to limit their extravagant contest in strategic weapons," a contest that had "led the two greatest powers of our generation into an arms race totally unprecedented in size and danger." In the subsequent twenty-five years after Bundy's appeal, an increasingly elaborate and institutionalized arms control process produced, with many ups and downs, a detailed web of constraints on the nuclear behavior of the superpowers. The goal was to stabilize the superpower nuclear balance by reinforcing mutual deterrence. The vast nuclear arsenals of the superpowers, however, were not the only source of nuclear danger. In a world in which the number of states armed with nuclear weapons was slowly growing and many additional states had interest in acquiring such weapons or the technology to produce them, there was reason, as Albert Wohlstetter warned in 1961, to be "concerned with the enormous instabilities and dangers of a world with many nuclear powers."² Such a world—"life in a nuclear armed crowd"—Wohlstetter wrote in a later famous study, was widely believed to be "vastly more dangerous than today's world."³ The desire to prevent this unattractive world led to the negotiation of the Nuclear Nonproliferation Treaty (NPT), which entered into force in 1970, and to the subsequent development of an associated regime intended to create legal and technical barriers to the spread of nuclear weapons. Thus, in reaction to the major perceived dangers of the nuclear age,

1. McGeorge Bundy, "To Cap the Volcano," *Foreign Affairs* (October 1969).
2. Albert Wohlstetter, "Nuclear Sharing: NATO and the N+1 Problem," *Foreign Affairs* (April 1961).
3. Albert Wohlstetter et al., *Moving Toward Life in a Nuclear Armed Crowd?* Report to the U.S. Arms Control and Disarmament Agency, ACDA/PAB 263, December 4, 1975, 143. Writing in 1975, Wohlstetter and colleagues anticipated that by 1985, some forty states would possess the technical wherewithal to acquire nuclear weapons.

there emerged what Lawrence Freedman calls the “twin pillars” of the global nuclear order: mutual stability in the major nuclear rivalry and nonproliferation to inhibit or prevent the spread of nuclear weapons to additional states.

By the end of the Cold War, mutual deterrence and strategic arms control had been deeply embedded in the relationship between the United States and the Soviet Union, and most states in the international system had, by joining the NPT, undertaken a legally binding pledge not to acquire nuclear weapons. The collapse of the Cold War structure and the end of reflexive hostility between Moscow and Washington seemed to suggest that a much more cooperative international security system might be possible and that a golden age of ambitious arms control might beckon.⁴ To be sure, there were still worries about nuclear dangers and still debates about the effectiveness of the NPT system, but in general there was optimism about what President George H.W. Bush labelled “the new world order.” “The winds of change are with us now,” Bush concluded confidently in his moving and triumphant State of the Union Address in January 1991.⁵ A safer world, in which nuclear dangers would be contained by cooperative management, seemed to be at hand—or at least possible.

Nearly three decades later, it is evident that such hopes for a benign nuclear order have been dramatically disappointed. Harmony and cooperation among the major powers have not been preserved, a golden age of arms control and disarmament has not arrived, and the nonproliferation norm has not been universally respected. Instead, Russia’s relations with the United States and the West have grown difficult and sometimes toxic. China’s rise has added a significant complication to the nuclear calculations of Washington and Moscow. Several new nuclear-armed states have emerged, creating complicated and unprecedented regional nuclear dynamics, while protracted crises over the nuclear ambitions of Iran and North Korea have called into question the effectiveness of the NPT regime. Important pieces of the arms control framework inherited from the Cold War era have been rejected or jettisoned while others are undermined and jeopardized by contentious compliance disputes—and at present there appears to be little serious interest in reviving the arms control process, either bilaterally or multilaterally. Meanwhile technological advances in surveillance and accuracy have the potential to erode the survivability of deployed nuclear forces and thereby undermine the deterrence stability that has been one of the pillars of the global nuclear order. Compared to the high hopes of 1991, the current state of the global nuclear order is shockingly worrisome: political relations are frayed, stability is jeopardized, and arms control has deteriorated. The potential implications are enormous. As Gregory Koblentz argues in his recent analysis of the evolving nuclear scene, the United States could find itself

4. See, for example, Janne E. Nolan, ed., *Global Engagement: Cooperation and Security in the 21st Century* (Washington, D.C.: Brookings Institution, 1994). This was one product of a collaboration between the Brookings Institution, Harvard University, and Stanford University to explore what forms of security cooperation could be possible in the new international environment.

5. “Address Before a Joint Session of Congress on the State of the Union,” January 29, 1991.

“trapped in a new nuclear order that is less stable, less predictable, and less susceptible to American influence.”⁶

How did we arrive at this point and what are the forces that are shaping the negative evolution of the global nuclear order? In what follows, I provide broad-brush sketches of three phases of the nuclear age, sketches that demonstrate movement from an unregulated and highly competitive environment to one that gradually becomes highly regulated and collaboratively (sometimes cooperatively) managed. The concern that stirs Lawrence Freedman and Robert Legvold, and animates their analyses, is the turn in the narrative arc in recent years toward a less regulated and more contentious third phase in the history of the global nuclear order. In these pages, Lawrence Freedman examines the core principles that have shaped the global nuclear order and Robert Legvold explores the often-profound implications of the factors that are shaping that order in ways that pose challenges and raise risks. Old concerns (such as missile defense) have resurfaced while new problems (such as multilateral deterrence) have arisen. It is not entirely clear yet where we are headed but there should be no doubt that fundamentally important questions should be on the agenda. Are we going to be living in a nuclear world that is more laden with friction, more multilateral, less stable, less constrained by negotiated agreement, and possibly populated with additional nuclear-armed actors? Will some of the undesirable characteristics of the early years of the nuclear age re-emerge? If so, what can be done to address the emerging nuclear dangers? If we are headed into or are already living in a new nuclear age, how can it be managed safely and prudently? A brief examination of the history of the nuclear order provides the context for and demonstrates the significance of the questions that Freedman and Legvold are tackling.

UNMANAGED COMPETITION, 1945–1970: RACING TO OBLIVION?

In the beginning, there was not order but unmitigated competition. For the first quarter of a century of the nuclear age, nuclear forces evolved in an unregulated environment. Serious dialogue between the great Cold War protagonists was virtually nonexistent. States were unconstrained by arms control agreements. There were few norms or tacitly agreed codes of conduct. To the extent that order existed at all, it emerged from the uncoordinated unilateral steps and choices of states acting on the basis of their own perceived self-interest. For the two Cold War superpowers, the result was a world of intense arms racing and recurrent nuclear crises. Driven by fear, by the opacity of the existing military balance, by uncertainty about the plans and motives of the other side, and by concern about the adequacy of deterrent postures, the two nuclear superpowers rapidly expanded and modernized their nuclear forces.

6. Gregory D. Koblentz, *Strategic Stability in the Second Nuclear Age* (New York: Council on Foreign Relations, November 2014), 32.

The formative nuclear strategists of this era quickly came to the conclusion that nuclear weapons were best understood as instruments of deterrence. Remarkably, Bernard Brodie articulated the core logic almost immediately after World War II in an essay initially drafted late in 1945. Because no gain would be worth suffering a devastating nuclear attack, Brodie argued, aggressors would refrain from nuclear attack if threatened with retaliation in kind. Hence the great imperative of the nuclear age: “The first and most vital step in any American security program for the age of atomic bombs is to take measures to guarantee ourselves in case of attack the possibility of retaliation in kind.”⁷ Inexorable logic suggested that if other nuclear powers heeded the imperative to possess nuclear retaliatory capabilities, a condition of mutual deterrence (later codified in American doctrine as mutual assured destruction, or MAD) would exist. If nuclear rivals had confidence in the adequacy and survivability of their respective retaliatory capabilities, the nuclear balance would be stable, meaning neither side would have incentives to use nuclear weapons first. In this way, a kind of nuclear order would emerge as the Cold War evolved, so long as the United States and the Soviet Union satisfied the requirements of deterrence—as both strenuously sought to do. As Lawrence Freedman observes in his essay, “The logic of the nuclear stalemate was to neutralize the effects of the arsenals. There was no premium in initiating nuclear war. Each arsenal cancelled out the other.”

With hindsight, we know that the resulting order—the logic of nuclear stalemate—sufficed to prevent the use of nuclear weapons despite years of dramatic political contention and military conflict (notably Korea and Vietnam). But it was also an order marked by stresses, dangers, and disadvantages. Nuclear weapons were never used but the arms competition between the nuclear superpowers was extremely intense and the confrontations between them seemed, both at the time and in retrospect, to be perilous.

Powerful arms race dynamics propelled the Soviet-American nuclear competition. At least five reinforcing forces were in play. First, the overwhelming importance of preserving second strike capabilities against current and future threats created incentives for expansion and redundancy; a large and diverse nuclear arsenal provided insurance against the risk of being victimized by a successful first strike and allayed strategic concerns that the other side’s expanding and improving forces might pose a credible threat to one’s own deterrent force. Second, each side was keen to ensure its own second-strike capability but was not willing to accept without resistance the retaliatory forces of the other side. Rather, both Moscow and Washington embraced operational nuclear doctrines—under the rubric of counterforce and damage limitation—that targeted the nuclear forces of the other side. Hence, the enormous growth in the size of

7. Bernard Brodie, “Implications for Military Policy,” in Bernard Brodie, ed., *The Absolute Weapon: Atomic Power and World Order* (New Haven: Yale Institute of International Studies, February 15, 1946), 62. Brodie concluded this paragraph with one of the most famous passages in the history of U.S. nuclear thought: “Thus far the chief purpose of our military establishment has been to win wars. From now on its chief purpose must be to avert them. It can have almost no other useful purpose.”

the arsenals represented an expansion of the number of targets, requiring larger forces to ensure that all targets could be covered—a self-reinforcing cycle.⁸

Third, these potent doctrinal impulses produced strong interaction effects as the nuclear plans and behavior of the Cold War protagonists influenced one another—what came to be known as the action-reaction phenomenon.⁹ But in an atmosphere of hostility, distrust, and uncertainty about future plans, there was a tendency to worry about the worst-case, to prepare to match what the opponent might do next, to fear that the future threat could turn out to be larger and more effective than expected. Prudent policy-makers, it was believed, would feel the need to be ready for the worst-case scenario, resulting in what might be more accurately described as an action-overreaction dynamic. As George Rathjens wrote in 1969, “the action-reaction phenomenon, with the reaction often premature and/or exaggerated, has clearly been a major stimulant of the strategic arms race.” The pattern of overreaction, Rathjens observed, produces “an arms race with no apparent limits other than economic ones, each round being more expensive than the last.”¹⁰ The unknown future cast a powerful shadow as fears of an ever larger and ever more sophisticated and effective nuclear arsenal in the hands of the other side shaped the perceptions and decisions of nuclear policy-makers; the long timelines associated with the procurement of major systems meant that today’s choices were inevitably framed in the context of an unknown future threat.

Fourth, one particular form of the action-reaction model, the offense-defense arms race, was thought to be operating powerfully. For deterrence to work, nuclear forces needed not only to be able to survive an attack in some number, but the surviving forces needed to be able to penetrate the enemy’s defenses—otherwise the necessary retaliation in kind is questionable and may not be sufficient to deter.¹¹ Even an imperfect first strike could significantly degrade an arsenal and might reduce the surviving retaliatory force to such an extent that it makes the problem of defense against retaliation much more

8. See, for example, David Alan Rosenberg’s classic study, “The Origins of Overkill: Nuclear Weapons and American Strategy, 1945–1960,” *International Security* 7 (4) (Spring 1983): 3–71.

9. See, in particular, the influential analysis in George Rathjens, “The Dynamics of the Arms Race,” *Scientific American* 220 (4) (April 1969): 15–25, reprinted in Herbert York, ed., *Arms Control: Readings from Scientific American* (San Francisco: W.H. Freeman & Co., 1973), 177–187.

10. Rathjens, in *Arms Control*, 181–182. Critics, however, argued that the action-reaction model overstated the interactive sources of arms race behavior and undervalued the internal political, bureaucratic, economic, and technological drivers of arms racing. See, notably, Colin S. Gray, “The Arms Race Phenomenon,” *World Politics* 24 (1) (October 1971): 39–79. The most emphatic rejections of the interactive model argued that the arms race was a myth, both because “US and Soviet strategic weapons programs were largely independent of each other” and because the United States simply did not race, but instead leveled off its forces even as the Soviet arsenal continued to grow. See, for example, Richard Perle, “The Arms Race Myth, Again,” *The Washington Post*, March 3, 2008.

11. Albert Wohlstetter’s legendary warning about the instability of nuclear balance rested on the argument that deterrent forces needed to be able both to survive an attack and then penetrate enemy defenses, and neither attribute could be taken for granted. See Wohlstetter, “The Delicate Balance of Terror,” *Foreign Affairs* (January 1959).

tractable. At the time, missile defenses were still limited and not highly effective, but no one knew what advances might be made in the future. A breakthrough could undermine deterrence and give one side a strategic advantage. The answer to the potential threat of future effective defenses was, once again, an expansion of offensive forces. If the offensive force was large enough, it would always be possible to exhaust a missile defense system no matter how effective it might be. Moreover, in this era (as at present) it was considerably cheaper to acquire additional offensive forces than to deploy missile defense interceptors. “In a competition with a determined and resourceful adversary,” Rathjens explained in response to impending U.S. decisions in the late 1960s about deploying missile defense, “the advantage in an offense-defense duel would still lie with the offense.” Nevertheless, the urge to defend is very strong and the choice to remain defenseless is often unacceptable in domestic political terms even if sensible in strategic terms. Hence, both the United States and the Soviet Union were working on missile defense systems and their planning for nuclear forces had to take into account possible defensive deployments in the future. The notion of an offense-defense arms race envisioned a future in which ever larger and better missile defense systems would be offset by ever larger and more sophisticated offensive arsenals—with the expansion of offensive forces driven by the imperative of deterrence. This would produce an upward spiral in the nuclear competition without eliminating the nuclear threat. As Rathjens concludes, “it appears virtually certain that at the end of all this effort and all this spending neither nation will have significantly advanced its own security.”¹²

Finally, at least in the United States nuclear policy-making was driven in part by a politically motivated fear of falling behind and being (or looking) inferior. In strategic terms, exact numbers might not be significant and possession of a secure second-strike capability should make additional forces unnecessary or superfluous. However, there was concern about the international optics of having smaller forces; friends and foes might perceive the United States to be the weaker power, with negative consequences for Washington’s ability to operate in the world.¹³ Similarly, in the American domestic political context, the Soviet achievement of numerical advantages by the 1970s was disturbing and for elected officials there was little to be gained by supporting alleged inferiority. Codifying those Soviet advantages in arms control agreements was particularly controversial and provoked intense criticism. Writing decades after the debates about ratifying the SALT I agreements, for example, Henry Kissinger is still visibly frustrated by the “amazing tale” of the claim that in the SALT negotiations the Nixon administration had “conceded an inequality.” Kissinger explains that “inequality was one of those code words that create their own reality,” a reality

12. Rathjens, in *Arms Control*, 177–178.

13. Illustrating the (contested) argument that nuclear superiority matters, in large part by affecting the resolve of contending parties, is Matthew Kroenig, “Nuclear Superiority and the Balance of Resolve: Explaining Nuclear Crisis Outcomes,” *International Organization* 67 (1) (January 2013): 141–171.

that undermined support for the Nixon-Kissinger arms control policy and produced the impression, as Kissinger himself puts it, “that what the Administration was defending was a ‘missile gap’ disadvantageous to the United States.”¹⁴ In short, internal political considerations joined strategic calculations in promoting vigorous competition in the nuclear relationship.

A further confounding factor was the possibility that nuclear weapons might spread to additional countries. From the earliest days of the nuclear age, it was understood that other states might choose to pursue and deploy nuclear arsenals, resulting in what Brodie, in 1946, described as “multilateral possession of the bomb.”¹⁵ This was an option available to any state that possessed or could develop or acquire the technical and financial resources necessary for a nuclear program. While the United States and the Soviet Union were primarily preoccupied with each other, it was recognized that in the not-too-distant future there could be a number of nuclear-armed states. By 1960, Washington feared that there might be as many as twenty-five nuclear weapon states within five to fifteen years—a prediction that John Kennedy noted during his presidential campaign and that President Kennedy later highlighted in a memorable press conference in March of 1963.¹⁶ Here, then, was another large and worrisome uncertainty: the U.S.-Soviet rivalry might become embedded in a multilateral nuclear order that could involve many (large and small, stable and less stable, responsible and irresponsible) actors, regional nuclear balances, multidirectional fears of attack, and concerns about the stability of a complicated overall system of nuclear interactions. Both Moscow and Washington feared and opposed this outcome, a deeply held shared interest that produced considerable cooperation between them on nonproliferation even in the darker days of the Cold War.¹⁷ But policy-makers and nuclear planners on both sides had no choice but to consider the implications of life in Wohlstetter’s “nuclear-armed crowd.” This was another unsettling feature of the nuclear order in the first quarter century of the nuclear age.

The operation of this set of powerful forces had three broad effects. First, there was a prodigious accumulation of weapons—to a level that today seems

14. Henry A. Kissinger, *Diplomacy* (New York: Simon and Schuster, 1994), 749.

15. Brodie, “Implications for Military Policy,” 61.

16. During the presidential debate on October 13, 1960, for example, Kennedy said, “There are indications, because of new inventions, that ten, fifteen, or twenty nations will have a nuclear capacity—including Red China—by the end of the presidential office in 1964. This is extremely serious.” See Commission on Presidential Debates, “October 13, 1960 Debate Transcript,” available at <http://www.debates.org/index.php?page=october-13-1960-debate-transcript>. I am grateful to Chris Chyba for bringing this quote to my attention. For Kennedy’s March 1963 statement and more broadly for an overview of concerns about future proliferation, see Peter R. Lavoy, “Predicting Nuclear Proliferation: A Declassified Documentary Record,” *Strategic Insights* III (1) (January 2004).

17. See, for example, William Potter and Sarah Bidgood, eds., *Once and Future Partners: The United States, Russia, and Nuclear Non-Proliferation* (London: IISS, 2018), which examines cases in which the United States and the Soviet Union were able to cooperate in efforts to prevent proliferation.

Estimated Global Nuclear Warhead Inventories 1945–2018



Source: Hans M. Kristensen and Robert S. Norris, “Status of World Nuclear Forces” (Washington, D.C.: Federation of American Scientists, June 2018).

irrational. One small nuclear weapon devastated Hiroshima, but the superpowers eventually deployed tens of thousands of weapons, nearly all of them many times more powerful than the bombs dropped in 1945. By the time this gluttonous acquisition of nuclear weapons peaked in 1986, there were more than seventy thousand nuclear weapons deployed by the superpowers—more than thirty thousand in the American arsenal and nearly forty thousand in the Soviet arsenal.¹⁸ This extraordinary amassing of weapons represented an unimaginable aggregation of destructive power—leading to concerns that any substantial nuclear exchange between the Soviet Union and the United States could seriously damage the global ecosystem by producing a “nuclear winter” as enormous quantities of dust and debris in the atmosphere blocked the sun and produced a cooling of the planet.¹⁹ Advocates of arms control believed that this immense buildup increased dangers and wasted resources while producing no net improvement in security. An intense quantitative arms race was one of the hallmarks of the unregulated phase of the nuclear age. And the momentum of this build-up continued well into the 1980s.

Second, the scramble for advantage and the fear of disadvantage led to the nuclearization of nearly everything. Long-range bombers and ballistic missiles were, of course, the mainstays of the strategic nuclear competition. But by the 1960s, nuclear weapons were being deployed throughout the U.S. and Soviet militaries in every armed service and on nearly every conceivable means of con-

18. The data used here, including the table, are drawn from Hans M. Kristensen and Robert S. Norris, “Status of World Nuclear Forces” (Washington, D.C.: Federation of American Scientists, June 2018).

19. See, most famously, the analysis undertaken by a group of leading climate scientists: R. P. Turco, O. B. Toon, T. P. Ackerman, J. B. Pollack, and Carl Sagan, “Nuclear Winter: Global Consequences of Multiple Nuclear Explosions,” *Science* 222 (4630) (December 23, 1983): 1283–1292.

veyance. Gravity bombs were provided for tactical aircraft. Shorter-range missiles and cruise missiles were armed with nuclear weapons. Nuclear air defense interceptors and nuclear torpedoes were deployed. In addition, an array of so-called battlefield nuclear weapons was developed, including nuclear artillery shells, nuclear land mines, and man-portable nuclear weapons. The M28/M29 Davey Crockett, for example, was a recoilless rifle, handled by a three-man crew, that fired a W54 warhead weighing 51 pounds in a projectile that was 11 inches in diameter and 31 inches in length; between 1961 and 1971, the Davey Crockett was deployed in both Germany and South Korea.²⁰ At the peak of this nuclearization in the 1970s, the United States possessed some 7,600 tactical nuclear weapons, of which 7,300 were deployed with U.S. forces in Europe.²¹ Every domain of warfare—ground forces, naval deployments, tactical air—became part of the nuclear equation. Along with the pervasive deployment of nuclear weapons came elaborate doctrinal explorations about how the various levels of nuclear capability were related to one another in ladders of escalation and whether it might be possible to engage in varieties of limited nuclear war without escalating to all-out nuclear exchanges.²² The unrestrained competition widened the horizons of the nuclear debate and brought more menacing scenarios and possibilities into view.

Third, the vast accumulation and wide distribution of weapons were accompanied by rapid innovation and a fast pace of nuclear modernization. At the outset of the era, medium-range bombers were the primary delivery system, but were soon supplanted by intercontinental bombers. Starting in 1951, the United States invested in more than two thousand B-47 medium range bombers, but in 1955 the long-range B-52 was introduced and by 1963 more than seven hundred B-52 bombers had been acquired. The Soviet Union was simultaneously charging into the missile age. The Soviet launch of an orbiting satellite in October 1957 demonstrated Moscow's progress and produced in the United States the shocked belief that it was lagging behind in the missile field—producing deep fears of a missile gap. The U.S. missile program was galvanized and early in his administration President Kennedy decided to deploy a thousand intercontinental ballistic missiles (ICBMs), dubbed Minuteman. In parallel, starting in 1961, ballistic missiles were deployed at sea on submarines. By the

20. Facts on the Davey Crockett system can be found in Matthew Seelinger, "The M28/M29 Davey Crockett Nuclear Weapon System," Army History Center, National Museum of the United States Army, September 20, 2016, at www.armyhistory.org.

21. For discussion and data, see Hans M. Kristensen, *Non-Strategic Nuclear Weapons*, Special Report No. 3 (Washington, D.C.: Federation of American Scientists, May 2012). Statistics on the numbers of tactical weapons can be found on p. 18.

22. In a landmark study from the mid-1960s, Herman Kahn identified and analyzed a remarkable number of "rungs" on the "escalation ladder." See Herman Kahn, *On Escalation: Metaphors and Scenarios* (New York: Praeger, 1965). Henry Kissinger first became prominent and controversial by advocating a doctrine of limited nuclear war as an alternative to Eisenhower's massive retaliation policy. See Henry Kissinger, *Nuclear Weapons and Foreign Policy* (New York: Council on Foreign Relations, 1957).

late 1960s, programs were underway to put multiple warheads on missiles and to upgrade their guidance systems to improve accuracy.

The large and redundant strategic forces that emerged on both sides provided grounds for thinking that second-strike forces would survive any attack and deterrence would therefore be effective. The pace of innovation and modernization, however, was worrisome and disruptive, and gave rise to fears that large and dangerous vulnerabilities might emerge or exist or that asymmetric capabilities might give significant or even decisive advantage to one side. Reliance on medium range bombers meant utilizing air bases within range of the Soviet Union that were vulnerable to attack. Long-range bombers were potentially vulnerable to short-notice attacks by ICBMs. Even missiles in hardened silos were vulnerable if attacking missiles could strike accurately enough. Command and control arrangements for nuclear forces could become vulnerable to crippling “decapitation attacks.” Rapid modernization brought all these concerns into view, producing a perennial debate about the survivability and adequacy of deterrent forces and a pattern of lurching from one vulnerability crisis to the next. By the mid-point of the Cold War, the United States was in the midst of a serious scare over the possible vulnerability of its ICBM force.²³ While the heated quantitative arms race produced enormous numbers, the intense qualitative race generated endless anxiety and repeated scares about possible instability in the nuclear balance.

The compulsion to compete quantitatively and qualitatively produced what came to be labelled arms race instability. This was an unfortunate circumstance: costly, potentially dangerous, and producing questionable gains in security while raising fears of instability. But an even larger concern arose from the repeated diplomatic confrontations between the nuclear antagonists, which raised the risk of military escalation and brought the possibility of nuclear use into view. In one collision after the next—the Korean War, Quemoy and Matsu, Berlin—nuclear weapons cast a worrisome shadow. What is generally regarded as the moment of maximum danger—namely, the Cuban Missile Crisis—came in October 1962. The incredibly intense standoff between Moscow and Washington over the Soviet Union’s deployment of missiles in Cuba brought the world to the brink of nuclear war—or so it was believed—and subsequent revelations exposed dangers not fully understood at the time. This frightening near-miss highlighted the peril of nuclear crises. “Events were slipping out of their control,” commented Robert McNamara in one of his countless exhortations about the lessons of the 1962 crisis, “and it was just luck that they finally acted before they lost control, and before East and West were involved in nuclear war that would have led to destruction of nations. It was that close.”²⁴

Two large concerns were reinforced by the Cuban Missile Crisis. One was the importance of managing crises carefully and effectively; “crisis management”

23. See, for example, Albert Carnesale and Charles Glaser, “ICBM Vulnerability: The Cures are Worse than the Disease,” *International Security* 7 (1) (Summer 1982): 70–85.

24. <https://nsarchive2.gwu.edu/coldwar/interviews/episode-11/mcnamara2.html>.

became almost a field unto itself—abetted by the claim that disaster had been avoided in 1962 because President Kennedy and his team had handled the affair so deftly. The other, more fundamental, concern had to do with the problem of crisis instability—the fear that in a crisis there might exist particular temptations to strike if striking first with nuclear weapons would confer advantage, especially if each side feared that the other might strike first. Thomas Schelling warned in 1960 that even a small incentive to strike first could be magnified by this dynamic, which he called the reciprocal fear of surprise attack: “Fear that the other may be about to strike in the mistaken belief that we are about to strike gives us a motive for striking, and so justifies the other’s motive.”²⁵ This was another argument for robust deterrence: the answer to crisis instability was survivable nuclear forces that would guarantee that a surprise attack would be met with unacceptable retaliation. After Cuba, the power of this analysis was fully understood.

In sum, nuclear order in the first twenty-five years of the nuclear age took the form of unregulated competition in which the only significant constraints were budgetary and technological and in which the primary moderating force was the mutual deterrence that arose out of each side’s unilateral efforts to neutralize the nuclear forces of the other. This was a nuclear order that, as it evolved, came to be marked by massive numbers of nuclear weapons, pervasive nuclearization of military forces and doctrines, and recurrent dangerous and sometimes frightening crises. Gradually, however, a school of thought emerged that suggested that the costs and dangers of the existing nuclear order could be contained and reduced if negotiated constraints could be achieved.

MANAGED RIVALRY, 1970–2000: BUILDING AN ARCHITECTURE OF RESTRAINT

It would be incorrect to suggest that there was a magical transformation of the nuclear order, after which all was well. On the contrary, the superpower rivalry remained intense, nuclear forces remained substantial, bruising diplomatic confrontations continued, domestic controversies over nuclear policy and arms control were common, and worries about nuclear proliferation persisted. After the unfettered competition of the first quarter century following World War II, though, the next several decades were an era of arms control. Starting in the late 1950s, a group of strategists began to analyze and advocate for arms control, suggesting that negotiated constraints were both feasible and desirable.²⁶ The

25. Thomas C. Schelling, “The Reciprocal Fear of Surprise Attack,” in Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, Mass.: Harvard University Press, 1980), 207.

26. The spearhead of this effort was an arms control study group at the American Academy of Arts and Sciences, which resulted in a study known as the bible of arms control. See Donald G. Brennan, ed., *Arms Control, Disarmament, and National Security* (New York: George Braziller, 1961). Also influenced by the American Academy project was Thomas C. Schelling and Morton Halperin, *Strategy and Arms Control* (New York: Twentieth Century Fund, 1961). The other arms control classic to appear in 1961 was Hedley Bull, *The Control of the Arms Race: Disarmament and Arms Control in the Missile Age* (New York: Praeger, 1961).

aim, as then-Director of the International Institute for Strategic Studies (IISS) Alistair Buchan summarized, was “the stabilizing of mutual deterrence by taking both unilateral and multilateral action and at the same time attempting to identify and control the most dangerous features of the arms race”²⁷ Ideas and policy concerns that had been discussed for years came to fruition in the 1960s. Prompted in part by the Chinese nuclear test in October 1964, negotiations commenced in 1965 under the auspices of the United Nations for a treaty to inhibit the spread of nuclear weapons. In the same period, efforts to launch U.S.-Soviet arms control discussions were disrupted for a time, in particular by the Soviet intervention in Czechoslovakia in 1968, but the strategic arms control talks finally began in November 1969, initiating a process that would continue, with minor interruptions, more or less continuously for four decades. The processes for enhancing Lawrence Freedman’s twin pillars—nonproliferation and strategic stability—were in place.

The evolution of the nuclear order was neither smooth nor harmonious. Though the United States and the Soviet Union shared an interest in preventing nuclear proliferation and in avoiding an unwanted nuclear war, their relations were contentious and marked by distrust until very late in the Cold War period. Arms control remained controversial and outspoken skeptics criticized both the broad process and the content of specific agreements.²⁸ Nevertheless, over several decades, stretching from the late 1960s to the late 1990s, there was the gradual construction of elaborate treaty regimes that addressed both concerns about nuclear proliferation in the multilateral arena and about nuclear rivalry in the bilateral Soviet-American arena. As Richard Haas has written in characterizing this nuclear era, “reason and caution increasingly gained the upper hand.”²⁹

The tales associated with building the web of connections and constraints are long and filled with telling details, but the essential architecture of restraint rested on four main building blocks.

Preventing the Spread of Nuclear Weapons: The Nonproliferation Treaty and Regime. Somewhat miraculously, it proved possible to negotiate a legally binding multilateral treaty that acknowledged and accepted the five nuclear weapon states that existed at the time but prohibited all other signatories from building or otherwise acquiring nuclear weapons. Across time, also perhaps somewhat miraculously, nearly every state in the international system (191 member states) signed the treaty; every state that does not possess nuclear

27. Alistair Buchan, “Foreign Comment,” in Brennan, ed., *Arms Control, Disarmament, and National Security*, 443.

28. For an excellent concise summary of the critique of arms control, which argues that the benefits were meager or nonexistent and the counterproductive effects were costly and destabilizing, see Richard N. Perle, “Good Guys, Bad Guys, and Arms Control,” in Ian Anthony and Daniel Rotfeld, eds., *A Future Arms Control Agenda* (Oxford: Oxford University Press, 2001), 43–51. For fuller examples of the anti-arms control genre, see Bruce D. Berkowitz, *Calculated Risks: A Century of Arms Control, Why it Has Failed, and How it Can Be Made to Work* (New York: Simon & Schuster, 1987); and Colin S. Gray, *House of Cards: Why Arms Control Must Fail* (Ithaca: Cornell University Press, 1992).

29. Richard N. Haas, “Foreword,” in Koblenz, *Strategic Stability in the Second Nuclear Age*, vii.

weapons (with the single exception of South Sudan) has signed a legal instrument in which they accept a binding obligation to remain non-nuclear. The Nuclear Nonproliferation Treaty entered into force in 1970 and became the legal foundation for an evolving regime of technology controls and mandated inspections of nuclear facilities aimed both at preventing the spread of weapons-related nuclear technology and at discouraging the use of civilian nuclear facilities for illicit weapons-related purposes. Adaptions in the regime often came after some undesirable development or challenge to the system. After the 1974 Indian nuclear test, for example, a Nuclear Suppliers Group (NSG) was established to harmonize export controls on sensitive nuclear technologies and to deny weapons-related technologies to potentially worrisome recipients. Similarly, after the discovery of Iraq's illicit nuclear weapons program in 1990, the International Atomic Energy Agency (IAEA) developed a new set of information requirements and inspection measures, enumerated in a document called the Additional Protocol, that enhanced the IAEA's access to information and its powers of inspection. In the nearly five decades since its inception, there has been considerable evolution in the NPT regime. From the beginning, there were doubts about its sufficiency and effectiveness.³⁰ Doubts remain even today, and the regime has been seriously tested by protracted crises involving Iran and North Korea—showing that where proliferation problems exist, they are very disruptive and troublesome and not easily addressed. Nevertheless, the unregulated order in which it was feared that nuclear weapons might spread to many states has been replaced by a nearly universal treaty that prohibits the acquisition of nuclear weapons and by an associated regime for managing and limiting the spread and use of weapons-related nuclear technology. In the 1950s and 1960s, few would have imagined that the eventual puzzle would be why there are so few nuclear-armed states nor would they have expected the emergence of a widespread norm against the acquisition of nuclear weapons.³¹ The assumption that a steadily growing number of states would acquire nuclear weapons was supplanted by the belief that most states would not do so. This was a profound change in the global nuclear order.

Severe Constraints on Missile Defenses: The ABM Treaty. Nascent missile defense programs in the United States and the Soviet Union had been both engines of the arms race and potentially destabilizing factors in the strategic equation between the superpowers, since they could contribute to first-strike options. In the early stages of the strategic arms control process, the most significant result was the 1972 ABM Treaty, of unlimited duration, that limited the

30. See, famously, Albert Wohlstetter, "Spreading the Bomb without Quite Breaking the Rules," *Foreign Policy* (25) (Winter 1976–1977), which articulates the complaint that the NPT regime allows states to come close to acquiring the bomb without violating any of its provisions.

31. See, for example, William Potter, "The NPT & the Sources of Nuclear Restraint," *Daedalus* (Winter 2010), which seeks to explain why there are so few nuclear weapon states and argues for the impact of the nonproliferation norm.

two sides to two strategically insignificant missile defense sites.³² Interest in and explorations of missile defense persisted (most prominently with Reagan's Strategic Defense Initiative program in the 1980s), but operational deployments were severely restricted by a permanent treaty. A 1974 protocol to the ABM Treaty reduced the number of permitted sites to one, and in 1975 the United States abandoned missile defense deployments altogether (though research and development continued). Regarded as the essential foundation of strategic arms control, the ABM Treaty directly confronted offense-defense interactions as an influence on nuclear decision-making by eliminating missiles defenses from the equation for the foreseeable future. This was a vast and moderating change in the character of the global nuclear order.

Limiting and Reducing Offensive Nuclear Forces: SALT, START, and Beyond. Missile defenses were only one of the factors that gave momentum to the accumulation of offensive nuclear forces. Fears of vulnerability, worries about inferiority, desires for counterforce options, and the drive for innovation and modernization were also in play. Uncertainty was a major influence: who knew how large and capable an opponent's force might be in the future, especially when current planning had to anticipate capabilities that might exist years ahead? Starting with the Strategic Arms Limitations Talks (SALT) in November 1969 and continuing through the New START agreement of April 2010, Washington and Moscow engaged in a long series of negotiations aimed at limiting strategic offensive forces.³³ These negotiations were typically slow and difficult. The agreements were sometimes disappointing and were frequently controversial. The process sometimes broke down or failed; ratification of the SALT II agreement, for example, was prevented by the Soviet invasion of Afghanistan in 1979.

But the aggregate impact of this process was the imposition of an evolving set of increasingly significant constraints on the size and character of nuclear forces, accompanied by a verification process that reduced the opacity of the competition. The first such agreement, the Interim Agreement on Offensive Forces of 1972, established a freeze on the number of launchers—the volcano was capped and the upward spiral in the number of delivery systems was stopped, permanently as it turned out. It is commonly presumed that arms control codified rather than caused the leveling off of the Soviet-American nuclear competition, but it is also plausible that deployments could have grown even larger in the absence of limits on offensive and defensive forces. Since 1972, however, strategic nuclear arsenals have been governed by agreed limits and hence the future size of the opposing force could be known precisely with some confidence so long as the arms control framework was expected to remain

32. The very complicated path that led to this result is detailed in James Cameron, *The Double Game: The Demise of America's First Missile Defense System and the Rise of Strategic Arms Limitation* (Oxford: Oxford University Press, 2017).

33. For an overview of this history, see Matthew J. Ambrose, *The Control Agenda: A History of the Strategic Arms Limitation Talks* (Ithaca, NY: Cornell University Press, 2018); and James H. Lebovic, *Flawed Logics: Strategic Nuclear Arms Control from Truman to Obama* (Baltimore, Md.: Johns Hopkins University Press, 2013).

intact. The Soviet Union and the United States agreed to observe the limits of the 1979 SALT II agreement even though it was never ratified. Starting in the 1980s, strategic arms control focused on reducing numbers and constraining modernization—even though the Reagan administration was skeptical of arms control and started out with a confrontational policy toward the Soviet Union. With the signature of the START I agreement of 1991 after nearly a decade of negotiation, significant reductions had been agreed upon, limits on modernization had been achieved, extensive verification measures had been accepted, and the strategic nuclear relationship was governed by a detailed treaty, including countless pages of definitions, annexes, protocols, and agreed-upon understandings. This was a remarkable change from the reality that existed in the first twenty-five years of the nuclear age.

The aim of this protracted exercise in arms control was not only to contain the arms competition between the two superpowers—that is, the promotion of arms race stability. It was also intended to inhibit the emergence of destabilizing capabilities—thus contributing to crisis stability. To be sure, neither side ever really abandoned the quest for advantage or the pursuit of usable nuclear options, but the imperative to ensure the adequacy of deterrence was fundamental. Arms control was viewed as an instrument that could strengthen deterrence and prevent threats to the deterrence system from arising. As Henry Kissinger has written, “The diplomacy of arms control concentrated on limiting the composition and operating characteristics of strategic forces to reduce the incentive for surprise attack to a minimum.”³⁴

Arms Control as Management Process. Despite recurrent acrimony in U.S.-Soviet relations and occasional interruptions in negotiations, arms control talks became a form of institutionalized dialogue on nuclear issues. As Matthew Ambrose comments about SALT, for example,

Negotiations grew so routine that they became divorced from whatever agreement they sought to achieve next and were instead seen as a continuous process. In this process, senior policymakers on each side formulated a policy and presented and discussed these positions at formal diplomatic exchanges. These exchanges were punctuated by intermittent summit meetings by heads of state or cabinet officials. As this cycle repeated itself, policymakers primarily thought of their task as tending to the more abstract “SALT process.”³⁵

These regularized interactions became, in effect, a mechanism for the joint management of the nuclear balance. The completely uncoordinated exertions of the 1950s and 1960s were eventually replaced by the practice of regular consultation, producing periodic agreed-upon limitations on nuclear forces. Rivalry still existed and nuclear dangers did not disappear, but the era of unbridled nuclear competition and galloping acquisition of nuclear forces was brought to an end.

34. Henry A. Kissinger, *Diplomacy* (New York: Simon and Schuster, 1994), 715.

35. Ambrose, *The Control Agenda*, introduction.

Post–Cold War Promise and Progress. Arms control had proven resilient enough to weather setbacks and low moments, even during the Cold War. With the end of the Cold War, there arrived a moment of extraordinary hopefulness. Instead of intense antagonism, there was now “strategic partnership” between Moscow and Washington. As the Cold War waned and then disappeared into history, what emerged was a remarkable decade-plus of arms control. This phase commenced with the dramatic Reagan-Gorbachev summit at Reykjavik in 1986, at which the two presidents discussed both the elimination of all nuclear weapons and the banning of ballistic missiles.³⁶ Though the two sides were unable to reach agreement on these unprecedentedly sweeping measures, Reykjavik represented a symbolic breakthrough to a much more ambitious era of arms control. Soon after came the 1987 Intermediate Nuclear Forces (INF) agreement that eliminated an entire class of missile. This was the beginning of a retreat from the nuclearization of everything that had been witnessed in the early decades of the nuclear age. It was followed in September 1991 by an unprecedented set of reciprocal unilateral initiatives undertaken by Presidents Bush and Gorbachev (prompted in part by the August 1991 coup attempt against Gorbachev that raised concerns about control of nuclear weapons) that committed the two sides to eliminate, withdraw from service, or significantly reduce most categories of tactical nuclear weapons; particularly notable was the focus on removing tactical nuclear weapons from ground and conventional naval forces.³⁷ The intent and effect of these initiatives was to “radically reduce” holdings of deployed tactical nuclear weapons.³⁸ In December 1991, the United States initiated the Cooperative Threat Reduction program (also known as Nunn-Lugar) that involved intimate cooperation with and investment of U.S. taxpayer dollars in the Russian nuclear weapons establishment; it sought to secure facilities and weapons-usable nuclear materials to allay concerns that Russian nuclear assets might leak into illicit nuclear markets during the turbulent period after the collapse of the Soviet Union. This program was not without its difficulties and frictions, but it involved a degree of intimate nuclear collaboration that would previously have been unthinkable. In short order, the possibilities for arms control seemed to expand and the nuclear relationship was transformed by one unprecedented move after another.

In parallel, significant steps were taken in strategic arms control. After a difficult decade of on-again, off-again negotiations, the START I agreement was signed on July 31, 1991. Much the most complex of these agreements and con-

36. Reagan’s team, at least, reacted with alarm at these deliberations, which posed a mortal threat to existing Cold War nuclear structures. See, for example, the scathing account in Kenneth Adelman, *The Great Universal Embrace: Arms Summitry—A Skeptic’s Account* (New York: Simon and Shuster, 1989), 19–88. At the time of the summit, Adelman was head of the U.S. Arms Control and Disarmament Agency (ACDA).

37. For a concise summary of the details, see “The Presidential Nuclear Initiatives (PNIs) on Tactical Nuclear Weapons at a Glance” (Washington, D.C.: Arms Control Association, July 2017), available at www.armscontrol.org.

38. Nikolai Sokov and William Potter, “The Presidential Nuclear Initiatives, 1991–1992: An Assessment of Past Performance and Future Relevance,” Policy Brief No. 21 (Tokyo, Japan: Toda Peace Institute, October 2018), 2.

taining elaborate verification provisions, START I called for significant reductions in the number of deployed strategic delivery systems and associated nuclear weapons. Soon thereafter, on January 3, 1993, yet another agreement—START II—was reached; it represented a further elaboration of the increasingly extensive network of negotiated constraints governing nuclear capabilities by introducing an important qualitative constraint: the banning of multiple warhead (MIRVed) missiles, which were regarded as potentially destabilizing because they expanded attack capabilities while also representing attractive targets for the other side.

This phase of hope and progress reached a crescendo in the mid-1990s, highlighted by one historic event and one dramatic vision. The historic event was the indefinite extension of the NPT in 1995. The treaty was coming to the end of its initial twenty-five-year duration and the 1995 NPT Review and Extension Conference would determine whether the treaty was terminated or extended, and if extended, whether for a fixed term or indefinitely. There was no guarantee that the alchemy that had permitted the negotiation of the treaty in the late 1960s would exist in 1995 and there was plenty of indication (not least at earlier NPT review conferences) of dissatisfaction with the treaty. Hence, there was great concern in the period leading up to the 1995 conference that the outcome could well be disappointing. George Bunn, one of the leading nonproliferation experts, warned, for example, that “The obstacles to securing a lengthy extension are truly formidable....”³⁹ The United States, for its part, mounted a major diplomatic effort to gain support for a protracted renewal of the NPT, motivated by the realization that among NPT members “many are resisting an indefinite extension.”⁴⁰ At the 1995 conference itself a number of alternatives were put forward, including renewal for a single fixed period, rolling renewal for fixed periods, and renewal made conditional on greater and more tangible progress toward nuclear disarmament by the states possessing nuclear weapons. In the end, however, on May 11, 1995, the conference agreed on the indefinite extension of the NPT, thus putting the legal foundation of the nonproliferation regime on sound permanent footing.⁴¹ This was seen as a major victory: the demise of the NPT had been avoided and instead the NPT regime entered “a new era.”⁴² There were still nonproliferation problems on the agenda, of course, and efforts to improve the regime continued, but with the indefinite extension of the NPT the nonproliferation pillar seemed well-

39. George Bunn, “The NPT and Options for its Extension in 1995,” *The Nonproliferation Review* (Winter 1994): 58.

40. David Ottaway and Steve Coll, “A Hard Sell for Treaty Renewal,” *The Washington Post*, April 14, 1995, which provides a concise account of the pro-NPT campaign led by U.S. Ambassador Tom Graham.

41. For a thorough account of the issues and controversies at the 1995 Review and Extension Conference, see Rebecca Johnson, “Indefinite Extension of the Nonproliferation Treaty: Risks and Reckonings,” *ACRONYM Report No. 7*, The ACRONYM Institute, September 1995.

42. The phrase is used in Tariq Rauf and Rebecca Johnson, “After the NPT’s Indefinite Extension: The Future of the Global Nonproliferation Regime,” *The Nonproliferation Review* (Fall 1995): 28.

entrenched. Moreover, the deliberations over the NPT gave impetus to the negotiations on nuclear testing, with non-nuclear weapon state members of the NPT pressing the nuclear-armed states to take tangible steps toward disarmament, as called for in Article VI of the NPT. The Comprehensive Test Ban Treaty (CTBT) was signed in September of 1996.

The landmark step in nonproliferation was soon followed by the emergence of a dramatic vision of progress in strategic arms control. At their summit in Helsinki in March of 1997, Presidents Clinton and Yeltsin agreed on a framework for the upcoming START III negotiations that went well beyond earlier agreements.⁴³ The Clinton-Yeltsin framework envisioned not only further substantial reductions in nuclear forces, but also, for the first time, a direct focus on warheads and nuclear materials (in contrast to earlier agreements that focused overwhelmingly on delivery systems). The negotiation was (again, for the first time) to address tactical as well as strategic nuclear weapons, and to cover delivery systems (such as sea launched cruise missiles) that had been excluded from earlier agreements. There was an emphasis on trying to achieve the irreversibility of reductions by creating a cooperative and transparent program for the dismantlement of warheads withdrawn from service and to secure and manage the nuclear materials extricated from dismantled warheads. Clinton and Yeltsin established the goal of creating a nuclear arms control regime of permanent duration. The parameters for negotiation agreed by the two presidents at the Helsinki summit aimed at nothing short of a comprehensive, cooperative, highly transparent, permanent, treaty-based regime for managing the nuclear relationship between the United States and Russia.⁴⁴ If the Reagan-Gorbachev summit at Reykjavik was, in terms of ambition, the pinnacle of Cold War arms control, the Clinton-Yeltsin summit at Helsinki was the high-water mark of post-Cold War arms control. An agreement based on the Helsinki parameters would be unprecedentedly ambitious and transformative.

In sum, a fertile dozen years, spanning the end of the Cold War and the emergence of the post-Cold War era, stretching from Reykjavik 1986 to Helsinki 1997, witnessed an impressive advance of arms control in multiple contexts. The negotiations were often contentious, forward movement was often hard-won, interests still collided, rivalries and antagonisms between states continued, agreements invariably attracted criticism and opposition, and policy battles were fought and sometimes lost. This is not a smooth story of steady and uninterrupted progress. Nevertheless, in aggregate, by the late 1990s, much had been achieved: an extensive, treaty-based regulatory infrastructure governed the nuclear affairs of the planet, and momentum in the direction of greater cooperation and additional constraints seemed in evidence.

43. The Helsinki framework is spelled out in “Joint Statement of Parameters on Future Reductions in Nuclear Forces,” March 1997, available at armscontrol.org.

44. The elements of a comprehensive regime are sketched more fully in Steven E. Miller, “A Comprehensive Approach to Nuclear Arms Control,” in *Arms Control and Disarmament: A New Conceptual Approach*, DDA Occasional Paper, No. 4 (New York: UN Department of Disarmament Affairs, September 2000), 16–33.

THE TIDE TURNS, 2000–2018: THE EROSION OF THE NUCLEAR ORDER

The picture so far suggests that during the first half century of the nuclear age there was a slow and uneven but broad evolution from intense, unregulated competition to an increasingly regulated, collaboratively managed nuclear environment in which nuclear arsenals were constrained by agreement and the spread of nuclear weapons was inhibited by a negotiated regime rooted in a permanent legally binding treaty. The unregulated phase was marked by the slow but steady increase in the number of nuclear armed states, prodigious accumulations of weapons by the two main protagonists, the spread of nuclear weapons throughout the military organizations of the superpower rivals, recurrent fears of instability undermining deterrence, and frightening and risky diplomatic and military confrontations that raised risks of nuclear use. We do not have to hypothesize about what an unregulated global nuclear order—a world without arms control—might be because the first twenty-five years after the end of World War II gave us a vivid taste of that world.

The increasingly regulated phase of this history, in contrast, gradually built a global nuclear order in which the NPT had gained almost universal acceptance, the associated regime was being slowly improved, a norm of nonproliferation was thought to exist, and the emergence of the feared nuclear-armed crowd was avoided. In parallel, the superpower arsenals were dramatically reduced in size and many types of tactical weapons were withdrawn from operational deployment, qualitative limits constrained modernization, missile defense deployments were constrained to meaningless levels by negotiated agreement, nuclear dialogue was sustained and essentially institutionalized, and the nuclear relationship between Washington and Moscow had grown impressively and unprecedentedly cooperative. In the early post–Cold War era, with past antagonisms consigned to history and once unimaginable collaboration now possible, it seemed that the movement in the direction of a heavily regulated and jointly managed nuclear order would continue and deepen.

And then the tide turned. It is even possible to point to a moment when, arguably, events began to shift in a more troubling direction. On May 12, 1998, India conducted a set of nuclear tests that represented the commencement of an open program aimed at developing deployable nuclear weapons.⁴⁵ Within weeks, Pakistan responded with its own nuclear tests. The two big powers in South Asia were now committed to the nuclearization of their troubled and conflict-prone relationship.⁴⁶ Not since China detonated its first nuclear test in

45. For a contemporaneous account, see John F. Burns, “India Sets Three Nuclear Blasts, Defying a Worldwide Ban; Tests Bring a Sharp Outcry,” *The New York Times*, May 12, 1998.

46. For an assessment of the impact of the 1998 tests, see Michael Krepon, “Looking Back: The 1998 Indian and Pakistani Nuclear Tests,” *Arms Control Today* (June 2008), available at www.armscontrol.org.

October 1964 had the nonproliferation norm been so blatantly disregarded.⁴⁷ Another reversal came the following year: in October 1999, the United States Senate voted down the CTBT and has yet to ratify the agreement to this day. This multilateral instrument, hailed as a breakthrough and seen as a point of significant progress when signed in 1996, cannot enter into force until the United States (along with some others) formally adopts the treaty; hence, the treaty remains in limbo. Whatever momentum was derived from the indefinite extension of the NPT and the signing of the CTBT was soon lost.

These setbacks in nonproliferation were accompanied in 1998 by a dramatic loss of momentum in strategic arms control. With Clinton embroiled in scandal and impeachment proceedings, Russia preoccupied with a severe domestic economic crisis, and relations between Washington and Moscow increasingly complicated by NATO enlargement, Balkan crises, and other frictions, the strategic arms control process fell off the agenda. The START III negotiations were never begun and the ambitious Helsinki framework was never converted into an actual treaty governing Russian and American nuclear forces. The 2000 presidential election in the United States brought to power an administration that regarded the inherited arms control infrastructure as an “obsolete relic” of the Cold War and was determined to escape the shackles imposed on American policy by arms control treaty obligations. The Bush administration was more inclined to dismantle existing arms control arrangements than to build a more extensive web of negotiated constraints.⁴⁸

Looking back two decades later, the events of 1998 look like the beginning of a long period in which difficulties, setbacks, and worrying trends outweighed occasional gains in terms of the stability and management of the global nuclear order. To be sure, the picture is not totally bleak. Two new strategic arms control agreements—the Strategic Offensive Reductions Treaty (SORT) of 2002 and the New Start Agreement of 2010—were reached with Russia; though modest compared to the ambitions of the late 1990s, these agreements preserved the negotiated nuclear relationship between Moscow and Washington. An unprecedented agreement—the Joint Comprehensive Plan of Action (JCPOA)—was put in place to constrain Iran’s nuclear program and to ease concerns about its possible acquisition of nuclear weapons (only to be renounced in 2018 by President Trump). There have been meaningful augmentations of the NPT regime, including the

47. Israel’s presumed nuclear weapons capability was developed covertly and has never been acknowledged by the Israeli government. South Africa’s nuclear weapons were similarly secret and were eventually abandoned. Neither involved the overt pursuit of nuclear weapons.

48. For a detailed analysis of the change in arms control policy represented by the Bush administration, see Steven E. Miller, “Skepticism Triumphant: The Bush Administration and the Waning of Arms Control,” in Hans J. Giessmann, Roman Kuzniar, and Zdzislaw Lachowski, eds., *International Security in a Time of Change: Threats, Concepts, Institutions* (Baden-Baden: Nomos Verlagsgesellschaft, 2004), 15–40. For a sympathetic account of Bush’s arms control policy that also emphasizes its change of direction, see Christopher A. Ford, “A New Paradigm: Shattering Obsolete Thinking on Arms Control and Nonproliferation,” *Arms Control Today* (November 2008), available at www.armscontrol.org.

wide acceptance of the Additional Protocol that strengthens the safeguards system and refinements of international export controls to inhibit the spread of weapons-related nuclear technology. Nevertheless, the global nuclear order today is vastly different and more worrisome than was envisioned two decades ago. A number of trends and developments have combined to alter the trajectory of the nuclear order.

The Return of Great Power Competition. Political relations among the major powers have grown more contentious and potentially more confrontational. Most immediately, relations between the United States and Russia have grown much more toxic and have brought back into view nuclear concerns and dangers reminiscent of the Cold War—though, as Legvold emphasizes in his essay, in a very different and more difficult international context. At the same time, China’s extraordinary growth in recent decades and its increasing power and assertiveness have dramatically raised the prominence of the relationship between China and the United States. These two states seem destined to be the primary rivals on the international scene in the decades to come and the potential for antagonism and confrontation is real—as evidenced by the bubbling debate in the United States about the likelihood of war with China.⁴⁹ All three of these states are committed to substantial long-term nuclear modernization programs that are sure to influence one another; in the cases of the United States and Russia, they retain doctrinal inclinations that are legacies of the Cold War. The effects of competition and friction among these three can already be seen. The 2018 U.S. *Nuclear Posture Review*, for example, explicitly highlights the rise of great power competition and the growing power and assertiveness of Russia and China as key factors shaping U.S. nuclear policy and as core rationales for Washington’s ambitious and extremely expensive nuclear modernization program.⁵⁰ Nuclear weapons are now prominent in the security policies of these states and indeed, after fading into the background after the end of the Cold War, nuclear weapons have been “relegitimized.”⁵¹ Among the most powerful nuclear-armed actors, the environment is strikingly less benign and less hopeful than was the case in 1991. This is one fundamental factor that is reshaping the global nuclear order.

Proliferation Creates Regional Nuclear Balances. The emergence of three new nuclear-armed states since 1998 has resulted in regional nuclear balances in Northeast Asia and South Asia that simply did not exist previously. The possession of nuclear weapons by a mercurial North Korean regime and the presence of nuclear weapons in the fraught and conflict-prone relations between India and Pakistan have raised a new set of risks, dangers, and potential instabilities. There is no reason to assume that regional nuclear dynamics will have the attributes that have marked the bilateral relationship between the two nuclear

49. See, for example, Graham T. Allison, *Destined for War: Can America and China Escape Thucydides’s Trap?* (New York: Houghton Mifflin Harcourt, 2017).

50. U.S. Department of Defense, *Nuclear Posture Review*, February 2018, pp. 6–7.

51. The phrase is found in Nina Tannenwald, “How Strong is the Nuclear Taboo Today?” *The Washington Quarterly* 43 (3) (Fall 2018): 90.

superpowers and no reason to be confident that more than seven decades of superpower nuclear peace will be easily replicated in regional settings.⁵²

Multilateral Nuclear Dynamics. The rise of China and the arrival of additional nuclear-armed actors has led to the multilateralization of deterrence relationships. Where once a single bilateral nuclear relationship was the primary focus, now a set of triangular relations has become increasingly salient. The United States, Russia, and China will obviously be increasingly caught up in a three-way nuclear relationship. China is simultaneously integral to a second triangle involving India and Pakistan—a “trilemma” that has been described as “inherently unstable.”⁵³ North Korea engages in a complicated nuclear interaction with the United States but also sits in a location where China and Russia are major players. No longer can the nuclear strategy community preoccupy itself largely with the U.S.-Russia nuclear relationship. Difficult questions are becoming unavoidable. Are past concepts and practices appropriate and effective in this new setting? Can arms control work in this multilateral environment? How can this more complex situation be handled safely?

The Deterioration of Arms Control. While new challenges are arising, the regulatory framework is weakening, to the point that long-time arms control experts have suggested that perhaps the era of negotiated arms control is ending.⁵⁴ “If we think of the end of the cold war as a time of relative peace among the major powers,” wrote experienced arms control negotiator James Goodby in 2001, “we should ask ourselves whether arms control could survive the peace.” His plaintive answer: “Perhaps not.”⁵⁵ Much that has happened in the subsequent years has vindicated his pessimism. “Arms control,” writes Eugene Rumer, “is in trouble.”⁵⁶

One of the first, and most portentous, steps away from arms control was the U.S. withdrawal from the ABM Treaty in 2002. This step eliminated what had been regarded as the essential foundation of strategic arms control and opens

52. On regional nuclear dynamics, see Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton: Princeton University Press, 2014). For an imaginative fictionalized exploration of how regional instability could lead to nuclear war, see Jeffrey Lewis, *The 2020 Commission Report on the North Korean Nuclear Attacks Against the United States* (New York: Houghton Mifflin Harcourt, 2018). It is notable that important elements of John Gaddis’s famous explanation of “the long peace” between the United States and the Soviet Union do not exist in regional settings. See John Lewis Gaddis, “The Long Peace: Elements of Stability in the Post-War International System,” *International Security* 10 (4) (Spring 1986): 99–142.

53. Koblenz, *Strategic Stability in the Second Nuclear Age*, 30.

54. See, in particular, Alexei Arbatov, *An Unnoticed Crisis: The End of History for Nuclear Arms Control?* (Moscow: Carnegie Moscow Center, 2015); and Linton Brooks, “After the End of Bilateral Nuclear Arms Control” (Washington, D.C.: Center for Strategic and International Studies, October 24, 2017), available at www.nuclearnetwork.csis.org, in which Brooks predicts the imminent collapse of U.S.-Russia nuclear arms control.

55. James E. Goodby, “Major Powers and Arms Control: A US Perspective,” in Anthony and Rotfeld, eds., *A Future Arms Control Agenda*, 68.

56. Eugene Rumer, “A Farewell to Arms Control,” US-Russia Insight (Washington, D.C.: Carnegie Endowment for International Peace, April 17, 2018).

up the possibility that the offense-defense dynamics feared in the earlier years of the nuclear age might resurface. Missile defense deployments remain small in scope and limited in effectiveness, so the arms race dynamics should not yet be operating powerfully. Nevertheless, there are already indications that the U.S. missile defense program is having an outsized impact on the calculations of others. On March 1, 2018, for example, Russian President Vladimir Putin gave a speech in which he explicitly identified U.S. missile defense policy as one of the driving factors behind Russia's nuclear modernization:

Now, on to the most important defense issue. I will speak about the newest systems of Russian strategic weapons that we are creating in response to the unilateral withdrawal of the United States of America from the Anti-Ballistic Missile Treaty and the practical deployment of their missile defense systems both in the US and beyond their national borders....In light of the plans to build a global anti-ballistic missile system, which are still being carried out today, all agreements signed within the framework of New START are now gradually being devaluated, because while the number of carriers and weapons is being reduced, one of the parties, namely, the US, is permitting constant, uncontrolled growth of the number of anti-ballistic missiles, improving their quality, and creating new missile launching areas. If we do not do something, eventually this will result in the complete devaluation of Russia's nuclear potential.⁵⁷

Putin proceeded to enumerate an array of nuclear acquisition programs, some quite long term, that he described as intended to neutralize the U.S. missile defense effort. Chinese concern about U.S. missile defense—especially but not only that deployed in northeast Asia—is similarly quite visible.⁵⁸ But the problem is not limited to Russian and Chinese concerns about U.S. missile defense; Moscow and Beijing are working to develop their own missile defense capabilities that can discomfit American policy-makers.⁵⁹ The potential for a revival of offense-defense interactions clearly exists and it may prove difficult to sustain limits at low levels on offensive forces if substantial missile defense systems are built: the death of constraints on missile defense could thus undermine future efforts at constraining offensive forces.

57. The text of Putin's speech can be found in "Presidential Address to the Federal Assembly," March 1, 2018, available at <http://en.kremlin.ru/events/president/news/56957>.

58. See, as one example, Wu Riqiang, "China's Anxiety About US Missile Defense: A Solution," *Survival* 55 (5) (October 2013): 29–52.

59. See, illustratively, Chris Riback, "Russia Missile Defense Worries US," *Roll Call*, October 8, 2018; and Ankit Panda, "China and the United States Worry About Each Other Missile Defense Intentions—So Why Not Talk?" *The Diplomat*, March 4, 2018. For a discussion of the implications of a world of multiple national missile defense deployments, see Charles D. Ferguson and Bruce W. MacDonald, *Nuclear Dynamics in a Multiple Strategic Ballistic Missile Defense World* (Washington, D.C.: Federation of American Scientists, July 2017).

The elimination of the ABM Treaty may be the most profound change in the arms control scene in the past two decades, but other developments compound the concern that the hard-won regulatory framework created over decades is eroding. The INF Agreement has been seriously jeopardized by a compliance dispute triggered by new Russian systems, and also by growing U.S. interest in deploying INF in the Pacific to offset expanding Chinese capabilities. In October 2018, the Trump administration announced its intention to withdraw from the treaty (though at present it has yet to convey formal notification of withdrawal, as required by the agreement).⁶⁰ The Cooperative Threat Reduction Program, which for two decades had facilitated deep cooperation with Russia's nuclear establishment, was terminated completely in 2012, falling victim to increasingly contentious U.S.-Russian relations.⁶¹ In addition, apart from a fifteen-month period at the beginning of the Obama administration, during which the New START agreement was negotiated, the strategic arms control process has grown largely dormant and the institutionalized regular dialogue on nuclear issues has disappeared. In contrast to painstakingly negotiated earlier treaties, the 2002 Moscow Treaty was a hastily negotiated two-page document whose contents were so meager and poorly drafted that it called into question the significance of the exercise. New START (2010) is a serious agreement but it expires in 2021, with no process yet in view to negotiate a replacement. A follow-on agreement may materialize, but no one would suggest that strategic arms control is in good health—and it is plausible that the expiration of New START will represent the end of strategic arms control. As Nikolai Sokov and William Potter observe, “The fabric of US-Russian nuclear arms reductions is unraveling.”⁶² The arrival of the Trump administration has so far accentuated this trend; it concluded in its *Nuclear Posture Review*, for example, that arms control is inappropriate in current international conditions and that “further progress is difficult to envision.”⁶³ U.S.-Russian nuclear arms control may be sputtering, but possibly even more striking is the fact that the world's seven other nuclear arsenals (several of which are growing steadily) are ungoverned by any effective constraining agreement. Meanwhile, on the nonproliferation front, the emergence of three new nuclear-armed states, each working steadily to expand its nuclear arsenal, has undermined confidence in the robustness of the nonproliferation norm.

60. On the implications of Trump's INF decision, see Steven E. Miller, “Ideology Over Interests? Trump's Costly INF Decision,” *Bulletin of the Atomic Scientists* (October 26, 2018).

61. See David M. Herszenhorn, “Russia Won't Renew Pact on Weapons with US,” *The New York Times*, October 10, 2012.

62. Sokov and Potter, “The Presidential Nuclear Initiatives, 1991–1992,” 1. Also anticipating the end of U.S.-Russian arms control is William Caplan, “Nuclear Stability in a Post-Arms Control World,” *New Perspectives in Foreign Policy*, vol. 1 (Washington, D.C.: Center for Strategic and International Studies, Fall 2017), 18–27; and Ulrich Kuhn, “Nuclear Arms Control Shaken by New Instability” (Washington, D.C.: Carnegie Endowment for International Peace, June 12, 2018).

63. On Trump administration views of arms control, see Steven E. Miller, “Nuclear Battleground: Debating the US 2018 Nuclear Posture Review,” Policy Brief No. 16 (Tokyo, Japan: Toda Peace Institute, June 2018), 11–13.

The protracted and never fully resolved crises involving Iran and North Korea have raised criticism of the effectiveness of the NPT regime. Can proliferation really be held back over the long run, when it seems that determined states—with North Korea being the prime example today—can get nuclear weapons if they really want them? How long can the nonproliferation regime keep possible nuclear aspirations at bay? The record of the nuclear age so far suggests that success is possible, but doubters fear the trend cannot last. “Is Nonproliferation Dying?” asked *The Washington Quarterly* on its cover not long ago.⁶⁴

In short, far from building on the arms control inheritance of past decades, the arms control frameworks governing nuclear weapons have been discarded, weakened, or jeopardized. The trend toward more extensive constraints and greater cooperation has been substantially reversed, meaning the future nuclear order may be less regulated and more competitive. This is another dramatic change in the character of the nuclear order, and moves us back toward the dangerous world experienced in the first decades of the nuclear age.

Technological Advance Undermining Stability? Worries that nuclear forces might become vulnerable to an opponent’s first strike have been an abiding feature of the nuclear age, notwithstanding the wide belief during the mature Cold War period that large, redundant, protected, or hidden capabilities were sufficient to produce a stable deterrent relationship.⁶⁵ But now technologies have emerged or are emerging that have the potential to erode, perhaps substantially, whatever stability may be thought to exist. Advances in surveillance, accuracy, lethality, artificial intelligence, and cyber capabilities could make it much more difficult to have confidence in the survivability of deterrent forces.⁶⁶ The growing transparency of the military milieu, for example, could make submarines more vulnerable than in the past, thus undermining a capability that has long been regarded as a survivable guarantor of deterrence. Land-based capabilities (including mobile missiles) may become increasingly vulnerable to attack as improvements in surveillance provide precise real-time targeting information to highly effective attacking forces. Progress across an array of technologies from precision to data processing has increased the potential for making missile defense more effective. Further, technological improvements make it

64. See *The Washington Quarterly* 36 (2) (Spring 2013).

65. Recent scholarship, however, suggests that (especially Soviet) forces may have been more vulnerable and deterrence more fragile than was fully appreciated at the time. See, for example, Austin Long and Brendan Rittenhouse Green, “Stalking the Secure Second Strike: Intelligence, Counterforce, and Nuclear Strategy,” *Journal of Strategic Studies* 38 (1–2) (2015): 38–73.

66. For an extensive analysis that offers disturbing conclusions, see Keir A. Lieber and Daryl G. Press, “The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence,” *International Security* 41 (4) (Spring 2017): 9–49. For a concise analysis of the issue, see “Not So MAD: Why Nuclear Stability is Under Threat,” *The Economist*, January 27, 2018. On the potential for artificial intelligence (AI) to undermine the survivability of deterrent forces by making possible rapid integration and assessment of massive amounts of data from surveillance sensors, see Edward Geist and Andrew J. Lohn, “How Might Artificial Intelligence Affect the Risk of Nuclear War?” RAND Perspectives Paper, 2018. They write, for example, “Even if AI only modestly improves the ability to integrate data about the disposition of enemy missiles, it might substantially undermine a state’s sense of security and undermine crisis stability.”

possible to use advanced conventional weapons against strategic targets and nuclear command and control facilities, potentially blurring the line between conventional and nuclear war and possibly creating escalatory risks and pressures in the event of conventional conflict.⁶⁷ An additional layer of potential threat and vulnerability has emerged with the advance of cyber capabilities, which raise the possibility that command and control systems can be attacked and nuclear operations can be disrupted using cyber assets.⁶⁸ How far these technological trends will go and how much they will shake confidence in deterrence is still being debated. Nuclear-armed states will be highly motivated to find countermeasures to preserve their deterrent forces. But there can be no doubt that a world of more vulnerable offensive forces, more effective missile defense capable of degrading whatever offensive forces might survive a first strike, more lethal conventional forces capable of use against strategic assets, and larger worries about cyber vulnerabilities will be a more dangerous and less stable world.

In short, over the past two decades, a confluence of multiple trends has transformed the nuclear landscape—and unfortunately, most of these trends have produced new challenges and worries.

CONCLUSION: NEW REALITIES, NEW CHALLENGES

We live in a new nuclear world—what some are now calling the third nuclear age.⁶⁹ The nuclear order of 1991 no longer exists. The optimistic and hopeful nuclear ambitions and opportunities envisioned in 1991 never became a reality. As we have seen, starting in the late 1990s there has been a significant deterioration of relations among the great powers, an erosion of arms control, violations of the nonproliferation norm, and the emergence and evolution of potentially destabilizing technologies. The broad storyline, stretching across decades, of evolution from a competitive, unregulated nuclear environment to a more cooperative, regulated environment has come to an end. Instead, as Nina Tannenwald has written, “In this emerging nuclear era, key norms that have underpinned the existing nuclear order—most crucially deterrence, non-use and nonproliferation—are under stress. . . . The global nuclear normative order is unraveling.”⁷⁰ It is far from clear where this will all lead but it is certain that the old order no longer exists.

67. For a detailed exploration of one such scenario, see James M. Acton, “Escalation Through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War,” *International Security* 43 (1) (Summer 2018): 56–99.

68. See, for example, Beyza Unal and Patricia Lewis, *Cybersecurity of Nuclear Weapons Systems: Threats, Vulnerabilities and Consequences* (London: The Royal Institute of International Affairs, January 2018).

69. See, for example, Michal Smetana, “A Nuclear Posture Review for the Third Nuclear Age,” *The Washington Quarterly* 41 (3) (Fall 2018): 137–157. In the 1990s, it had become common to call the post–Cold War environment the second nuclear age.

70. Tannenwald, “How Strong is the Nuclear Taboo Today?” 90–91.

As a result, there is a need for what Thomas Schelling described as “strategy in an era of uncertainty.” Schelling, a Nobel laureate in economics and one of the formative strategic thinkers of the nuclear age, has described the difficulty of the task:

Now we are in a different world, a world so much more complex than the world of the East-West Cold War. It took 12 years to begin to comprehend the “stability” issue after 1945, but once we got it we thought we understood it. Now the world is so much changed, so much more complicated, so multivariate, so unpredictable, involving so many nations and cultures and languages in nuclear relationships, many of them asymmetric, that it is even difficult to know how many meanings there are for “strategic stability,” or how many different kinds of such stability there may be among so many different international relationships, or what “stable deterrence” is supposed to deter in a world of proliferated weapons.⁷¹

The fundamentally important question is, of course, how can we live safely in such a world? If present trends continue, we may find ourselves living in a future world marked by greater contention among the great powers, more nuclear weapons, more nuclear weapons states, less stability, and less arms control and international regulation of the world’s nuclear affairs. What are the implications of living in such a world? What paths might lead in more constructive directions? How can this more complex environment be most prudently and effectively managed?

Answering such questions requires a comprehensive reassessment of the global nuclear order: what role will nuclear weapons play in the international order? What new dynamics will emerge? Will past approaches to managing nuclear dangers suffice and what new approaches might be needed or useful? The American Academy’s project on Meeting the Challenges of the New Nuclear Age aims to contribute to this reassessment. In the pages that follow, Robert Legvold and Lawrence Freedman offer thoughtful essays that analyze aspects of what Legvold describes as “a new and far different nuclear world.”

71. Thomas C. Schelling, “Foreword,” in Elbridge A. Colby and Michael S. Gerson, eds., *Strategic Stability: Contending Interpretations* (Carlisle, Pa.: U.S. Army War College Press, February 2013), vii-viii.

The Challenges of a Multipolar Nuclear World in a Shifting International Context

Robert Legvold

After a thirty-year hiatus, fear of nuclear war has returned. The world is watching nervously as tensions rise between a now-nuclear North Korea and a hawkish U.S. administration. The United States and Russia again see one another as primary nuclear adversaries, only this time the United States has added China. Almost overnight, in a post-Cold War world whose nightmares swirl around an Islamic world in flames and terrorism capable of catastrophic harm—indeed, potentially with nuclear materials—an old and unexpected dread has reemerged.

The prospect that control could somehow be lost and a nuclear war could erupt had faded from most peoples' minds. Governments worried that states like Iran and North Korea might acquire nuclear weapons and so they put considerable effort into preventing that from happening. Awareness that another conventional war between India and Pakistan could go nuclear existed, but as something of an abstraction. Among politicians, most, albeit not all, policy-makers, and the public, the sixteen thousand nuclear weapons still in national arsenals and what defense planners intended to do with them occupied little if any of their thoughts.

More consequentially, leaders, even when focused on nuclear issues, were seemingly unaware of, let alone ready to face, the mounting challenges and dangers posed by a new and far different nuclear world, one that included trends that altered the dynamics among the now nine nuclear actors, the technology frontiers that were being crossed, the new nuclear arms races underway, and the faltering safeguards of an earlier nuclear age. The lethargy and false sense of safety that had set in when defense planners stopped worrying about global nuclear war and shifted their attention to other anxieties, such as nuclear terrorism and the spread of nuclear weapons, left them not only unprepared when the shadow of nuclear war reappeared, but also oblivious to the ways in which its context had shifted, producing dangers they had forgotten and some they had little imagined.

This essay focuses on the changes underway and the dangers such changes may pose. Because developments among nuclear-armed states do not unfold isolated from the larger international political context of which they are a part,

the interplay between these two realms serves as the essay's point of departure. What follows, therefore, is a two-level analysis. The first level focuses on the intricate way that shifts in the international political setting are altering and complicating the nuclear postures and relations among the nuclear weapons states. The second level, and the harder task, is putting the nuclear maze together by integrating the pieces (i.e., the evolution of bilateral and potentially trilateral nuclear rivalries, the technological breakthroughs, and the shifting notions of what constitutes nuclear deterrence and strategic stability).

AN EVOLVING NUCLEAR ORDER IN A CHANGING INTERNATIONAL SETTING

As the international environment dissolves into pools of power swirling around the rise of China, India, and other regional powers, new and unfamiliar perils intrude—such as the world of Islam at war, terrorism with a global reach, and impending conflicts over food, water, and habitats driven by climate change. And as old political patterns, arrangements, and outlooks crumble, the world looks increasingly messy, without an identifiable political structure and without a clear sense of which forces of change will most shape the future. Will it be the turmoil of an unending series of regional conflicts? Or the “clash of civilizations” most furiously manifest in Islamist terrorism? Or the bill to be paid for the mounting social and economic inequalities within and between societies? Or a rogue actor, possibly a government, that sets off a nuclear conflagration? Or perhaps some combination of them all, or even forces unforeseen?

In the haze, however, another trend directly affecting key nuclear states has suddenly intruded. Great power strategic rivalry is resurgent again. In the last half decade, the U.S.-Russian relationship has sailed off the tracks and into a new Cold War.¹ At the same time, in the delicate balance between cooperation and competition, U.S.-China relations, which were mixed before, are slowly tilting toward competition, giving rise to the possibility of military conflict between them. Inevitably, these changes impinge on the nuclear dimension of both relationships. They are starkest, for example, in the transfigured assumptions underlying an evolving U.S. nuclear posture. In 2010, with the positive effects of the “reset” in U.S.-Russian relations still being felt, the U.S. *Nuclear Posture Review* stressed working with Russia to enhance strategic stability and jointly to reduce the number and role of nuclear weapons because “Russia and the United States are no longer adversaries, and prospects for military confrontation have declined dramatically.”² China, too, was treated as more a partner than an adversary, even though the lack of transparency in its nuclear plans

1. While distinguishing this from the original Cold War—and the distinctions are fundamental—I have explored the depth of the deterioration and its major consequences in Robert Legvold, *Return to Cold War* (Cambridge: Polity, 2016).

2. United States Department of Defense, *Nuclear Posture Review Report*, April 2010, iv.

remained a source of concern. “The United States and China,” as stated in the 2010 *Nuclear Posture Review*, “are increasingly interdependent and their shared responsibilities for addressing global security threats, such as weapons of mass destruction (WMD) proliferation and terrorism, are growing.”³

By 2018, the new *Nuclear Posture Review* painted a very different picture. There has been, it asserted, “a rapid deterioration of the threat environment since 2010,” a “return to great power competition,” with “potential adversaries,” in particular, Russia and China, “expand[ing] and moderniz[ing] their nuclear forces” in ways designed to degrade the U.S. nuclear deterrent and its ability to defend regional allies.⁴ Both countries, the document claims, have “made clear they seek to substantially revise the post–Cold War international order and norms of behavior.”⁵

A quarter century earlier the collapse of the Cold War bipolar order had fractured the structure of power, but in an asymmetrical fashion. During the Cold War, in narrow military terms, the United States and its allies worried first about a “bomber gap” in the mid-1950s and then a “missile gap” in the early 1960s. Yet throughout the initial post–Cold War period, Russia, in more profound respects, had confronted a “security gap.” The threats to its national security, both real and conjured, were more immediate, large, and diverse than anything felt by the United States or its European allies.

For the United States, favored by the discrepancy in economic and military power over all others, the world’s dangers were omnibus, complex, and new, but they were scarcely a mortal threat and, for the most part, remained distant. Nuclear weapons were treated as secondary and, in response to most threats, irrelevant. Their object had become more an abstraction—insurance against the unknown—than an identifiable adversary or adversaries.

Russia, in contrast, saw the challenges posed by the outside world as far larger, near at hand, and embodied in the distinct form of the power and policies of a major state and its alliance partners. In a setting in which threats arose out of the rubble of what was once its security glacis, mounted by states again viewed as potential adversaries—indeed, where the greatest sources of instability touch its borders—nuclear weapons assumed a far more prominent place, both as underpinning for the status it claimed and as makeweight for the deficiencies in the country’s conventional military resources.

China’s relationship to the larger setting was different. It was already a rising power, eyed with apprehension by neighboring powers, determined to have a prominent, perhaps dominant role within its region and a significant voice globally, and locked in a delicate and uncertain balance with the one power that remained its superior. As the asymmetrical weight of the United States and China in international politics shrank, the fundamental asymmetry

3. *Ibid.*, v.

4. United States Department of Defense, *Nuclear Posture Review*, February 2018, 6–12.

5. *Ibid.*, 6.

in their nuclear capabilities added both uncertainty to the broad U.S.-China relationship and a new and potentially destabilizing dynamic to its nuclear component. Where before the nuclear factor had been consciously downplayed, leaving China, as its leaders wished, an afterthought in the high politics of the U.S.-Soviet nuclear contest, the role that it now sought and the challenges facing it, including from more than one nuclear power, inevitably heightened the significance of nuclear weapons in Chinese foreign policy. China mattered increasingly as not merely a global actor but as one with nuclear weapons.

In the case of India and Pakistan, their bilateral relationship was influenced less by the diffusion of power in a post-Cold War world than by the asymmetry in their rapidly growing conventional and nuclear forces. On the other hand, India's relationship with China and its nuclear dimension did reflect the rise of China in a piebald world, lengthening the shadow of their long-standing border conflicts and augmenting the effect of China's global thrust, including into the Indian Ocean.

At the same time, another reality was also taking shape. While academics argued over whether the post-Cold War international order was becoming unipolar, multipolar, uni-multipolar, or non-polar, among the nuclear-weapons-possessing states the geometry was also changing but more starkly.⁶ During the Cold War the international system was bipolar and, at its heart, so was its nuclear dimension. But this was not true in the new era. The bilateral character of the U.S.-Russian nuclear relationship was rapidly becoming trilateral as China's changing nuclear profile impinged on Washington's calculations and, at some level, presumably Moscow's as well. And the nuclear standoff between India and Pakistan was growing more complex, as both India and China transformed their nuclear forces in ways that had direct implications for the other side.

Over the forty years of the Cold War, leaders, defense planners, and pundits slowly came to understand the dynamics of a two-sided nuclear competition in a two-sided global setting—even if that setting began to lose its cohesion in its later years. But how were the dynamics of a many-sided nuclear world, with pairings and triangles multiplying, in a fractured international political setting to be understood?

In a nuclear world no longer shaped exclusively by two nuclear superpowers but by the actions of, at a minimum, five nuclear-armed states (China, India, Pakistan, Russia, and the United States), this change introduced one further complication: among the five states, three—China, India, and the United States—viewed themselves in three-way contests and saw themselves increasingly compelled to design their forces for dual nuclear adversaries. The other

6. Multipolarity is the description favored by most, but Samuel P. Huntington employed the more nuanced notion of uni-multipolarity in his "The Lonely Superpower," *Foreign Affairs* 78 (2) (March/April 1999): 35–49. Unipolarity has been much argued over by a number of scholars, but the most recent hedged discussion of the issue is Stephen G. Brooks and William C. Wohlforth, "The Rise and Fall of the Great Powers in the Twenty-first Century: China's Rise and Fate of America's Global Position," *International Security* 40 (3) (Winter 2015/16): 7–53. Richard Haass has argued that the current international system is essentially "nonpolar." See Richard N. Haass, "The Age of Nonpolarity: What Will Follow U.S. Dominance," *Foreign Affairs* 87 (3) (May/June 2008): 44–56.

two—Pakistan and Russia—remained focused on a single nuclear adversary, although for Russia it was a nuclear adversary with nuclear allies.

Finally, in the Cold War nuclear era, once France, Britain, and China acquired nuclear weapons, any one of them could have triggered a nuclear conflict. But the hierarchical character of the Cold War world order tightly subordinated that risk to the central contest between the United States and the Soviet Union. With the collapse of that order no such constraint existed. Among nuclear-weapons-possessing states a nuclear conflict could be ignited from multiple directions. Indeed, the likelihood of a nuclear weapon being fired in anger, until recently, seemed less likely in a core relationship, such as between Russia and the United States, than in the friction-laden relationship between India and Pakistan or from the unpredictable actions of a regime like that in North Korea. Here the loosening contours of the international political system had intersected with the shifting parameters of the nuclear world to make both less stable and less predictable.

In the end, however, whatever the underlying character or structure of the international system, its direct impact on developments within the world of nuclear powers and, in turn, their impact on it depend on the course of relations between and among these states. The United States and Russia have gone from a period of relative comity in the post-Cold War era to a period of hostility with key characteristics of a cold war, and the deterioration has the potential to alter profoundly their nuclear postures. After years of relative inattention to their nuclear forces and, on the U.S. side, little thought of countering a Russian threat, both countries are again investing in modernizing all elements of their nuclear forces. As their relationship turns confrontational, each is again adjusting its thinking and resources to meet the threat it sees from the other side.

If the uneasy balance in the U.S.-Chinese relationship were to shift decisively toward strategic rivalry—that is, if one or both were to define the other as a primary national security threat, orient their defenses in significant part against the other, and form alliances designed to counter the other—the impact on their military planning and the place assigned to nuclear weapons would be substantial. The 2018 U.S. *Nuclear Posture Review* moves in that direction.

On the periphery of relations among the main nuclear actors, a ninth nuclear entrant has brought new concerns to this landscape. The speed with which North Korea has moved through the end stage in developing nuclear weapons capable of striking U.S. allies and bases in Northeast Asia and, at some point, the United States itself has transformed a political-diplomatic standoff into a potential military crisis with the risk of escalation to nuclear war. Even if the worst is avoided, other than in the unlikely case that North Korea is completely disarmed, the challenge will be to manage one more nuclear dyad in an already complicated security environment that threatens to grow more so if others in the region follow the Democratic People's Republic of Korea's example.⁷

7. Scott D. Sagan, "The Korean Missile Crisis: Why Deterrence Is Still the Best Option," *Foreign Affairs* (November/December 2017): 72–82.

Thus, two decades into the new century, with the U.S.-Russian relationship sinking deeper into a cold war, with tensions continuing between India and Pakistan, with the adversarial tone rising in U.S.-Chinese relations, and with the Korean imbroglio intensifying, the relations among nuclear players are giving a darkening cast to the complexities and dangers that distinguish a new multipolar nuclear era from its earlier bipolar predecessor. The deterioration in key relationships tilts the synergy between the evolution of the larger setting and developments in the world of nuclear powers in a worrying direction.

AMBIGUITIES, DISCREPANCIES, AND DANGERS IN AN ASYMMETRICAL NUCLEAR UNIVERSE

Fitful change in the larger geopolitical setting, including potentially dramatic shifts in relations among the great powers, is carving a deep imprint on trends within this new multipolar nuclear era. In the first years after the Cold War, both the asymmetries resulting from the fracturing of a bipolar order and the contrasting way the United States and Russia were situated in the emerging order drove the two countries apart in their approach to nuclear deterrence.

During the Clinton administration, the United States began moving away from a “one-size-fits-all” notion of deterrence toward “tailored” deterrence.⁸ The preoccupation with a nuclear Russia faded and it was replaced by a greater concern over regional environments where, it was feared, local nuclear actors might in a crisis move swiftly by a variety of conventional and nonconventional means to create a *fait accompli*, and then checkmate a U.S. response with either a threatened or actual limited use of nuclear weapons.

By extension, maintaining the United States’ extended deterrence commitments emerged as the central concern in the Obama administration’s 2010 *Nuclear Posture Review*. It focused plans for missile defense and conventional strategic strike forces, justified blending conventional warfighting, cyber, and political elements into a new and more comprehensive conception of deterrence, and framed the role of nuclear weapons within it. The threat varied from Europe to the Middle East to Northeast Asia, but in all cases, while the specific combinations contributing to deterrence differed, they all included reliance on sub-strategic nuclear weapons in or near the region backed by the full force of a modernized U.S. strategic nuclear triad.

Russia, in contrast, continued to see nuclear deterrence in a more monochromatic fashion, but with a larger role for nuclear weapons. While the United States, as it shifted its focus to deterring a regional adversary armed with nuclear weapons, urged moving away from the Cold War notion of mutual assured destruction (MAD) to what some referred to as “mutual assured stability,” Russia

8. Brad Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century* (Stanford: Stanford University Press, 2015), 18.

remained wedded to the older notion.⁹ The purpose of its nuclear forces, as Alexei Arbatov and Vladimir Dvorkin noted, remained threefold: to retaliate when Russia “or its allies” were subject to an adversary’s nuclear first strike; to retaliate against an aggressor’s attack with chemical or biological weapons; and to counter an “imminent national catastrophe resulting from a conventional attack on Russia.”¹⁰ But the core task was war—not, as in the U.S. case, nuclear blackmail, nuclear brinkmanship, and the maneuvering of a nuclear-armed regional predator.

While the Russian emphasis too was on regional war and not a general or large-scale nuclear war, which Russian officials treated as unlikely, a sharp contrast existed between the U.S. and Russian approaches to conventional war-fighting and nuclear deterrence. In the U.S. case, conventional options—stand-off conventional strike forces, prompt global strike, weaponry in space, and improved intelligence, surveillance, and reconnaissance (ISR)—were viewed as adapting and enhancing nuclear deterrence. In the Russian case, adjusting nuclear deterrence—incorporating the use of sub-strategic nuclear weapons, developing weapons for “pre-nuclear deterrence,” and toying with the concept of escalating to nuclear use to de-escalate a conventional conflict—was intended to enhance its capacity to wage a conventional war.¹¹

That was then. The contrast has since narrowed. In the 2018 U.S. *Nuclear Posture Review*, while programmatic aspects remain largely unchanged, the assumptions underpinning them are dramatically different. Modernizing the U.S. triad is still a priority, but not as interim insurance pending progress toward global nuclear disarmament. Instead, it is key to U.S. nuclear deterrence, and U.S. nuclear deterrence is the cornerstone of U.S. national defense in a seriously deteriorating threat environment.

As before, the challenge of preserving extended nuclear deterrence is central, requiring a more thorough integration of nuclear and nonnuclear resources, but in this mix, the introduction of new nuclear weapons, such as sea-based cruise and low-yield ballistic missiles, is meant to enhance the nuclear component by reducing the constraints on nuclear use. The stress on flexibility, the role of conventional weapons in nuclear deterrence, and the importance of keeping technological options open is not treated, as earlier, as part of an evolution away from nuclear deterrence, but as recognition that nuclear deterrence provides a margin of safety that conventional deterrence cannot.

9. International Security Advisory Board, *Report on Mutual Assured Stability: Essential Components and Near Term Actions*, U.S. Department of State, August 14, 2012, <http://www.state.gov/documents/organization/196789.pdf>. See also Celeste A. Wallander, “Mutual Assured Stability: Establishing US-Russia Security Relations for a New Century,” Atlantic Council Strategic Analysis, July 29, 2013.

10. Alexei Arbatov and Vladimir Dvorkin, *The Great Strategic Triangle*, Carnegie Papers (Washington, D.C.: Carnegie Endowment for International Peace, April 2013), 16.

11. Andrei Kokoshin, *Ensuring Strategic Stability in the Past and Present: Theoretical and Applied Questions* (Cambridge, Mass.: Belfer Center for Science and International Affairs, Harvard Kennedy School, June 2011), 57–58.

The 2018 *Nuclear Posture Review*, like its predecessor, emphasizes that “there is no ‘one size fits all’ for deterrence.” Therefore, “the United States will apply a tailored and flexible approach to effectively deter across a spectrum of adversaries, threats, and contexts.”¹² But while the “spectrum” includes North Korea, Iran, and terrorist organizations, the tailoring is now focused on major adversaries bent on far-reaching geopolitical change and armed with substantially enhanced nuclear capabilities.

Meanwhile other changes also have shrunk the earlier gap between U.S. and Russian approaches to nuclear deterrence. Like the previous U.S. position, Russia now emphasizes the importance of relying less on nuclear deterrence by strengthening nonnuclear deterrence. In early 2017 Russian Defense Minister Sergei Shoigu, as if taking a page from the Obama administration, boasted that, because of Russia’s rapid development of precision-guided conventional weapons, the country’s nonnuclear forces would increasingly substitute for nuclear weapons, eventually fully providing for the country’s national security.¹³

In this respect, the post-1999 much discussed Russian concept of using nuclear weapons to de-escalate a conventional military conflict, had it ever been official strategy, was receding at the same time the United States was giving greater attention to developing sub-strategic nuclear weapons to counter it. An artifact of the period when Russian conventional forces were weak, and apparently never incorporated into operational war plans, it faded as Russian defense planners began to stress a broader notion of strategic deterrence, one combining nuclear deterrence with conventional forces and even nonmilitary assets, such as information warfare and economic leverage.¹⁴ Yet this did not mean Russia had stopped thinking about the limited use of nuclear weapons, however that might be defined. On the contrary, like the United States, in the weapons it now featured, Russia concentrated on those whose characteristics increased both their usability and their interoperability with conventional alternatives.

Russia, like the United States, embraced the need for “tailored” deterrence, and its notion of it included a role for precision-guided, dual-capable cruise missiles and sub-strategic weapons. Here, however, its inspiration put the two countries at cross purposes that increased the possibilities for miscalculation. In the U.S. case, tailored deterrence is meant to rescue its beleaguered extended deterrence commitments against multiple adversaries in different, but increasingly complex, environments. Russia is preoccupied with strengthening its national strategic deterrent against a single adversary in one critical strategic arena—Europe. The trigger for the United States is an adversary intent on using its nuclear leverage to blackmail a weaker neighbor or neighbors, or on seizing

12. *Nuclear Posture Review*, 2018, vii–viii.

13. Zaki Shaikh, “Russians Working on Non-nuclear Deterrence,” Anadolu Agency, January 30, 2017, <http://aa.com.tr/en/analysis-news/russians-working-on-non-nuclear-deterrence/737881>.

14. Kristin Ven Bruusgaard, “The Myth of Russia’s Lowered Nuclear Threshold,” War on the Rocks, September 22, 2017, <https://warontherocks.com/2017/09/the-myth-of-russias-lowered-nuclear-threshold/>.

territory and then using nuclear threats to paralyze a response. The trigger for Russia is U.S. plans to tailor the development and use of nuclear weapons to allow it to exploit its conventional arms advantage in a European crisis. Symmetry in the case of “tailored deterrence” has the potentially perverse effect of reducing the barrier to early nuclear use by one or both sides.

In other respects, however, Russia and the United States are distinctive in the positions they share beyond their long-standing uneasy reconciliation with mutual assured destruction. They refuse to accept mutual deterrence as the basis for their relationships with other nuclear powers—most notably China.¹⁵ In part this is the inertia of attitudes formed during an earlier era, but, more tellingly, the fact is neither country is eager to acknowledge that its nuclear relationship with China rests on “mutual vulnerability.” Second, both reject pledging that they will not be the first to use nuclear weapons. As stated in the 2018 *Nuclear Policy Review*, “the United States has never adopted a ‘no first use’ policy and, given the contemporary threat environment, such a policy is not justified today. It remains the policy of the United States to retain some ambiguity regarding the precise circumstances that might lead to a U.S. nuclear response.”¹⁶ Russia’s position is equally explicit. Beginning with its 2000 military doctrine, it reserves “the right to use nuclear weapons . . . in response to large-scale aggression utilizing conventional weapons in situations critical to the national security of the Russian Federation.”¹⁷

Both countries also reject the principle that the “sole purpose” of their nuclear weapons should be to deter a nuclear attack. The United States in its formally articulated nuclear posture insists on retaining the right to respond to a nonnuclear attack on itself or its allies with nuclear weapons, and has in its most recent iteration broadened the categories (e.g., to include critical infrastructure) and forms of attack (e.g., potentially cyber) that could be subject to nuclear retaliation. Russian military doctrine, as noted, expressly sanctions the use of nuclear weapons in retaliation for a chemical or biological attack on itself or its allies (as does its U.S. counterpart), as well as a fundamental “threat to the state’s existence” in a conventional war.¹⁸ Again, as in other respects, the hardening of tensions between Russia and the United States, together with the threats a fracturing nuclear world poses, exert a negative effect—in this case by

15. Arbatov and Dvorkin, *The Great Strategic Triangle*, 13.

16. *Nuclear Posture Review*, 2018, 22. During the Obama administration the rationale for adjuring a no-first-use posture was that it was necessary to assure allies, and, hence, dull their desire to develop nuclear weapons of their own.

17. “Russia’s Military Doctrine,” *Arms Control Today*, May 1, 2000, trans. U.S. Foreign Broadcast Information Service from *Nezavisimaya Gazeta*, April 22, 2000, https://www.armscontrol.org/act/2000_05/dc3ma00.

18. The reformulation in the 2010 and 2014 Russian military doctrine. An English translation of the 2010 doctrine is available at https://carnegieendowment.org/files/2010russia_military_doctrine.pdf. An English translation of the 2014 doctrine is available at: <https://www.scribd.com/doc/251695098/Russia-s-2014-Military-Doctrine>.

raising the already considerable barriers to transforming the principle of no first use and sole purpose into universal nuclear norms.

China now adds a third dimension to the central U.S.-Russian nuclear relationship, at the same time that it complicates the Indian-Pakistani nuclear relationship. Like Russia and the United States, China bases its approach to nuclear deterrence on “assured retaliation.” Unlike Russia and the United States, however, but like India, it has committed itself to a doctrine of minimum deterrence and no first use of nuclear weapons. As a result, the asymmetries at both the international political and the nuclear level generate tension.

Over the last decade the rise of China as a great power has also featured the development of nuclear forces with a genuine, albeit rudimentary, capability of assured retaliation. In this context, it matters to the Chinese that the United States appears unwilling to accept a relationship of mutual vulnerability. Even more, as a number on the Chinese side argue, the United States is bent on a force modernization effort intended to give it “nuclear primacy”—that is, a combined offensive-defensive advantage allowing it to strike with nuclear weapons without fear of significant nuclear retaliation.¹⁹

China’s initial and likely further steps to preserve an assured retaliatory capability against the United States—by enlarging and modernizing its intercontinental ballistic missile (ICBM) force, developing a sea-based deterrent, and exploring missile defense—in turn stir Indian concerns. How real is the Chinese commitment to minimum deterrence, wonder Indian observers, when the country is increasing the number and accuracy of its ICBMs, adding multiple independently targetable reentry vehicle (MIRVed) missiles, and testing hypersonic weapons technologies?²⁰ What stock is to be put in the Chinese pledge of no first use, if in order to minimize the vulnerability of China’s assured retaliatory capability, some Chinese are debating the virtues of a launch-on-warning option?

Generally, the parallel commitment of China and India to minimum deterrence and a no-first-use posture has been seen as stabilizing. At one level it is, but it still leaves China’s Second Artillery Force (now the People’s Liberation Army [PLA] Rocket Force) targeting India’s cities and key strategic sites, and, since at least 2009, the Indian Army “preparing for a two-theater war with Pakistan and China under nuclear conditions.”²¹ Here too, however, the rapidly growing nuclear capacities of India and China, as each pursues advanced offensive and defensive capabilities serving what will be the world’s third and fourth nuclear triads, in the context of each country’s growing international ambitions, casts a different light on their core postures, particularly when the mistrust and military tension in the bilateral relationship remain.

19. Fiona S. Cunningham and M. Taylor Fravel, “Assuring Assured Retaliation: China’s Nuclear Posture and U.S.-China Strategic Stability,” *International Security* 40 (2) (Fall 2015): 7–50.

20. Srikanth Kondapalli, “Revisiting No First Use and Minimum Deterrence: The View from India,” in *The China-India Nuclear Crossroads*, ed. and trans. Lora Saalman (Washington, D.C.: Carnegie Endowment for International Peace, 2012), 58.

21. *Ibid.*, 63. Kondapalli is citing a statement by the Indian Army Chief General Deepak Kapoor.

Among the conflicting approaches to nuclear deterrence separating nine nuclear actors, the most unsettling are those in the Indian-Pakistani relationship. Each speaks of “credible” minimum deterrence, offered as justification for pressing to create a secure second-strike capability (although Pakistan’s altered notion of “full-spectrum” deterrence—that is, the threat to use battlefield nuclear weapons against a conventional attack—rather warps the concept). And each has set about building an air, land, and sea triad. Theoretically, both developments should be stabilizing. A secure second-strike capability will eliminate the highly unstable character of first-generation nuclear forces that depended on a limited number of aircraft to deliver a nuclear strike, and a triad helps to mitigate Pakistan’s strategic depth problem. But one similarity and two dissimilarities cloud this reality. The similarity resides in the four to six minutes it would take for a nuclear weapon to reach the capitals and major population centers in both countries, overwhelming even the most sophisticated early-warning system.

The dissimilarities are more portentous. In India nuclear decision-making occurs under a single national civilian command: the Political Council of the Nuclear Command Authority, chaired by the prime minister. It is not clear if this is also the case in Pakistan. Technically, decision authority there is invested in the Employment Control Committee of the National Command Authority, a multi-member group that supposedly can act only on the basis of consensus, but the suspicion lingers that the military’s finger is near the nuclear trigger.

The imbalance in the military balance, however, carries the most significant implications. Because of India’s assumed conventional military superiority, Pakistan from the outset has reserved the right to respond to a conventional attack with nuclear weapons, and it refuses to reciprocate India’s no-first-use position. Since 2004, when the Indian Army announced a so-called “Cold Start” conventional strategy—that is, the formation of smaller, rapid-reaction, forward-deployed battle units (although with limited follow-up)—Pakistan has threatened to respond to advancing conventional forces with battlefield tactical nuclear weapons, and has begun rapidly developing a short-range tactical ballistic missile, the Nasr, to deliver them.²² Indian officials have stressed that India will answer any use of nuclear weapons with “punitive” nuclear retaliation.²³ Assuming that Pakistan would then respond in kind, the prospect of a large-scale, countervalue nuclear war becomes real.²⁴

22. Jaganath Sankaran, “Pakistan’s Battlefield Nuclear Policy: A Risky Solution to an Exaggerated Threat,” *International Security* 39 (3) (Winter 2014/15): 118–151.

23. Indian spokesmen and India’s formal doctrine abjure the use of the phrase “massive retaliation.” How close “punitive” is to “massive” remains unclear.

24. Privately some senior Indian defense officials suggest that actual operational plans contain a range of options, from “nuclear demonstrations shots” to “tactical use against military area targets on the conventional battlefield” to “use against other counterforce targets.” If so the discrepancy with the formal public posture scarcely contributes to stability. Ashley J. Tellis, quoted in Gaurav Kampani, “India’s Evolving Civil-Military Institutions in an Operational Nuclear Context,” Carnegie Endowment for International Peace, June 30, 2016.

The perils in India's and Pakistan's evolving nuclear postures may be the most immediately and palpably disturbing, but the risks and complexities now reverberating through many dimensions of this multipolar world and among its other actors also are mounting. The intersecting contrasts in a mutating international setting and a fragmenting universe of nuclear weapons states come together most consequentially in three related contexts: the prospects for crisis stability, plans if deterrence fails, and notions of victory in war.

CRISIS STABILITY

In its simplest meaning, crisis stability in a world of nuclear powers exists when in a political-military crisis the incentive to use a nuclear weapon is low or non-existent. This is normally thought of as assured when nuclear adversaries have a secure (nuclear) second-strike capability. The lesser version with lower requirements imagines that each nuclear-armed state in a crisis would have options, nuclear or otherwise, discouraging the other side from using nuclear weapons first. Crisis stability conceived in these terms may make sense in a dyadic relationship, but does it make sense in more complex configurations? What would it require? How would it be executed?

In the present international context, for all the change underway, the risk of a nuclear confrontation between more than two countries may seem merely hypothetical, but the fact that Indian military leaders think in terms of a two-front war against Pakistan and China “under nuclear conditions” makes the hypothetical seem less remote. And were today's amorphous, but deteriorating, international setting to give way to unambiguous strategic rivalry among major powers—foremost the United States and China in parallel with an adversarial U.S.-Russian relationship—the hypothetical would weaken further.

The challenges to crisis stability, however, are already written into the intricate nexuses marking a multipolar nuclear world. Even in the most settled nuclear relationship—that between the United States and Russia—they are resurfacing. When the United States shifted the focus of its nuclear posture from the standoff with the Soviet Union to shoring up deterrence in critical regional contexts, it embraced a more comprehensive approach in which nuclear weapons were only one element. To deal with the stages of an escalating regional crisis, whether with North Korea, a future nuclear-armed Iran, China, or Russia, it placed increasing emphasis on rapid-reaction conventional forces, conventional-strike forces, limited ballistic missile defense, cyber and space defense, and an enhanced division of labor with defense partners.²⁵ In this mix, the nuclear component was “tailored” to the region, but in most instances it included present or readily available sub-strategic nuclear weapons.

25. This is discussed in Brad Roberts, “The New Regional Deterrence Strategy,” in Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century*, chap. 3.

From a U.S. perspective, this evolution was meant to diminish the importance of nuclear weapons and strengthen strategic stability with Russia and China, while giving the United States and its allies flexibility and an appropriate counter to any move an adversary might contemplate—from political blackmail by nuclear intimidation to a swiftly executed *fait accompli*, to an escape from a conventional conflict gone bad by limited nuclear escalation.

Seen from Moscow, all of this was judged quite differently. Technically qualified Russians might have understood that elements of this program, such as limited missile defense and conventional prompt global strategic strike weapons, did not in their present form threaten Russia's nuclear deterrent, but Russia's leadership appeared to view these steps as of a package aimed eventually at neutralizing Russia's nuclear defenses and giving free range to the use of U.S. conventional forces.²⁶

Framing the issue in these terms did not imply that crisis stability was yet menaced—only that, from a Russian perspective, if the United States continued down this road, it might be in the future. What it did now, however, was threaten arms race stability. If Russian leaders were serious about the potential threat they saw in U.S. efforts—or, alternatively, security and military-industrial interests were simply seizing an opportunity—the Russian response seemed sure to stimulate U.S. countermeasures. And so it has.

The Russian side has justified the development of the heavy, MIRVed, liquid-fueled, silo-based “Sarmat” ICBM replacement for the SS-18 “Satan” missile as ultimate insurance guaranteeing its ability to penetrate any ballistic missile defense that the United States might build. But in the context of Russian efforts to modernize its entire ICBM force, introduce a new fourth-generation nuclear-powered ballistic missile submarine (SSBN) armed with new, independently maneuverable nuclear missiles, a modernized Tu-160 bomber, and in the future perhaps a PAK-DA stealth bomber with advanced air-launched cruise missiles (ALCMs), the U.S. defense community now treats it as an ambitious program to put at risk key elements of the United States' nuclear deterrent. Presumably so will the U.S. side also interpret the new Russian long-range, standoff, air-launched high-precision cruise missiles, particularly the Kh-102, its nuclear variant, as a bid to achieve escalation dominance in the initial phases of a conventional conflict.

Earlier the United States might have responded to much of this with greater equanimity, treating a good many of these systems as part of a normal replacement process. Now, however, as the two countries sink back into cold war, the

26. Vladimir Dvorkin cites an article in *Voенно-Промышленный Курьер* (*Military-Industrial Courier*) in which experts offer “detailed calculations that demonstrate the impossibility of simultaneous high-precision cruise-missile strikes against even one of the Strategic Missile Force sites in the European part of Russia.” See Dvorkin, “Risky Contradictions: Putin’s Stance on Strategic Arms and Missile Defense,” Carnegie Moscow Center, February 10, 2016, <http://carnegie.ru/commentary/2016/02/10/risky-contradictions-putin-s-stance-on-strategic-arms-and-missile-defense/itq8>.

effort is assessed quite differently, underscoring how central the political factor is in shaping key nuclear trends.

Moreover, in the penumbra of a U.S.-Russian relationship turned adversarial, there is another pathway to crisis instability. Most likely it does not pass through the vague but hypertrophied notion that agitates much of contemporary Western analysis—that is, that Russia believes that in a conventional war with NATO the violence can be “de-escalated” by the limited use of nuclear weapons.²⁷ That idea, as noted earlier, had play after the 1999 Kosovo War, when Russian military analysts were struggling to address Russia’s conventional force inferiority, but the evidence that it was ever what Western observers understood it to be, let alone a concept integrated into operational war planning, remains murky.²⁸

Less noticed, however, is a new factor uniting the menacing turn in U.S.-Russian relations with a major strategic military development whose nuclear dimension heightens the risk of inadvertent nuclear war. For some time U.S. defense planners have worried that China is building a capability that would allow the PLA to deny U.S. military forces access to the South China Sea and the Sea of Japan, and eventually to the area within the “second island chain” bordering the Philippine Sea. These are operating areas critical to U.S. security guarantees to South Korea and Japan. The strategy is called anti-access/area denial (A2/AD), and it incorporates modernized cruise and ballistic missiles, including potentially hypersonic glide vehicles and aircraft, as well as the intelligence, surveillance, target acquisition, and reconnaissance facilities (ISTAR) needed to operate them. More recently the United States and its NATO allies have begun to focus on a comparable Russian threat in Europe. New Russian land- and sea-based precision-guided cruise missiles, forward-deployed sub-strategic ballistic missiles, and the planned ballistic missile defense system A-235, they fear, create an A2/AD problem compromising their ability to defend the eastern portion of the alliance from the Baltic Sea to the Black Sea.

Over the same period, on the other side, Russian defense planners have placed the accent on “air-space attack” as a principal threat to their country. As one Russian source puts it, “air-space itself will become the main and, at times, the only sphere of armed conflict. In these circumstances the enemy will get the opportunity to inflict coordinated, in time and space, high-precision strikes against virtually all targets on Russian territory, and indeed across the entire

27. Nikolai N. Sokov, “Why Russia Calls a Limited Nuclear Strike ‘De-escalation,’” *Bulletin of the Atomic Scientists*, March 13, 2014, <https://thebulletin.org/why-russia-calls-limited-nuclear-strike-de-escalation>.

28. Olga Oliker has argued that formal Russian military doctrine, most military exercises, and arms modernization did not suggest that “escalate to de-escalate” was, in fact, actual Russian strategy. Nor, she argues, are there clear signs that Russia has in reality lowered the nuclear threshold. Olga Oliker, *Russia’s Nuclear Doctrine: What We Know, What We Don’t, and What That Means* (Washington, D.C.: Center for Strategic and International Studies, May 2016), https://csis-prod.s3.amazonaws.com/s3fs-public/publication/160504_Oliker_RussiasNuclearDoctrine_Web.pdf.

world.”²⁹ The war the Russians anticipate centers on the United States’ precision-guided cruise and ballistic missiles, aircraft, and space resources, and begins with a heavy conventional assault, but at some point goes nuclear.

A strategy designed to impede or prevent an adversary’s control over the strategic approaches to the homeland is not a new phenomenon. The Soviet Union through the last half of the Cold War strove to erect a three-thousand-kilometer land and sea defense perimeter around itself.³⁰ But the contemporary A2/AD issue represents something new, not merely because it involves two different potential adversaries in two different strategic arenas—one maritime, the other on land—but, in the Russian case, because of the way it intersects with Russia’s preoccupation with air-space war.

In both cases, each expects a war to begin at the conventional level: the United States as the result of Russian aggression, whether open or surreptitious, against an adjacent NATO ally or allies. Russia’s A2/AD potential makes what is suddenly a more complex U.S. extended deterrence commitment still more complicated, and provides further justification for weapons systems such as the proposed Long Range Standoff air-launched cruise missile (LRSO) and the new nuclear precision-guided gravity bomb B61-12. The Russians, for their part, speak of a large-scale air and space attack similar to, only massively more elaborate than, the air war waged against Serbia in the 1999 Kosovo crisis.

To defeat the threat that each now ascribes to the other, each counts heavily on dual-use cruise and ballistic missiles and aircraft. While each assumes its own use of these weapons, at least at the outset of the conflict, would be in a conventional mode, nothing guarantees that the other side will be sure the attack is not nuclear and will not react accordingly. Moreover, when nuclear armed, these weapons are more accurate with lower yields and are designed for limited use. For example, presumably as part of a Russian A2/AD strategy, the Iskander-M nuclear-capable sub-strategic missile slated for permanent deployment in the Kaliningrad region would be targeted on the U.S. ballistic missile defense site planned for Poland. The U.S. nuclear-armed LRSO is defended sometimes as needed in order to blast a hole in an opponent’s air defenses, permitting U.S.

29. Andrei Demin, et al., “Sereznoi ugroze adekvatnyi otvet. Osnovnoi sferoi vooruzhennoi borby stanet vozdušno-kosmicheskoe prostranstvo” [An appropriate response to a serious threat. The main area of armed conflict will be the air-space theater], *Vozdušno-kosmicheskaya oborona*, August 13, 2012, quoted in Alexey Arbatov, Vladimir Dvorkin, and Petr Topychkanov, “Entanglement as a New Security Threat: A Russian Perspective,” in *Entanglement: Russian and Chinese Perspectives on Non-nuclear Weapons and Nuclear Risks*, ed. James Acton (Washington, D.C.: Carnegie Endowment for International Peace, 2017), 14. This is the most careful analysis of the Russian notion of air-space war available in English.

30. Christopher Cowan, “A2/AD—Anti-Access/Area Denial,” RealClearDefense, September 12, 2016, https://www.realcleardefense.com/articles/2016/09/13/a2ad_-_anti-accessarea_denial_110052.html.

strategic aircraft to complete their missions.³¹ In addition, on the U.S. side, there is a case for weapons that allow the United States to wage limited nuclear war to increase a president's decision-making flexibility and enhance nuclear deterrence. On the Russian side, the case is made that the limited use of nuclear weapons may be necessary, if Russia's defenses are overwhelmed in a large-scale air-space attack.³²

Further complicating the issue, as technology advances and the United States and Russia alike develop advanced conventional strategic strike weapons, including precision-guided hypersonic cruise missiles and hypersonic boost-glide vehicles, each places greater emphasis on nonnuclear deterrence. In this case, nonnuclear deterrence heightens the risk of "entanglement"—that is, once the firing begins attacks intended to destroy conventional weapons and their support systems may unintentionally hit colocated or dual-capable nuclear weapons and their command-and-control networks, including early-warning satellites, triggering an escalation to nuclear war.

The danger grows because advances in conventional cruise and ballistic missiles and potentially hypersonic boost-glide vehicles make their use against softer nuclear weapons targets and their associated facilities—as well as for a "decapitation strike" against national leadership—plausible. This blurring of the line between conventional and nuclear war adds to the risk that, in a crisis, if one or both sides act on the fears and calculations generated by the matrix of new threat analysis, weapons advances, and shifting attitudes toward nuclear use, the result could be, as Barry Posen long ago warned, inadvertent escalation to major nuclear war.³³

If the shadow of crisis instability again darkens the U.S.-Russian nuclear relationship, it is potentially an equally acute matter in U.S.-China relations. The two realms—geopolitical and nuclear—intersect in this case in a less crystallized but more portentous way. At the geopolitical level, U.S.-Chinese relations do not suffer the sharp hostility now marking U.S.-Russian relations, but the implications, were this relationship to veer toward unambiguous strategic rivalry, are immense, and the uncertainty over whether that could happen grows steadily. Uncertainty at this level suffuses a rapidly evolving nuclear relationship with meanings that were absent when China remained in the shadows and its nuclear forces an afterthought. It bears on crisis stability both in a grand, if distant, sense and in a more concrete and immediate sense.

31. Former U.S. Secretary of Defense William Perry, when serving as undersecretary of defense, engineered the development of the prior ALCM program. He now argues strenuously against acquiring the LRSO because of the "significant risk" it poses of "miscalculation and unintended escalation" to nuclear war, since the other side would not know when it was fired whether it was conventionally or nuclear armed. William J. Perry and Andy Weber, "Mr. President, Kill the New Cruise Missile," opinion, *Washington Post*, October 15, 2015.

32. Arbatov, Dvorkin, and Topychkanov, "Entanglement as a New Security Threat," 19.

33. Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, NY: Cornell University Press, 1991).

On the first score, China's basic nuclear position—its commitment to minimum deterrence and its so-called “lean and effective” posture, coupled with a determination to possess an assured retaliatory capability—is suspended somewhere between the non-credible and the destabilizing. To boost a secure second-strike capability China's ICBM program has advanced considerably, but remains vulnerable. Being able to reach parts or all of the United States with as many as seventy missiles, ten of which are MIRVed, has stirred the United States' attention. And China's ambitious program to begin deploying the road-mobile DF-41 ICBM, expected to carry up to ten MIRVed warheads, a MIRVed version of the DF-31A ICBM, and a new JL-2 submarine-launched ballistic missile (SLBM) for the second-generation Jin-class SSBN, promises to increase substantially the destructive power and flexibility of its nuclear forces.

If the Chinese leadership were confident that all sixty ICBMs would reach their U.S. targets or, if in doubt, that the new weapons systems soon coming online will be able to do so, a secure second-strike capability would be in place, and between the two countries strategic stability qua MAD would have arrived. But neither condition—now nor near term—is a sure thing. Unless China, as some have speculated, may have hundreds of uncounted missiles secreted away in the sprawling tunnel system it has constructed, its relatively small number of fixed, liquid-fueled ICBMs, thirty-two road-mobile DF-31A ICBMs, and few limited-range SSBNs would not likely survive a concentrated nuclear attack by the United States.³⁴

Moreover acquiring a genuine assured retaliatory capability for China may be an ever-receding prospect. Worse, its efforts to achieve qualitative, if not quantitative, strategic parity with the United States, combined with U.S. weapons advances blocking its path, risk still greater instability in a future crisis. Chinese leaders, as noted earlier, apparently believe the United States is straining to achieve “absolute security” through “nuclear primacy.” At the same time, while they evidently worry that U.S. efforts, including a persistent attempt to create a thick, integrated, multilayered missile defense system, advances in its ISR capabilities, and the further perfection of conventional strategic strike forces, could at some point imperil China's nuclear deterrent, they remain ostensibly confident that for now the difficulty of locating all of their nuclear missiles and the ambiguity produced by the nontransparency of their nuclear forces and strategic thinking remain adequate to deter the United States.

It may be something of a gamble, particularly since the rapid advances China is making in all aspects of its nuclear arsenal are being matched by the qualitative transformation of the U.S. strategic deterrent. Over the last ten years, the United States has continued to develop capabilities, particularly in the accuracy of weapons and remote sensing, that may put at risk the ways China would ensure, and Russia has ensured, the resilience of its nuclear retaliatory forces. In its extreme form, Daryl Press and Keir Lieber call it the “counterforce

34. Arbatov and Dvorkin, *The Great Strategic Triangle*, 10.

revolution.”³⁵ They argue that the enhanced accuracy of U.S. delivery systems and improved U.S. ability to locate and track opposing nuclear forces, coupled with the reduced size of the Russian force and the small size of the Chinese force, give the United States the theoretical possibility of executing a disarming first strike.

Whether this is so or not (Press and Lieber admit that against Russia in a real-world situation—i.e., in a crisis with Russian forces on alert—it is not) does not end the issue.³⁶ What China (and Russia) make of these developments, quite apart from U.S. intentions or actual capabilities, is what matters: that is, what they make of the modified Trident II SLBM whose circular error probable (CEP) has reportedly been reduced four-fold with a new fuze system on the W76-1 warhead/Mk4A reentry vehicle; or the U.S. Air Force’s interest in kinetic orbital strike capabilities against targets in space and land; or the growing talk of a space-based ballistic missile defense system;³⁷ or the prospect that the United States’ stress on nonnuclear deterrence means it now seriously intends to develop conventional counterforce weapons; or the U.S. plans to replace the platforms in all three parts of the triad rather than live within the Life Extension Program for some existing systems.

For China, in particular, the overall U.S. effort gives special resonance to what its leaders imagine may be the threat posed by U.S. ballistic missile defense and its emphasis on conventional precision-guided long-range strike capabilities. China almost certainly will take measures to counter any degradation of its efforts to develop an increasingly formidable assured retaliatory capability. Because China, as Russia, has the capacity to duplicate virtually any of the new technological directions taken by the United States, albeit with a lag, arms race instability looms in the future.

Yes, the Chinese insist they will not allow themselves to be drawn into a nuclear arms race, and that they intend to continue steering the course they are on. But it remains to be seen, if the core U.S.-China relationship veers toward increasing military hostility, whether this will hold. If not, in all likelihood an arms race between China and the United States, focusing particularly on the nuclear dimension, will unfold asynchronously, creating interludes of feared vulnerability on one side or the other. And in a competition that expands into new realms—space, offense-defense, lowered nuclear thresholds—the uneven incidence of the vulnerability feared will heighten the risk of crisis instability. Moreover, the moves and countermoves of the United States and China will, whatever currently is the level of Russian equanimity, eventually force Russian

35. Keir A. Lieber and Daryl G. Press, “The New Era of Nuclear Weapons, Deterrence, and Conflict,” *Strategic Studies Quarterly* 7 (1) (Spring 2013): 3–12.

36. Keir A. Lieber and Daryl G. Press, “The End of MAD? The Nuclear Dimension of U.S. Primacy,” *International Security* 30 (4) (Spring 2006): 8.

37. Sydney J. Freedberg, “Space-Based Missile Defense Can Be Done: DoD R&D Chief Griffin,” *Breaking Defense*, August 8, 2018, <https://breakingdefense.com/2018/08/space-based-missile-defense-is-doable-dod-rd-chief-griffin>.

defense planners to focus on a two-sided challenge—and the triangular effects of the new nuclear era will then be real.

In the meantime, the source of crisis instability in a confrontation between the United States and China already exists. In its narrowest form it arises because China has begun deploying its main medium-range ballistic missiles (the DF-21C and DF-21D) in a conventional mode. As Hans Kristensen and Robert Norris note, “This potentially dangerous mix of nuclear and conventional missiles increases the risk of misunderstanding, miscalculation, and mistaken nuclear escalation in a crisis.”³⁸ As mentioned earlier, entanglement is a new pathway to U.S.-Russia nuclear war, and it exists as well in the U.S.-China relationship.³⁹

In a conventional war over Taiwan or the South China Sea region, given U.S. concerns with the A2/AD threat that China poses, any U.S. plans to attack—in all likelihood preemptively—Chinese aircraft bases, cruise missile sites (including mobile missile launchers), and the defense radars and command-and-control sites serving them could well be interpreted by the Chinese as the initial phase of a disarming nuclear first strike.⁴⁰ Or, alternatively, China at the outset of a conventional war with the United States might try to blind U.S. satellite communication facilities that are key to naval operations, which provides one explanation for China’s extensive efforts in anti-satellite (ASAT) technology.⁴¹ But these resources are also critical to the U.S. early-warning satellite system protecting against a nuclear attack.

In the midst of an evolving multipolar nuclear world, crisis instability nowhere looms more menacingly than in the Indian-Pakistani nuclear relationship. As already noted, in its rawest form the instability stems from the tensions between the two countries and the realistic possibility of war, with growing

38. Hans M. Kristensen and Robert S. Norris, “Chinese Nuclear Forces, 2015,” *Bulletin of the Atomic Scientists* 71 (4) (2015): 79.

39. For a Chinese perspective on this risk, see Tong Zhao and Li Bin, “The Underappreciated Risks of Entanglement: A Chinese Perspective,” in Acton, ed., *Entanglement*, 47–76.

40. This was apparently envisaged in the United States’ original Air-Sea Battle Concept. Whether it still is in its unmemorable replacement, the Joint Concept for Access and Maneuver in the Global Commons (JAM-GC), is less clear. The JAM-GC reads, “Whereas the ASB concept was designed to counter emerging A2/AD challenges and hinged on a ‘disrupt, destroy, defeat’ approach to specific adversary A2/AD capabilities, JAM-GC is focused on defeating an adversary’s plan and intent, rather than just concentrating on dismantling adversary A2/AD capabilities.” http://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-84/jfq-84_134-139_Hutchens-et-al.pdf?ver=2017-01-27-091816-550. A copy of the ASB Concept is available at <http://archive.defense.gov/pubs/ASB-ConceptImplementation-Summary-May-2013.pdf>.

41. The U.S. early-warning satellite system and key communications and signals intelligence systems operate in Geosynchronous Earth Orbit and Highly Elliptical Orbit at an altitude of 36,000 km. As a result, there is an increasingly vigorous U.S. debate underway over whether China, notwithstanding its apparently ambitious efforts in this sphere, is close to having the capability of attacking satellites at this altitude on the scale and complexity that would be required to be effective. For a skeptical assessment see Jaganath Sankaran, “Limits of the Chinese Antisatellite Threat to the United States,” *Strategic Studies Quarterly* (Winter 2014): 19–48. For the other side, see Bill Geertz, “China’s Great Leap in Space Warfare Creates a Huge New Threat,” *Asia Times*, September 13, 2017.

nuclear arsenals on both sides and plans for their use—in particular, Pakistan’s apparent and reckless intentions to use battlefield nuclear weapons against superior Indian conventional forces.⁴²

The specific scenarios for what may happen described by experts dramatize what crisis instability really looks like. Of four possible scenarios, the first postulates that India might withdraw its troops from Pakistan after suffering the destruction from a single salvo of battlefield tactical nuclear weapons, calculating that having “managed to cause the obliteration of a part of Pakistan, with civilian deaths in the thousands, while losing only a portion of a regiment or brigade,” it had exacted adequate punishment for a Pakistani-originated terrorist attack.⁴³ The second scenario assumes that India would take the hit and press on, facing the Pakistanis with a choice of attempting to avoid conventional defeat by launching larger numbers of battlefield tactical nuclear missiles or by escalating to a strategic nuclear attack on Indian military garrisons.⁴⁴ And up the ladder it goes. If India acts as it promises to, and answers the use of any nuclear weapon with large-scale nuclear retaliation, the first of these scenarios is impossible; for the other three, it is simply a question of the path and speed by which the conflict escalates to a full-scale nuclear war.

There are, however, other threats to crisis stability in the Indian-Pakistani relationship and by extension in the U.S.-Chinese relationship that are less obvious. Theory argues that nuclear triads enhance strategic stability by providing redundant capabilities, flexibility in use, and security against attack. But these advantages fall away when countries are in the early stages of developing a triad. When the legs of the triad develop unevenly, as is the case with China, India, and Pakistan, redundancy is weak, flexibility is limited, and the security of the deterrent’s primary arm is menaced. For all three countries their land-based ballistic missile systems (along with aircraft in the Indian and Pakistani cases) serve this core function, and, when limited in size and in fixed locations, they are vulnera-

42. To be sure, Pakistan’s precise plans are not entirely clear and apparently in some flux. In peacetime the missile system remains de-mated and out of the field of operations, but surging them toward the battlefield during a crisis and the logic of pre-delegated authority contain their own hazards. See Mansoor Ahmed, “Pakistan’s Tactical Nuclear Weapons and Their Impact on Stability,” Carnegie Endowment for International Peace, June 30, 2016, <http://carnegieendowment.org/2016/06/30/pakistan-s-tactical-nuclear-weapons-and-their-impact-on-stability-pub-63911>.

43. Sankaran, “Pakistan’s Battlefield Nuclear Policy,” 147. The Nasr is mounted on a multi-tube launch vehicle.

44. Evan Braden Montgomery and Eric S. Edelman, “Rethinking Stability in South Asia: India, Pakistan, and the Competition for Escalation Dominance,” *Journal of Strategic Studies* 38 (1–2) (April 25, 2014): 17, quoted in Sankaran, “Pakistan’s Battlefield Nuclear Policy,” 147.

ble to first-strike destruction by an adversary with superior nuclear forces.⁴⁵ The risk of crisis instability grows when some of these missiles are MIRVed, as China is doing and India hopes to do, creating a powerful incentive for an opponent to preemptively destroy high-value concentrated targets.

At this early stage, the rudimentary development of all three countries' sea-based deterrents constitutes a special weak link in the chain guarding against crisis instability. India and Pakistan are in the process of nuclearizing the Indian Ocean, and, as each puts nuclear weapons to sea, the systems involved carry considerable risks, particularly those of Pakistan. Pakistan's plans appear to include loading nuclear-tipped cruise missiles aboard conventional submarines and tactical nuclear weapons on surface ships and patrol aircraft. Pakistani planners explicitly embrace the deterrent value of strategic ambiguity and dual-use platforms.⁴⁶ Moreover, while Pakistani military officials speak of naval nuclear weapons as intended to constitute a secure second-strike capability, they appear far more suited for conventional contingencies: that is, the use of tactical nuclear weapons aboard surface ships and aircraft against an Indian maritime blockade, and the use of nuclear cruise missiles for nuclear coercion in the face of an Indian conventional offensive. Either use would be instantly escalatory.

India's program, because of the limited range of the ballistic missiles on its first two SSBNs, remains for the moment confined to targeting Pakistan. Beyond the destabilizing ambiguities surrounding Indian talk of deploying short-range ballistic missiles on dual-use surface ships, as India moves nuclear forces into the Arabian Sea and Pakistan counters, the weakness of both countries' command-and-control systems over nuclear-armed submarines when on alert adds another element of instability.⁴⁷

Over the horizon India intends to have an SSBN force capable of striking China, and with the F-5 SLBM and the fourth of five planned SSBNs, it will have achieved such a force. At that point both China and India will have fully functioning nuclear triads with elements of each leg a threat to the other's nuclear deterrent. While the primary object of India's future SSBN force is

45. For now Pakistan has 140–150 systems capable of delivering nuclear warheads (36 by aircraft at two air bases, 102 by land-based ballistic missiles, and 12 ground- and air-launched cruise missiles); India has 130–140 delivery systems (48 aircraft, 60 land-based ballistic missiles, and 60 sea-based); and China has 254 delivery systems (186 land-based ballistic missiles, 48 SLBMs, and 20 aircraft, plus a number of cruise missiles, some of which are nuclear armed). These figures are from the separate 2018 reports by Hans M. Kristensen and Robert S. Norris on all three countries, prepared for the *Bulletin of the Atomic Scientists*. Hans M. Kristensen and Robert S. Norris, "Pakistani Nuclear Forces, 2018," *Bulletin of the Atomic Scientists* 74 (5) (2018); Hans M. Kristensen and Robert S. Norris, "Indian Nuclear Forces, 2018," *Bulletin of the Atomic Scientists* 74 (6) (2018); and Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2018," *Bulletin of the Atomic Scientists* 74 (4) (2018).

46. This and much of the following analysis of India's and Pakistan's sea-based programs draws on Iskander Rehman, *Murky Waters: Naval Nuclear Dynamics in the Indian Ocean* (Washington, D.C.: Carnegie Endowment for International Peace, 2015).

47. Ibid., 14–15. See also Usman Ansari, "Pakistan Unveils VLF Submarine Communications Facility," *Defense News*, November 16, 2016, <https://www.defensenews.com/naval/2016/11/16/pakistan-unveils-vlf-submarine-communications-facility/>.

China, the primary object for China is the United States. As India awaits a longer-range SLBM and an SSBN capable of carrying it in order to target China, so, too, does China need a longer-range SLBM than the JL-2 in order to target the United States. In the meantime, in a crisis, China could only rely on its sea-based deterrent by sending some or all of its four Jin SSBNs beyond the perilous choke points leading out of the South China Sea into the Pacific, where sophisticated U.S. anti-submarine warfare (ASW) would await.

IF DETERRENCE FAILS

It is a perverse irony of nuclear deterrence, as Kenneth Boulding long ago observed, that to work “there must be a positive probability of it failing.” (And, as he would add, “anything which has a positive probability will happen if we wait long enough.”⁴⁸) Thus, whether they do it consciously and systematically or casually and without strategic forethought, any country that goes to the trouble of acquiring nuclear weapons must face the prospect that what they hope nuclear weapons will prevent nonetheless may happen, and they must then decide what next. How carefully they think of this beforehand and prepare for it gives the final shape (or shapelessness) to that country’s nuclear posture. In a world of nine nuclear powers, asymmetries and troubling discrepancies reenter and take on greater force, because the trend in this new nuclear era is to conflate nuclear warfare with conventional warfighting.

The challenge posed by the failure of nuclear deterrence arises at two points: 1) when the peace is broken and a conventional war ensues with a genuine risk that nuclear weapons could be used, and 2) when a nuclear weapon is used. How precisely any of the nine nuclear powers would react at either point is not known (indeed, perhaps not even to those who would have to make the decision), but the evidence that exists suggests a large discrepancy among them. The gap is enormous between a United States that is again thinking hard about options not only in the event, but in the sequence of choices likely to follow, and a North Korea whose thinking, while denied to the outside world, is doubtless rudimentary, if it has even begun.

Part of the problem stems from the way different states define the failure of deterrence. Pakistani officials, for example, regard—or, at one point, did regard—any one of four events as justifying a nuclear response: 1) India’s conquest of a “large part of Pakistan’s territory”; 2) the destruction of “a large part of either its land or air forces”; 3) India’s attempt to “strangle” Pakistan economically; or 4) India’s attempts to “de-stabilize” Pakistan politically or to

48. Kenneth E. Boulding, “Moving from Unstable to Stable Peace,” in *Breakthrough: Emerging New Thinking: Soviet and American Scholars Issue a Challenge to Build a World beyond War*, ed. Martin Hellman and Anatoly Gromyko (New York: Walker, 1988), 162.

stir “large-scale internal subversion.”⁴⁹ How nuclear weapons might be used to control political instability abetted by India would seem to be something of a puzzle.⁵⁰ True, the United States and Russia, in refusing to embrace the principle of “sole purpose,” leave open the possibility of responding with nuclear weapons to other than a nuclear attack, such as a biological or chemical weapons assault. And in the 2018 *Nuclear Posture Review* the United States has broadened the list of threats warranting a nuclear response to include an attack on vital infrastructure by nonnuclear means.

Another source of the ambiguity of what would happen if deterrence fails derives from the failure of governments to think carefully about the consequences if it does fail. India’s posture of presumably large-scale nuclear retaliation is a case in point. Earlier as a declaratory doctrine this may have made sense, but how little sense it makes when Pakistan plots the use of battlefield tactical nuclear weapons against an Indian army that has breached its defenses is stirring debate in India.⁵¹ Because formally this remains India’s posture, divining whether and how nuclear planners might employ nuclear weapons less apocalyptically is left shrouded. Similarly, on the Pakistani side, while its nuclear use doctrine remains classified, and though its emphasis on battlefield nuclear weapons suggests a shift in nuclear posture toward a “graduated response” strategy, hence, toward warfighting, little suggests that Pakistani planners have given much thought to controlling escalation once nuclear weapons are used.⁵² Worse, if Sadia Tasleem is correct, Pakistani thinking on nuclear use is apocalyptic: assuming, on the one hand, that “deterrence is infallible” and will not fail, and, on the other, that if it does “all-out war” follows, and escalation control is meaningless.⁵³

Even between veteran nuclear powers, such as the United States and Russia, however, the gulf between their likely actions should deterrence fail may not only be large, but dangerous. Consistent with long-standing practice, as the post-Cold War lapse in thinking about nuclear weapons fades, U.S. defense planners are struggling with the actual use of weapons in war. According to Brad Roberts, who was close to the process during the Obama administration,

49. Rehman, *Murky Waters*, 16–17. He is citing a 2002 statement by Lieutenant General Khalid Kidwai, then director of Pakistan’s Strategic Plans Division.

50. It seems unlikely that the portfolio of threats justifying Pakistan’s nuclear retaliation remains this broad, but there is still considerable ambiguity over just how broad it is. See Zachary Keck, “Pakistan Says It’s Ready to Use Nuclear Weapons—Should India Worry?” *National Interest*, November 3, 2017, <http://nationalinterest.org/blog/the-buzz/pakistan-says-its-ready-use-nuclear-weapons%E2%80%94should-india-23034>.

51. Shashank Joshi, “An Evolving Indian Nuclear Doctrine?” in *Deterrence Instability and Nuclear Weapons in South Asia*, ed. Michael Krepon, Joshua T. White, Julia Thompson, and Shane Mason (Washington, D.C.: Stimson Center, April 2015), 69–94.

52. Sadia Tasleem, “Pakistan’s Nuclear Use Doctrine,” Carnegie Endowment for International Peace, June 30, 2016, <http://carnegieendowment.org/2016/06/30/pakistan-s-nuclear-use-doctrine-pub-63913>.

53. *Ibid.*, 7.

instincts push toward devising ways by which nuclear weapons and their complements (missile defense, precision conventional strike forces, cyber capabilities) can, in refined fashion, be applied to checkmate an opponent's choices at each rung up the escalatory ladder.⁵⁴

Because the United States is preoccupied with the threat posed by adversaries willing to gamble that they can create facts on the ground and then coerce U.S. and allied capitulation by threatening to use, or actually using, nuclear weapons (sub-strategic in the Russian case, crude in the North Korean case), U.S. planners focus on an opponent's decision points, tailoring the limited and discriminating use of nuclear weapons to dissuade the opponent from making the next move. As Roberts and others have stated, it is a theory of limited nuclear war.⁵⁵ It privileges what Roberts calls forward-deployed nonstrategic nuclear weapons—i.e., deployed within the region and delivered by nonstrategic systems—with the goal of demonstrating collective alliance resolve and delegitimizing a nuclear retaliatory attack on the U.S. homeland. It also assumes the United States has accurately understood the other side's calculations and likely chess moves once the nuclear threshold has been crossed. Chances are, however, that is not so in the Russian case, and in all likelihood not in the Chinese case either.

True, an ambitious Russian Air-Space Defense program as a counter to U.S. and NATO subsonic cruise missiles and hypersonic systems can be interpreted as Russia planning for a limited nuclear war fought along the lines imagined by the United States. But some, including Alexei Arbatov, have made a strong case that it is not in the mentality of the Russian military to think in terms of influencing, rather than removing, an opponent's choices in the fog of war, to embrace subtle concepts of intra-war deterrence, or to bind themselves by principles of discrimination and proportionality in the design and employment of nuclear weapons.⁵⁶ On the contrary, while Russia may treat regional war as less unlikely than global war, this does not mean that Russian defense planners think like the Americans about a regional limited nuclear war.

With the exception of a brief interlude in the late 1990s, when, as Arbatov reports, a special commission of military and civilian experts on strategic force planning recommended steps to enhance strategic stability by de-emphasizing counterforce targeting, stressing “force survivability,” and favoring low-yield weapons, the Russian military has never seen warfighting as a chess match, and instead plans to use any and all means to avoid defeat.⁵⁷ Accordingly it would be foolish to assume that, if deterrence fails, Russia would act as the United

54. Roberts, *The Case for U.S. Nuclear Weapons*, especially chap. 3 and chap. 6, “Extended Deterrence and Strategic Stability in Europe.”

55. Ibid. See also Jeffrey A. Larsen and Kerry M. Kartchner, eds., *On Limited Nuclear War in the 21st Century* (Stanford: Stanford University Press, 2014).

56. Alexei Arbatov, “Challenges of the New Nuclear Era: A Russian Perspective,” in Linton Brooks, Francis J. Gavin, and Alexei Arbatov, *Meeting the Challenges of the New Nuclear Age: U.S. and Russian Nuclear Concepts, Past and Present* (Cambridge, Mass.: American Academy of Arts & Sciences, 2018), 38.

57. Ibid., 41.

States assumes, and use sub-strategic nuclear weapons for nuclear “signaling” or “blackmail” and long-range standoff precision weapons to control escalation rather than as the best way to prosecute the war.⁵⁸ In this case, the discrepancy between U.S. and Russian plans and mental outlook, should deterrence fail, contains a high risk of miscalculation leading to inadvertent escalation.

This may also be true in the U.S.-Chinese relationship, although its basis may be less in mismatched plans when each side approaches or crosses the nuclear threshold than in the ambiguities bringing them to this point. Chinese sources discuss a “theory for ‘war control,’” including “the scale, pace, scope, and intensity of conflict.”⁵⁹ This, however, scarcely means that Chinese planners have worked out a notion for the graduated use of nuclear weapons, and, while they speak of a larger or smaller retaliatory strike to achieve unacceptable damage, their formal position remains no first use. Nor is there evidence that they plan for—or are capable of—a protracted nuclear contest with repeated nuclear exchanges. Indeed, Taylor Fravel and Fiona Cunningham contend that Chinese planners, while attentive to managing escalation in a conventional war, have largely ignored the issue once the nuclear threshold is crossed.⁶⁰ This is because the Chinese believe that escalation cannot be controlled in a nuclear war and because they are confident the United States will not intervene in a war between a U.S. ally and China if it risks nuclear conflict.

Uncertainties and dangers also arise because of the ambiguities of who would do what at the outset of hostilities. Were the United States, in carrying out a conventional attack, to strike colocated Chinese nuclear cruise missiles mistaken for conventionally armed missiles, China’s no-first-use policy would be stressed. Once China faced a decision to use nuclear weapons, the risk of instant or rapid escalation to large-scale nuclear war would be very high. Or, alternatively were China to destroy U.S. satellites essential to its naval operations, but also as early warning of a nuclear attack, confident the United States would trust China’s no-first use doctrine and disinclination to commit nuclear suicide, the consequences of a faulty calculation would be severe.⁶¹

58. Notwithstanding considerable discussion within the Russian expert community over the last decade devoted to regional nuclear deterrence and the use of nonstrategic nuclear weapons to cope with conventional armed aggression, there is little evidence that this talk—some of it rather elaborate—has been translated into operational doctrine. The nuclear component in actual Russian military exercises neither figures as an early and key factor nor is it employed in limited, tactically precise fashion. In neither Zapad 2013 nor Zapad 2017, the large Russian war exercises in Russia and Belarus, were nuclear weapons employed in this fashion. The issue is well discussed in Dmitry (Dima) Adamsky, “If War Comes Tomorrow: Russian Thinking about ‘Regional Nuclear Deterrence,’” *Journal of Slavic Military Studies* 27 (1) (March 2014): 163–188.

59. Lonnie D. Henley, “Evolving Chinese Concepts of War Control and Escalation Management,” in *Assessing the Threat: The Chinese Military and Taiwan’s Security*, ed. Michael D. Swaine, Andrew Yang, Evan Medeiros, and Oriana Mastro (Washington, D.C.: Carnegie Endowment for International Peace, 2007), 85–110.

60. Fiona S. Cunningham and M. Taylor Fravel, “Dangerous Confidence? Chinese Views on Nuclear Escalation,” unpublished paper (2018), 4–5.

61. The issue is discussed in Zhao and Li, “The Underappreciated Risks of Entanglement,” 57–59 and 63–65.

If the potential perils inherent in the contrasting and, probably misperceived, likely reactions of the United States, Russia, and China in the actual event of nuclear war ought to be worrying, they pale in comparison to those surrounding the uncertainties between and among Pakistan, India, and China. The risk of miscalculation looms large, because planning a realistic response to a near or actual nuclear attack remains an obscure and almost certainly ill-thought-through matter in two and perhaps all three of these countries. India's apparent "belief that nuclear weapons are only for retaliation and have nothing to do with Indian war planning," reinforced by an organizational void that leaves India without a decision-maker to "control the escalation ladder or manage the conventional-nuclear interface," underscores the point.⁶² Because India and Pakistan both are focused on prevailing in a limited conventional war (India, on keeping war below Pakistan's nuclear threshold; Pakistan, on using battlefield tactical nuclear weapons without provoking nuclear retaliation), serious thinking about options once nuclear weapons are fired goes by the boards.⁶³ How then does one begin to imagine choices for India, if it becomes a two-front war? And how would Pakistan and China play their respective hands in this instance?

The ambiguities of this new multipolar nuclear era and the dangers they pose do not end here. Near the end of the Cold War, leaders on both sides recognized, as Ronald Reagan emphasized in 1984, that "a nuclear war cannot be won, and must never be fought." By extension neither should a conventional war be fought between nuclear weapons states because it carries the risk of ending in nuclear catastrophe. In this new age the fear of an all-out nuclear war remains, but it is being eclipsed by approaches to national security that once more embed a role for nuclear weapons in a conventional armed conflict—only in ways that leave the players on perilously different wavelengths, each preparing for radically different contingencies.

ON "VICTORY"

Nearly all nine nuclear-armed states continue to gird themselves for the possibility that they could find themselves in a nuclear war, and, therefore, faced with the need to set goals and decide how to measure success or failure. If there is a common notion of what would constitute success, it is the vague sense of terminating hostilities on terms politically acceptable to one's own side. But some countries fill that void more explicitly and elaborately than others.

62. Manoj Joshi, "The Credibility of India's Nuclear Deterrent," in Krepon et al., *Deterrence Instability*, 55–56.

63. Neil Joeck, "Prospects for Limited War and Nuclear Use in South Asia," in *Deterrence Stability and Escalation Control in South Asia*, ed. Michael Krepon and Julia Thompson (Washington, D.C.: Stimson Center, 2013), 117.

The United States, for example, according to Roberts, has an emerging, although unarticulated, “theory of victory.”⁶⁴ It assumes the principal threat facing the United States is a regional power willing to commit aggression despite U.S. conventional and nuclear superiority. Victory in this context is required even before hostilities begin, that is, against the risk of nuclear blackmail and brinkmanship. To achieve victory, the United States and its allies must have capabilities (conventional, collective, nuclear, and cyber) as well as resolve adequate “to prevent provocations, blunt attempts at provocation, and deter a decision to strike for a military *fait accompli*.” When hostilities begin, victory consists of inducing “the challenger to choose restraint over escalation when faced with military and political failure.” At this level, nuclear weapons may or may not be employed, but, if so, this should be in limited, precise, and proportionate fashion, relying on an adversary’s knowledge of U.S. superiority at higher levels of escalation to persuade him to call it quits. Failing that, if the war threatens to expand beyond the immediate war zone, victory would follow if the U.S. nuclear posture persuaded the adversary not to launch a nuclear attack on the U.S. homeland or that of its allies. What victory would look like in a war that falls between an adversary’s refusal “to choose restraint over escalation” and the point at which an adversary would be tempted to launch strategic nuclear strikes on the U.S. homeland, however, remains unspecified.

The trouble is that if Russia, China, and for that matter North Korea have a theory of victory or only a vague sense of what it might be, the premise of that victory is that in a war with the United States, it is the victim, not the one that started the war. For example, in the case of Russia, even if it believes nuclear use can be limited in a way that assures a Russian advantage in a war fought on its strategic perimeter, “victory” will not be achieved until the United States and/or NATO relent. Presumably Russia, whatever the mounting cost, would continue to escalate the war, including its nuclear dimension. When approaching the threshold of a homeland-to-homeland nuclear exchange, the image of victory for Russia may simply be the obverse of that for the United States: namely, whatever the level of escalation in the war zone or broader military theater, the United States would be deterred from striking Russia with nuclear weapons for fear of what it would bring on itself.

In China’s case, presumably one route to war with the United States is through the United States’ defense of Taiwan or Japan in a military conflict between China and either one of them. Victory for China in this instance would doubtless be in preventing the United States from entering the conflict. If that failed, one assumes victory would be keeping the conflict regionally confined and below the nuclear threshold, with U.S. naval and air assets sufficiently degraded that the Chinese military could secure the leadership’s political objectives vis-à-vis Taiwan or Japan. Or conceivably, as some in the United States worry, it would be a successful quick-strike *fait accompli*, leaving the United States with no option short of putting its own regional bases and naval forces at risk.

64. Roberts, *The Case for U.S. Nuclear Weapons*, chap. 3.

Whatever the nature of thinking on war's termination once nuclear weapons have been used, no matter how refined, it cannot escape the vagaries that surround the prior question: what to do if deterrence fails. Indeed, the whole subject grows more fraught because of three larger trends. First, renewed rivalry between the United States and Russia and potential strategic rivalry between the United States and China are rendering a serious military confrontation between them less an abstraction. Second, the development and refinement of conventional and nuclear military capabilities in all three countries are blurring the line between conventional and nuclear war, weakening the "nuclear taboo," and resuscitating the notion of limited nuclear war. And, third, trends that mix politics, long-standing conflicts, and nuclear weapons are spilling out of bilateral relationships and into more complex trilateral configurations in ways that make it far more difficult to calculate what may happen when nuclear weapons enter the equation. Together they threaten settled assumptions about how nuclear competition is to be stabilized, how nuclear deterrence is to work, and how, if war comes, nuclear weapons are to be managed.

If that is true of relations among the United States, Russia, and China, the reality among other less established nuclear-armed states raises greater risks. In the case of India and Pakistan, clear thinking about the sequence of steps once a nuclear weapon is fired remains a well-kept secret, and how either envisages a war's termination drifts into near desuetude. Pakistan, in the war games that it runs, expects outside powers to intervene and decide the outcome.⁶⁵ India may have some hope a war can be terminated early and with limited damage, but if not, the screen conveying the defense planner's thinking goes blank. In North Korea's case, one can only guess with what assumptions the regime works. If Pyongyang believes war will come either because Washington decides to "bloody its nose" with a punishing conventional assault or impair its nuclear program by attacking test launch sites, it well may calculate that it can disrupt U.S. plans by preemptively attacking U.S. bases and military facilities in the region. Or in a war with South Korea, including one of its making, it may count on its ability to strike nearby U.S. air bases and ports and, at some point, the U.S. homeland with nuclear missiles as adequate to weaken U.S. readiness to get involved. In all cases, however, while the pathways to war between nuclear-armed states are multiplying, the assumptions of these states, whether well curated or not, on how a nuclear war will unfold, let alone be controlled or ended, suffer the high likelihood of being wrong.

65. Tasleem, "Pakistan's Nuclear Use Doctrine," citing a communication with Feroz Hassan Khan, the former director of arms control and disarmament, in Pakistan's Strategic Plans Division, Joint Services headquarters.

THE SHADOW OF THE FUTURE

Predicting the future shape of the international political system, or where trends in a multipolar nuclear world may lead, or how one will affect the other is close to a fool's errand. Surely, however, the dangers already present should be enough to impel a prudent person to imagine what could go wrong and to begin considering ways and measures that would spare the world from a nuclear reality more tenuous and hazardous than its Cold War predecessor.

Consider, for instance, the technological frontiers that the most advanced nuclear powers are crossing. Three technological clusters matter in particular: first, the continued effort to create effective ballistic missile defense, including so-called "left-of-launch" defense, exploiting cyber and directed-energy technologies; second, the development of conventional weapons capable of executing missions once reserved to nuclear weapons, including the destruction of nuclear weapons and their command-and-control systems; and third, advances in countries' abilities to locate and track the other side's strategic nuclear weapons. The continued development of a fourth technology also matters: the progress of several countries in lowering the yield of nuclear warheads and increasing the accuracy of the missiles delivering them—thereby lessening the collateral damage they do and the fratricide they risk—makes it more thinkable that they could actually be used.

Technology, as often observed, albeit not without contention, is a neutral factor. Its impact, for good or ill, in most cases depends on the use to which it is put. Sorting that out in the case of these four technological areas, however, is not easy. Advances in any one of them could contribute to a more stable nuclear environment or, alternatively, could considerably heighten the danger that in a crisis—or simply as the result of an accident—nuclear weapons will be used. Whether their impact is one or the other depends, first, on the purpose to which they are put; second, the degree to which they are developed and on what scale; and, third, whether their incorporation is on a mutually understood and accepted basis by potential adversaries.

The U.S. effort to develop a fleet of new weapons, such as the new B-61 nuclear gravity bomb with a tail section and steerable fins that allow a vast advance in accuracy and controlled collateral damage, a modified nuclear warhead for ballistic missiles whose fuze system also improves accuracy with lower yields, and a proposed new low-yield warhead for Trident II D5 SLBMs, is designed to enhance "tailored deterrence" by giving the president "a range of limited and graduated options, including a variety of delivery systems and explosive yields."⁶⁶ No doubt a comparable rationale exists on the Russian side for developing the new submarine-launched nuclear-armed Kalibr cruise missile, the 9M729 ground-launched cruise missile (said to violate the Intermediate-Range Nuclear Forces [INF] Treaty), and the nuclear version of the Iskander sub-strategic missile. The usability of these weapons, advocates argue,

66. *Nuclear Posture Review*, 2018, 31.

makes nuclear deterrence more credible, and, hence, reduces the likelihood of war. But in a war this same quality increases the likelihood of their use. How countries balance this trade off—if they do so—will determine how stabilizing or destabilizing this technology is. As a result, in order to be stabilizing this technology cannot be allowed to run free. Governments will need to decide how slippery they want the slope into nuclear war to be versus how plausible they insist their readiness to use nuclear weapons must be to ensure nuclear deterrence, and then reach some understanding of how much and in what form of this capability, if any, they require.

The same can be said of ballistic missile defense (BMD). If, for the moment, none of the five countries with BMD programs has a system fully capable of defending against a large-scale strategic nuclear attack, progress toward thicker, integrated systems will at some point call into question the adequacy of countries' capacities for inflicting assured destruction in a second strike. It already does for countries with limited nuclear forces. Technologies moving beyond current capabilities loom on the horizon. The United States intends to deploy a new technology called a Multi-Object Kill Vehicle (MOKV) that allows a single interceptor to destroy multiple incoming objects, including decoys. It appears designed to deal with Russian and Chinese MIRVed missiles, not the more primitive threat U.S. officials insist is the purpose of the United States' current missile defense program.⁶⁷ The United States also has underway a major new research effort to develop so-called "left-of-launch" defense, an approach employing non-kinetic tools—such as electromagnetic pulse attacks and airborne lasers—to disable computers and sensors controlling an opponent's missile systems, paralyzing or destroying these weapons before they can be launched.⁶⁸ And, as noted earlier, thoughts of a space-based ballistic missile defense system are again in the air. The Russians and the Chinese are developing similar technologies.

Ballistic missile defense could be a stabilizing factor in two circumstances: First, if and only at the point peer rivals have a fully effective BMD system guaranteeing their safety against a nuclear attack at any level. (Short of that, in an offense-defense competition and with imperfect BMD on one or both sides, the effect will surely be destabilizing.) The second stabilizing case would be an agreement to limit BMD to something short of a threat to a peer opponent's assured retaliatory capability, but this raises two problems. On the one hand, limited BMD that protects against limited nuclear attack, if effective, will undermine the nuclear component in tailored deterrence—i.e., the feasibility of a limited use of nuclear weapons. On the other hand, when directed at third parties, such as North Korea or potentially Iran, peer rivals will treat it as threat-

67. Kris Osborne, "Get Ready, Russia and China: U.S. Missile Defense Is Going 'Star Wars,'" *National Interest*, May 17, 2016, <http://nationalinterest.org/blog/the-buzz/get-ready-russia-china-american-missile-defense-going-star-16226>.

68. Bill Gertz, "Pentagon Developing Pre-Launch Cyber Attacks on Missiles," *Washington Free Beacon*, April 14, 2016, <http://freebeacon.com/national-security/pentagon-developing-pre-launch-cyber-attacks-missiles/>.

ening to them. This is also true with the Terminal High Altitude Area Defense (THAAD) and Aegis systems deployed by the United States in East Asia, but viewed by China as also targeting it.

Another area in which technological advances impinge on crisis stability involves nonnuclear technologies, principally advanced conventional strike forces and ASAT weapons. The first category includes primarily hypersonic cruise missiles and hypersonic boost-glide vehicles. Their potentially destabilizing qualities center on their ability to deliver conventional or nuclear warheads against conventional or nuclear targets and on their ability to escape detection after early warning. Once launched, the uncertainty they create over payload, location, and destination invites misinterpretation and inadvertent escalation to nuclear war.⁶⁹ While it is difficult to envisage ways in which large numbers of these weapons available to peer rivals can be stabilizing, if they are to be rendered less destabilizing, it would presumably be by limiting their numbers. Retained for prompt long-range conventional missions, say, against a terrorist group planning an attack with biological or chemical weapons, their effect would be one thing. If they come to have a nuclear counterforce mission, their effect will be quite another.

The ASAT issue leads quickly to the problem of entanglement, particularly in the U.S.-Chinese context. China's vigorous efforts in this area, as noted earlier, may be principally intended to give it the option of disabling U.S. space-based reconnaissance and communications satellites early in a limited conventional war—but in the fog of war, because these same satellites are key to the U.S. early-warning nuclear system, U.S. leaders might well misread this as a prelude to a nuclear attack. The danger swells, if, as Chinese observers maintain, the Chinese side is sure that the United States, aware of China's no-first-use posture and confident its leadership would not commit nuclear suicide, could not make this mistake. In this case, it is difficult to conceive how the pursuit of ASAT weapons by any of the key parties can contribute to crisis stability. To the extent that these weapons are pursued, crisis stability will depend on the measures states take to harden their early-warning systems and provide them with redundancy.

Finally, advances in a wide range of converging technologies that, if perfected, were capable of locating and tracking in real time mobile ICBMs and sea-based strategic nuclear forces could be stabilizing or destabilizing in multiple and complex ways. The panoply of relevant technologies extends from aerial reconnaissance, including drones, to space-based imaging; from cyber, artificial intelligence, and machine learning to data analytics. In a futuristic stable nuclear world, they, in effective combination, would be essential to fool-proof BMD. Were they, in an initial stage, only able to compromise mobile ICBMs, from one perspective, this could be seen as stabilizing, to the extent that states were impelled to abandon ICBMs, the most vulnerable segment

69. James M. Acton, *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike* (Washington, D.C.: Carnegie Endowment for International Peace, September 2013).

of the triad, and rely on the more secure sea-based portion of their deterrent when fully developed. Or its effect could be destabilizing, if states feared that a cornerstone of their nuclear deterrent was now vulnerable to a disarming first strike. Were these technologies, in combination with ASW weapons, such as unmanned underwater vehicles, electronic barriers, and underwater gliders, able to threaten SSBNs, viewed as the anchor of a secure second-strike capability, the destabilizing impact would be indisputably immense.

All this said, the critical fact is that most of these technologies have not yet arrived. True, those being pursued in virtually all critical nuclear realms by all major nuclear players raise doubts whether the United States and Russia, in particular, really are reconciled to living with mutual vulnerability as a basis for strategic stability.⁷⁰ It may be that MAD came to be accepted in the U.S.-Soviet nuclear relationship more as a reality than a doctrinal choice, simply because technological limitations dictated it. If they no longer do, and some nuclear states have set themselves the goal of overcoming it, what then is the basis of strategic nuclear stability in this new multipolar nuclear age?

On the other hand, if in a world of nine nuclear powers and the mounting complexities this world is generating, key states want to head off the destabilizing effects that lie on the other side of the technological frontiers they are approaching and concentrate on ways that the advance of technology can be made stabilizing (not merely advantageous to one side), now is their chance. If they wish to be architects of their future and not simply caught in the current of events, the elements with which they would be working are still forming.

Technology, however, is but one piece of a puzzle whose other pieces are also in motion. Rather than, as during the Cold War, when two states gradually embraced a common notion of strategic stability and underwrote it with an arms control agreement (the Anti-Ballistic Missile [ABM] Treaty), the notion of strategic stability is gradually losing cohesion as the premises underpinning multiple states' concepts of nuclear deterrence drift apart.⁷¹ Nor do prospects favor a conscious effort to manage the untoward direction that nuclear trends might take, given the demise of nuclear arms control and the weakening of nuclear norms, including the nuclear taboo.⁷² Add to this the complications in

70. Not that they ever were entirely. James M. Acton, "Reclaiming Strategic Stability," in *Strategic Stability: Contending Interpretations*, ed. Elbridge A. Colby and Michael S. Gerson (Carlisle, Pa.: U.S. Army War College Press, 2013), 144–145, notes how many authors have shown that, despite official declaratory policy, the United States resisted living with mutual vulnerability and continued to pursue a war-winning strategy during the Cold War. The most recent study to explore the subject is Caroline R. Milne's Ph.D. dissertation, "Hope Springs Eternal: Perceptions of Mutual Vulnerability Between Nuclear Rivals," The Woodrow Wilson School, Princeton University, November 2017.

71. Not to overstate the contrast, Alexei Arbatov reminds us of the gap that always remained between U.S. and Soviet nuclear thinking in "Challenges of the New Nuclear Era," 21–46.

72. Nina Tannenwald, "The Great Unraveling: The Future of the Nuclear Normative Order," in Jane Vaynman, Nina Tannenwald, and James M. Acton, *Meeting the Challenges of the New Nuclear Age: Emerging Risks and Declining Norms in the Age of Technological Innovation and Changing Nuclear Doctrines* (Cambridge, Mass.: American Academy of Arts & Sciences, 2018).

framing arrangements that cope with the challenges posed by many states at different levels of nuclear development, with incommensurate capabilities, and in often widely different threat environments.

Finally, trends in the larger geopolitical setting form the ultimate arbiter of what happens among the nine nuclear-armed states and whether their world skids into trouble or finds some level of stability. This has two dimensions: the first is structural—that is, not merely the proliferation of nuclear-armed states, but the ambitions of China and India to be, and to be treated as, global powers, along with Russia’s determination to reclaim the political status that reflects its nuclear prowess. For India and China, their nuclear profile now transcends that of regional secondary nuclear actors. They want to be seen as equals by peer rivals, and their field of rivalry now has an increasingly elaborate nuclear dimension. For Russia, whatever the deficits in the other sources of its power, the fact that it still has nearly half of the world’s nuclear weapons and is modernizing them ensures it will remain a decisive player in shaping a multipolar nuclear world, however it chooses to play that role.

The second dimension is dynamic and reflects a central theme of this essay: trends in political relations among the major nuclear powers ultimately determine the meaning of the nuclear choices those states are making and the effect they will have. When U.S.-Russian relations are spinning in reverse, as they are now, the prospect that the two countries, or they with others, will join together to address any of the challenges discussed in this essay is dim to nonexistent. If relations were to worsen further, many of the factors threatening crisis stability in this new nuclear era would acquire greater force, especially if U.S.-Chinese relations turn adversarial, as recent newspaper headlines suggest they could.⁷³ Thus, as significant as the evolution from a bipolar to a multipolar nuclear world may be, as complex and fraught are the implications of the technological barriers that nuclear powers are crossing, and as vexing and potentially dangerous is the cacophony of concepts and strategies guiding nuclear thinking among them, how well the major nuclear states, beginning with the United States and Russia, manage their overall relationships will determine how well they manage the challenges of this new nuclear era.

If the larger geopolitical scene were less forbidding and if governments were ready to resume their efforts to control the pace and scale of the nuclear change underway, the task facing them would nonetheless be considerably more complex than what confronted the United States and the Soviet Union during the Cold War. Given the number and diversity of nuclear actors, the range of technologies implicated, and the asymmetries in countries’ capabilities, doctrines, and postures, a single process among states seeking a comprehensive agreement is manifestly impossible. Progress, if achieved, will doubtless be fragmented and multifaceted—a montage of agreements, some formal, some informal, between different combinations of states. And it will be uneven, dealing with different

73. For example, Jane Perlez, “Xi Jinping Extends Power, and China Braces for a New Cold War,” *The New York Times*, February 27, 2018.

parts of the problem in no particular sequence, producing a slow, choppy cumulative effect.

For anything to happen, however, the key nuclear actors, beginning with Russia and the United States and at some early point China, must first pause, take a step back, and reflect both on the potential dangers in the weapons choices they are making as well as on weapons choices that could contribute to a more stable nuclear environment. They need to engage one another and do so at various levels: bilaterally in most cases; trilaterally—the United States, Russia, and China, or India, Pakistan, and China—in others; all five countries together on issues that transcend these narrower contexts; and, for some purposes, such as deliberating over nuclear norms and basic concepts, all nuclear-armed states would need to be involved.⁷⁴ Strategic dialogue of this kind is most difficult in the circumstances when it is most needed. At the same time, however, engaging in this fashion, especially if it is productive, not only opens a path for dealing with the challenges of a new nuclear era, but it helps to ease the tension in deteriorated or deteriorating relationships. Though the odds that governments will rise to this challenge remain low, the conversation needs to begin among experts in the nuclear weapons states.

74. I have attempted to sketch the issues that need to be addressed and the formats in which they might be addressed in Robert Legvold, “The Future of Nuclear Arms Control,” *Topical Issues of Nuclear Non-Proliferation*, ed. Viatcheslav Kantor (Geneva: The International Luxembourg Forum on Preventing Nuclear Catastrophe, 2018), 26–49.

The Interplay Between the International System and the Global Nuclear Order

Lawrence Freedman

A political order is a top-down concept. It assumes that a political system can be designed in such a way so that conflicts are managed expediently and normally without violence. How it is structured may be the result of deliberate action by the major powers using treaties, conventions, and new institutions to encourage restraint and establish competent mechanisms for resolving disputes. Alternatively, there may be a favorable concatenation of circumstances that results in order. Either way the test lies in durability. An “order” shapes the choices of individual actors by means of informal or formal rules, to the point where over time patterns of behavior become embedded. Even as parties enter into a dispute, they will have expectations about how the dispute can be resolved.

Viewed from the bottom up rather than the top down, individual actors still have choices. If they decide in sufficient numbers that the system generates unfair outcomes or that disruptive behavior will yield more advantages, then the order will start to become vulnerable. At such moments, those who have the greatest stake in the system’s continuity must decide whether to enforce its rules. If that is their decision, then there can be no half measures. The stakes will be too high, and such determination can lead to major war. Alternatively, they may conclude that the tide of history is against them and not worth resisting. They may seek instead some sort of accommodation or compromise to facilitate a shift in the international hierarchy, as the United Kingdom did with the United States.

The yearning for a more orderly world becomes most intense during the course of long and painful wars. Such wars prompted deliberate action that established rules to prevent further carnage—for example, the 1648 Peace of Westphalia after the Thirty Years’ War, the 1815 Congress of Vienna after the Napoleonic Wars, the League of Nations after World War I, and the United Nations after World War II. An example of an effort to consolidate an existing order, taken without the prompt of a major war, was the package of measures associated with the East-West détente from 1969 to 1975. Here the aim was to take advantage of forms of political order that had emerged more as a result of a balance of power than by any deliberate design. The further shift in the

balance of power that took place with the implosion of European communism from 1989 to 1991 created new opportunities to put in place a more satisfactory political order, based more on shared values than mutual fear.

THE COLD WAR ORDER

The Cold War order is usually attributed to a convenient bipolarity and a shared fear of nuclear war. The two superpowers, the United States and the Soviet Union, each led an ideological bloc and both were armed with substantial nuclear arsenals. If the two alliances clashed, then mutual destruction was the likely result. Winston Churchill made this point in his last significant speech as UK prime minister when he observed how though a “sublime irony . . . safety will be the sturdy child of terror, and survival the twin brother of annihilation.”¹ Thus a stable political order was the result of a stable nuclear order, which depended on mutual deterrence. During the years of the Cold War, a new line of strategic reasoning developed to explain how this depended on a shared vulnerability to nuclear devastation and it explored whether this might be upset by new technologies. A critical point came in the early 1960s when, after the shocks of the Berlin and Cuba crises and a cool appraisal of the consequences of vast numbers of offensive systems and the limited capabilities of defensive systems, the two superpowers began to accept that both sides were locked into a condition of mutual assured destruction (MAD). The search for a plausible first-strike strategy lingered on before it eventually subsided, but caution was now the norm in superpower relations.

To what extent did a political order depend on a nuclear order? At one level, there is no reason to doubt the reported views of political leaders on both sides of the Cold War divide—that they feared nuclear war sufficiently to moderate their geopolitical demands on each other and to exercise caution at moments of crisis. Part of this was a developing conviction on both sides that, whatever their clever strategists might tell them, there was no reliable route to a nuclear victory.² Any victory would depend on a surprise attack that would either leave the enemy disarmed or disoriented but any initiation of nuclear war promised to be suicidal. The only circumstances in which one side might take a nuclear initiative would involve the intense emotions, panic, and uncertainty of another major war. Irrational decisions might be made in irrational situations—so best not to tempt fate by exploring how far it was possible to go in a large-scale war without triggering a nuclear conflagration. It became hard to see how and why a third world war might start.

1. Winston Churchill, “Never Despair,” speech in UK Parliament House of Commons, March 1, 1955, International Churchill Society, <http://www.winstonchurchill.org/resources/speeches/1946-1963-elder-statesman/never-despair>.

2. McGeorge Bundy, “To Cap the Volcano,” *Foreign Affairs* 48 (1) (October 1969): 1–20.

It is possible the same effects could have been achieved with conventional weapons, as John Mueller has argued, because two earlier world wars had demonstrated that they were destructive enough and that victory was unlikely to be the result of anything other than a long and painful slog.³ This is a counterfactual assumption that cannot be proven one way or the other.

The key property of nuclear weapons was that they left no room for doubt about their effects and so reduced any temptation to try a cunning strategy that might just catch a complacent enemy unawares. More important, however, than the question of whether the stability resulting from a nuclear balance might also have resulted from a conventional balance was the question of whether either might have worked without the existence of an alliance. The Atlantic Alliance was the result of a reflection on the twin failures of deterrence in 1914 and 1939 in the face of German aggression. The view was that the problem was not so much the absence of a super-destructive weapon and more the absence of the United States. This was the failing remedied by NATO. The value of a counter to Soviet power was confirmed by the Berlin airlift, leading to the formation of NATO in 1949. It took time before the Soviet Union could organize its satellites into something comparable—the Warsaw Pact was formed in 1955 in response to West Germany joining NATO.

A nuclear-armed superpower led both alliances, which divided Europe neatly down the middle. But this apparent symmetry was between two alliances that were fundamentally different in their political composition. The question of order was dependent on whether the two sides could accept a Westphalian Peace, based on respect for sovereignty and no interference in internal affairs, or what Moscow described as “peaceful coexistence” between two opposing systems. This was itself dependent upon the internal cohesion of the two ideological blocs.

Thus, the Cold War began with one form of domestic political order, based on liberal democracy, fearing another, based on tight control by vanguard communist parties. Liberal capitalism flourished, benefiting from the security and cohesion provided by an alliance, while state socialism progressively lost its legitimacy. The West agreed not to interfere directly in the affairs of the Soviet bloc as a precondition for détente. Nonetheless, the existence of a freer and more prosperous way of life, about which people in communist countries became increasingly aware, undermined the basis of Communist Party rule. The Cold War was sufficiently established so it could continue for some time, even into the twenty-first century, without major mishap, were it not for the fact that the domestic order of one side proved to be extraordinarily fragile.

The Warsaw Pact was a coercive alliance, in that most (if not all) of its members would not have chosen to be aligned so closely (including ideologically) to the Soviet Union. When individual states began to step out of line—Hungary in 1956, Czechoslovakia in 1968, or Poland in 1981—force was used to get

3. John Mueller, *Retreat from Doomsday: The Obsolescence of Major War* (New York: Basic Books, 1990).

them back. NATO was more voluntary, and so the benefits of alliance had to be regularly restated and demonstrated. Although in practice the Warsaw Pact was more brittle, it was always NATO that appeared to suffer most from internal rows. In addition, it was assumed for most of the Cold War that the advantages in conventional war lay on the Soviet side. This introduced one of the most challenging features of the relationship between nuclear order and political order—the impact of MAD on the credibility of an alliance.

The logic of the nuclear stalemate was to neutralize the effects of the arsenals. There was no premium in initiating a nuclear war. Each arsenal cancelled out the other. There was an obvious stabilizing benefit with self-neutralization so long as the only conflict in mind was one between the two superpowers. This reflected the view that the only possible rational reason to use nuclear weapons was in retaliation to a nuclear attack on the homeland.

Actually, looked at coolly as a rational calculation, there was no inherent logic to automatic retaliation once one's own society had been lost. Nonetheless, the safest assumption was that the impulse would be irresistible.⁴ This was not an assumption that was going to be sensibly tested. But would that impulse extend to allies? Would treaty obligations, such as NATO's Article 5 on collective defense, mean that any attack against a European state would be treated as if it had been an attack on the United States, even if it could not be resisted by conventional means?

Whatever the reassurances given in public, senior American policy-makers in private doubted that it would ever make sense to risk the destruction of the homeland by initiating nuclear war on behalf of allies. President Richard Nixon is reported to have said during an early White House discussion, with his typical elegance, "Nuclear umbrella in NATO is a lot of crap. Don't have it."⁵ According to the famous "Healey theorem" (named after a British defense secretary), it was far easier to deter Moscow than reassure the allies: "it takes only five percent credibility of American retaliation to deter the Russians but ninety-five percent credibility to reassure the Europeans."⁶ The alliance held. Whatever their doubts, most alliance members concluded it was safer and certainly cheaper to rely on the U.S. nuclear guarantee than to seek out alternative security arrangements. The only exception was France, which developed its own nuclear arsenal and moved into a semi-detached relationship with NATO, largely because after the Suez crisis of 1956 France did not trust the United States to back its wider interests. Successive UK governments may have had similar thoughts, but care was always taken to present the national nuclear force as a supplement to that of the United States and as a contribution to NATO.

4. Rose McDermott, Anthony C. Lopez, and Peter K. Hatemi, "Blunt Not the Heart, Enrage It': The Psychology of Revenge and Deterrence," *Texas National Security Review* 1 (1) (December 2017): 68–88.

5. "Minutes of National Security Council Meeting," February 19, 1969, in *Foreign Relations of the United States, 1969–1976, Vol. XXXIV, National Security Policy, 1969–1972*, ed. M. Todd Bennett (Washington, D.C.: U.S. Government Printing Office, 2011).

6. Denis Healey, *The Time of My Life* (London: Michael Joseph, 1989), 243.

Away from Europe, the Soviet Union also suffered its most serious alliance indiscipline with China. Although it had tolerated the early development of a Chinese nuclear capability, as a result of the 1958 Taiwan Strait Crisis the Soviet leadership concluded it did not wish to link its fate with a Chinese leadership that was careless about nuclear danger. The Chinese pressed ahead regardless with their own nuclear program while forcing a split in the Communist world that soon raised the possibility of a Sino-Soviet war. In this respect, the two blocs were quite different in their ability to manage proliferation. NATO held together despite the Gaullist challenge; the Communist bloc turned in on itself as a result of the Maoist challenge.

For the United States, the challenge of alliance management lay in the credible extension of deterrence. It was an issue not only with regard to NATO but also to the other American allies in the Asia-Pacific region—South Korea, Japan, Taiwan, and Australia. If they were not reassured then the most likely alternative was to build their own nuclear deterrents along the lines of France and China. It was partly to close off this possibility that the superpowers began to edge toward a nonproliferation treaty in the 1960s. This would oblige countries to accept publicly that they would not develop their own arsenals.

The success of the effort, in the form of the 1970 Nuclear Nonproliferation Treaty (NPT), provided the second pillar of the global nuclear order, according to William Walker.⁷ Limiting the number of nuclear players through the nonproliferation regime complemented the first pillar of mutual deterrence restricting the likelihood of war among the established nuclear players. Whereas a strong nonproliferation regime supported mutual deterrence by keeping strategic relationships relatively simple, it was not the case that mutual deterrence necessarily supported nonproliferation, precisely because it undermined the credibility of alliance guarantees. The key proliferation bargain was to eschew national arsenals in return for superpower security guarantees. Proliferation was more likely when that did not occur.

This provides a different twist to the standard understanding of the proliferation bargain as expressed in the NPT, which says that states should only be expected to give up their nuclear option if they still get the benefits of peaceful nuclear energy (which generally was not problematic), and as long as the nuclear weapons states agreed, under Article VI, to make their own best efforts to end the arms race and achieve general and complete disarmament (which has been extremely problematic). Article VI was designed to address the evident unfairness of an unequal treaty. This intent is stressed, not surprisingly, by proponents of disarmament. They warn that if arsenals are not cut back then proliferation will result.

Yet Article VI demands no more than best efforts and then sets a standard that goes well beyond nuclear abolition to the effective elimination of major conventional forces as well (an idea that was still current in the 1960s). If, however, the United States really began to disarm substantially, its allies might

7. William Walker, "Nuclear Order and Disorder," *International Affairs* 76 (1) (October 2000): 703–724.

begin to fret about whether their security guarantees were still in place. Of course, if their security problems had been dealt with along the way (which is what the grander schemes for disarmament often suppose) then this might not be a problem, taking us back to the question of whether it makes much sense to attempt to reduce armaments while underlying conflicts are still unresolved. For the relevant countries NATO's Article 5 trumped the NPT's Article VI.

POST-COLD WAR DISORDER

The Cold War concluded with a victory for the West as a demonstration of the strength of liberal capitalism and alliance cohesion. Unlike the end of hot wars, in which the victors were careful to avoid triumphalism. Russia was now encouraged to serve as an active partner in the creation of what President George H. W. Bush called a "new world order."⁸ There was a period in the early 1990s when would-be architects of this new world order designed structures that would meet all the criteria of peace, justice, and durability. The designs required that some old institutions be discarded while others found new roles. Additional institutions with their own rules might need to be created so that all conflicts could be resolved and rivalries calmed.

Ideally this new world order could manage without a new nuclear order. Instead of relying on the MAD of the Cold War, which had resulted in at best a prudent peace, the aim was now to have a more positive, liberal peace based on partnerships, economic interdependence (globalization), and the rule of law, in which nuclear weapons had no role at all. This view was reflected in schemes for nuclear abolition, which were predicated on achieving a new world order, since ways had to be found to encourage nuclear powers to disarm completely without any loss of security. As these schemes developed it became evident they depended on hitherto intractable issues—such as the eccentricity of North Korea or the tension between India and Pakistan—being sorted out on the way to a nuclear-free world. In practice, most of these schemes ended up describing stages in this process, building upon existing treaties and pushing for the reduction of arsenals and less dangerous operational procedures, which soon appeared to be challenging enough by themselves, falling well short of complete abolition.⁹

One reason for the disappointing lack of progress on an even more modest arms control agenda (after an initial burst of disarmament in the 1990s) is that a new world order did not develop as hoped. The term reflected a misapprehension about the series of events that began with disaffection in Eastern Europe,

8. George H. W. Bush, "Address Before a Joint Session of the Congress on the Persian Gulf Crisis and the Federal Budget Deficit," September 11, 1990, American Presidency Project, <http://www.presidency.ucs.edu/ws/?pid=18820>.

9. See, for example, Gareth Evans and Yoriko Kawaguchi, *Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers* (Canberra, Australia: International Commission on Nuclear Non-proliferation and Disarmament, 2009). Gareth Evans (Australia) and Yoriko Kawaguchi (Japan) were the cochairs.

marked by the breach in the Berlin Wall of November 1989 and the breakup of the Soviet Union at the end of 1991. This period was, and still is, celebrated as the “end of the Cold War.” This moment is now fixed in our mental chronologies along with the end of the World Wars as one of the great punctuation points of history. Yet the Cold War had been through many stages before this point, and its end had also been celebrated, prematurely, in the early 1970s. The relationship between the two superpowers was quite different in 1989 from what it had been in 1947, 1956, 1961, 1972, or 1983. What had really come to an end was European communism—which was finished as a political force—and a Russian empire—which had been built up over centuries and extended after 1945.

Within a short time frame, Russia lost its governing ideology, economic bearings, other former Soviet Socialist Republics, and the satellite states of the Warsaw Pact. All the new states to its west began to gravitate toward NATO and the European Union (EU), and most of them ended up in both organizations. As the new leaders in Moscow became alarmed at the assertiveness of the West and tried to push back they still often had to give way, for example over Kosovo. It was only as the West allowed itself to get overextended, in Afghanistan and Iraq, and as the Russian economy grew with higher oil and gas prices, that Moscow was able to recover some lost ground. In addition, it had clung to its position on the UN Security Council and to its nuclear arsenal, both of which were seen to be increasingly valuable assets (which is one reason for the growing Russian disinterest in plans for nuclear abolition). Russia was left bereft of its allies. Its recent international behavior can be explained in part by its anxiety about the loss of one client, Ukraine, and the potential loss of another, Syria.

Thus what took place in the 1990s was a massive shift in international power. It was not the end of Russia, but its power was greatly diminished, soon leaving it feeling insecure. It was a fresh start for the United States since it could spend less time on some long-standing concerns, but its global position was still founded on its existing network of alliances. The main change was that the United States took on more allies as a result of the surge of new applicants from the Soviet bloc. The United States also enjoyed a degree of ideological hegemony and a greater freedom of political maneuver (although both turned out to be far less than what was assumed in the 1990s). It was not so much that the United States and its allies did not accept the value of a rules-based international order, especially when it came to the economic domain, but that they felt they could rewrite the rules, for example with regard to humanitarian intervention.

One reason for this outcome may be found in the continuing repercussions of the other great feature of the post-1945 world: namely, decolonization. While the old European overseas empires were all essentially dismantled by 1975, the collapse of the Soviet Union and Yugoslavia could be seen as a continuation of the same process, resulting in far more independent states. From the fifty-one states that signed the UN Charter in 1945, membership in the United Nations grew to 193. Many new states turned out to be economically weak with immature political institutions and deep social cleavages, generating a slew of new security challenges.

This has made it even harder to configure a new world order. Interstate relations have never been more varied and complex. International institutions still work reasonably well away from the security sphere, for example in managing trade, and coped better than might have been expected with the 2008 financial crisis. But it was always the security sphere that was supposed to provide the test of a new world order, and the results continue to disappoint. This does not mean the system is doomed to violence and disarray. Most states, most of the time, work out their relationships with each other. The U.S. alliance network has a profound influence on many of the potential arenas of conflict. What we do not have is a new, top-down international order designed for contemporary purposes.

THE NUCLEAR ORDER AND THE POLITICAL ORDER

It is remarkable that more than a quarter century after the end of the Soviet system the network of alliances forged for Cold War reasons is still in place. I have argued that the key proliferation bargain was to eschew national arsenals in return for superpower security guarantees. Proliferation was more likely when that did not occur. Does the persistence of alliance networks therefore help explain why nuclear proliferation has been less than feared?

Certainly if stopping proliferation had depended on progress toward disarmament as envisaged in Article VI of the NPT, then there should already be many more nuclear powers. Even without much happening on this particular Article, the NPT provides a normative framework that might influence some potential proliferators. In addition, the entry costs into the nuclear business remain high, requiring advanced technological and industrial capabilities. These capabilities are hard to construct covertly. When the effort has been made it tends to get revealed before the projects are complete. It is particularly difficult now if a state has signed on to International Atomic Energy Agency (IAEA) safeguards. The agency is a sophisticated organization that has learned from past mistakes. If the IAEA is prevented from doing its work, or there has been a formal withdrawal from the NPT, that provides a damning clue about intentions. Since it takes time to produce fissionable material and to develop and then realize weapons designs, alert neighbors may start to become anxious years before the capability is in place, creating a risk of preemption. Whatever the limits of the Iran nuclear deal, the fact that a country with radical regional aspirations accepted it in the end is a testament of sorts to the pressure would-be proliferators face.¹⁰ At the same time, one of the reasons why President Trump

10. The Iran nuclear deal, officially the Joint Comprehensive Plan of Action (JCPOA), was signed in Vienna in July 2015. “Joint Comprehensive Plan of Action,” European External Action Service, July 14, 2015, European University Institute Historical Archives of the European Union, http://collections.internetmemory.org/haeu/20160313172652/http://ceas.europa.eu/statements-ceas/docs/iran_agreement/iran_joint-comprehensive-plan-of-action_en.pdf. See also Gary Samore, ed., *The Iran Nuclear Deal: A Definitive Guide* (Cambridge, Mass.: Belfer Center for Science and International Affairs, Harvard Kennedy School, August 2015).

abandoned the deal in 2018 was evidence that despite the deal, which was still working as intended, it had done nothing to impede Iranian missile development and regional militancy.

Because of the costs and risks of proliferation the benefits need to be serious. There were always three sorts of benefits. The first was to break open the international hierarchy. One objection to the NPT was that it confirmed a hierarchy in which the five designated nuclear powers were also the permanent members of the UN Security Council. Many would argue that there is a case for reform of the Security Council to include the major nonnuclear powers in order to break that link. But since reform has proven to be so elusive, the permanent membership has stayed the same. In practice, however, economic strength is usually far more relevant to most international groups.

A second benefit was prestige. To be able to master the technology demonstrated that a country was on the first rank in its science and advanced industrial capabilities. This argument is still current. It appears to have been important in the Iran case and was part of the rationale for countries such as Brazil, which put considerable effort into their nuclear programs. But nuclear energy is no longer seen to be vital to wider industrial success.

Whatever the prestige or civil energy arguments for developing an advanced capability short of an actual weapon, the strategic value lies in hedging since the breakout time is reduced if a weapon is desired. This was a major issue in discussions of the quality of the Iran deal.

Enhancing security must be the main potential benefit of a nuclear capability. Because of the costs and risks of a nuclear program, the security gain must be high. It is evident that with many security challenges, especially if they involve terrorism or insurgencies, nuclear weapons are irrelevant, and even with interstate warfare they are very much in the last resort category. Those countries that have opted for their own nuclear capability do have serious strategic rationales. Even then they still seek to soften their dependence on nuclear deterrence by building up their conventional capabilities, or looking for ways to ease tensions with their neighbors, or strengthening their ties with friendly great powers. One reason Israel refuses to brag about its nuclear options is that it does not want to jeopardize the far more important alliance with the United States, and its nuclear capability is less relevant to most of the security challenges Israel currently faces.

Despite the logic that might warn against relying on the United States to provide deterrence, given the risks to which that would expose the United States, alliance continues to trump proliferation. France has come back into the NATO fold. In the 1974 Ottawa Declaration, it allowed the force de frappe to be presented, along with the UK's Polaris fleet, as contributions to NATO's deterrent. No other U.S. ally has built a nuclear weapon. There have been regular reports that America's Asian allies, and in particular Japan and South Korea, have kept the matter under review, but as long as the United States appears ready to honor its obligations in the face of Chinese and North Korean threats, the Asian allies choose to stay with the status quo. The uncertainties

resulting from the policies of President Trump, including on notionally unrelated areas such as trade, have led America's allies to wonder about the solidity of alliance ties. Allies are clinging to the fact that they are supported by official policies even though this is rarely reflected in the President's statements. If he wins a second term, it is hard to see how the current alliances can survive in their current form, although Trump is not wholly consistent and future crises may change the context.

What then of the former Soviet allies? We have already noted that China broke with the Soviet Union completely over the nuclear issue. North Korea also decided to go it alone in the early 1960s when Moscow refused to help it develop its own arsenal. The most intriguing case was the unplanned nuclear status of Ukraine, Belarus, and Kazakhstan in 1991 when the Soviet Union came apart. Whether or not at the time the nuclear-tipped missiles that were left in bases on their territory were close to being operational, it is reasonable to assume that this could have been achieved at some point. In order to get these newly independent countries to join the NPT and relinquish any claims to nuclear status, security assurances were offered.

The 1994 Budapest Memorandum, a document that has now become a byword for ineffectuality, offered Ukraine in return for joining the NPT a reaffirmation from the treaty's depository powers, inter alia, to respect its independence, sovereignty, and existing borders, and to refrain from the threat or use of force. None of this did Ukraine much good twenty years later when Crimea was annexed by the Russian Federation. Indeed the fact that Russia had felt able to invade non-NATO Georgia (in 2008) as well as non-NATO Ukraine, while it had held back from acting against such NATO members as Estonia and Latvia, with whom it had comparable arguments, can be taken as a demonstration of the importance of alliances as a source of security. At the same time, Russia has drawn regular attention to its nuclear strength when warning outsiders not to intervene actively on behalf of Ukraine. "Russia's partners," Putin was reported saying in August 2014, "should understand it's best not to mess with us," with a reminder that "Russia is one of the leading nuclear powers."¹¹

We can develop this theme further by looking at the other proliferators: India, Pakistan, and Israel. These countries do not have formal alliance arrangements. Pakistan and the United States once had an alliance arrangement, and Israel is all but an ally with the United States. Israel was able to use the threat of a nuclear program to persuade the Kennedy and Johnson administrations in the 1960s to reverse past policies of transferring conventional arms. When it became apparent that Israel had a covert nuclear program, the Nixon administration agreed not to make a fuss so long as the program stayed covert. As Or Rabinowitz has shown, this approach extended to a degree to Pakistan and to

11. Tom Parfitt, "Ukraine Crisis: Putin's Nuclear Threats Are a Struggle for Pride and Status," *Telegraph*, August 29, 2014, <http://www.telegraph.co.uk/news/worldnews/europe/russia/11064978/Ukraine-crisis-Putins-nuclear-threats-are-a-struggle-for-pride-and-status.html>.

South Africa (before South Africa decided as it entered its political transition to abandon its weapons program).¹²

In addition to looking after its own nuclear status, Israel pursued a very active regional anti-proliferation policy. It destroyed an Iraqi nuclear reactor in 1981 and a Syrian one in 2007, and threatened to strike against Iran. After the 1991 Gulf War, the United Nations terminated Iraq's revived nuclear program. Iran joined Libya, whose ambitions were exposed with the A. Q. Khan network, in agreeing to abandon, or at least defer, its nuclear ambitions in return for relief from sanctions. Neither the Libyan nor Iranian experiences are straightforward. The program Libya abandoned in 2003 was still in its early stages. It is unlikely it would have been completed by 2011, but if it had been then it might have led to doubts in NATO about whether it was so wise to support the rebellion against the Libyan leader, Colonel Gaddafi, that led to him being killed. In the case of Iran, critics argued from the start that easing economic sanctions meant that in return for apparently temporary restrictions on its nuclear program it would be able to push ahead with its missile program and pursue aggressive regional policies, including in Syria. While supporters pointed out both the durability of the restrictions and Iran's compliance, the critics persuaded President Trump to abandon the deal in May 2018. At the time of writing, Iran's intentions with regard to its nuclear program are unclear, but the episode demonstrates the difficulty of separating non-proliferation measures from broader judgments on foreign policy. If Iran does revive its program, it is also not clear whether this will lead to American military action and whether those Sunni Arab states opposed to Iran will begin to hedge with their own nuclear programs.

The Middle East is thus an area of high conflict in which alliance relationships are tentative, and the country that is closest to a superpower is still hedging with a covert nuclear arsenal. One cannot demonstrate that the Middle East would be more orderly if the key antagonists were nuclear powers. Many of the conflicts are the result of fractures within states rather than between them. This region would offer a striking test of the thesis that nuclear weapons can bring stability. At the moment it is certainly not at all stable. One can argue that the Israeli nuclear arsenal, though never officially declared, has weighed on the strategic calculations of Arab countries, and that more nuclear arsenals might encourage more caution. But this is a region where fraught situations develop that could overcome the natural caution of governments.

In Asia it is arguable that a nuclear order has contributed to a political order, in that a degree of caution has been injected into the India-Pakistan relationship, although there is an important proviso about the consequences of internal turmoil should weapons and facilities fall into the hands of extremist groups. The most curious case is that of North Korea, a country that does not feel itself bound by any rules or norms and has set up a separate existence for itself detached from the rest of the international community. During the course

12. Or Rabinowitz, *Bargaining on Nuclear Tests: Washington and Its Cold War Deals* (Oxford: Oxford University Press, 2014).

of 2017, the first year of Donald Trump's administration, Pyongyang accelerated its nuclear testing and, most alarming for the United States, its intercontinental ballistic missile (ICBM) program. This put the continental United States directly at risk, which could be seen as a challenge to the U.S. nuclear guarantee to South Korea. Yet it was not as if the North Koreans had been without retaliatory threats up to this point, including a formidable conventional deterrent in the mass of artillery that had Seoul in range. It was therefore not clear what the United States could do to prevent North Korea from deploying ICBMs without taking enormous risks. This became a question of whether the United States was prepared to risk North Korean retaliation against South Korea (and Japan) in order to remove a threat that undermined its ability to deter attacks on South Korea.

Not surprisingly, the South Koreans engaged in direct diplomacy of their own with the North in order to calm tensions.¹³ Despite the bellicose rhetoric ("fire and fury") of President Trump and of the North's leader, Kim Jong-Un, this led to a surprise move for a summit between the two, which took place in Singapore a month after Trump had abandoned the Iran deal. His stance this time was quite different. Trump built up Kim as a worthy partner in the pursuit of peace, and accepted vague promises of "complete denuclearization." The provisions were less firm than past agreements that Pyongyang had violated. The new situation was preferable to an arms race and heightened tensions, and meant that North Korea was unlikely to develop a direct threat to the continental United States, but was also likely to remain a nuclear power for some time. This created its own risks if the Americans came to feel that they had been cheated once again. Moreover, it demonstrated what a small nuclear arsenal might do for an otherwise insubstantial country in raising its international standing

Compared with past projections of how the nuclear age might develop, one could argue the situation is better than expected. There have been no nuclear weapons used in anger since 1945, credible ways to win a nuclear war against another nuclear power have yet to be developed, and relations among the main nuclear states have therefore been stable, while the nonproliferation regime has been surprisingly successful. Yet the underlying issues of extended deterrence remain in play. Russia has shrunk as a power but it is seen still as a threat by neighbors, including a number that were part of the same state not long ago, while China has grown as a power, and the threat it poses to its neighbors is assumed to have intensified. In these respects, therefore, the nuclear order has not changed so much, except that there are now additional issues revolving around India and Pakistan, North Korea, and Israel. A number of countries expected to loom larger in these calculations, notably Iran, having officially left the nuclear business for the moment, might now return.

The foundation for containing nuclear proliferation therefore remains the American network of alliances. There are two potential and related risks in this

13. Motoko Rich, "Trump Opens Door, Just Slightly, to Talking with North Korea," *The New York Times*, February 27, 2018.

situation. The first is that the United States no longer wishes to play a role it has now accepted for almost seventy years and requires its allies to make other arrangements. The second is that the allies believe they must make new arrangements anyway, because they no longer trust American security guarantees, even if Washington tries to reassure them that nothing has changed. One of these developments could trigger the other, especially if it was the result of a major crisis.

Some argue that President Obama's failure to manage the Syrian crisis effectively and his willingness to cut a nuclear deal with Iran has had a deleterious effect on relations with allies in the Middle East. I contend that doubts about the U.S. nuclear umbrella guarantee have been around since the 1950s. So long as the Americans professed to take it seriously, the allies professed to be reassured. Is this a spell that might one day be broken? As argued, the policies of President Trump represent a challenge to past assumptions about the conduct of American foreign policy and its solidarity with traditional allies. For the United States to sustain its network of alliances does not intrinsically depend on a readiness to offer a nuclear guarantee, although in practice one comes with the other. The United States—with its allies—could deal with most likely conventional threats without having to escalate. But the thought that this might lead an enemy to escalate will always be there.

Alliance works by reminding strong regional powers that they risk a fight with the United States if they start to pick on any of its allies. One argument against a system so dependent on the United States is not only the weight this places on the quality of American leadership, but the implication that any local conflict could get a whole lot worse, because it might turn what would otherwise be nasty but contained into a nuclear confrontation. Putin is not the only one who argues that American interference can turn what might otherwise be peaceable parts of the world into places of strife and discord. I have concentrated on one objection to this view, namely, that a world without an alliance system would be more, not less, conflictual, and more prone to nuclear proliferation. The other difficulty is that while it might be preferable to have a world system based on rules and strong institutions, somehow rules would have to be enforced. It is hard to see why the United States would play that role if it had abandoned its alliance network, which provided it with considerable influence over the course of events.

During the Cold War, especially in its early stages, political order was a possible casualty of nuclear disorder; now it is more likely that the nuclear order can be put at risk as a result of political disorder. Over time the deterrent effect of nuclear weapons became less dependent on the credibility of conditional threats and more on the possibility, however tiny, that they would be used in a major war. Some states depend on that possibility more than others and therefore will be inclined to stress that potential if they are edging toward a substantial conflict. There are risks when the United States has the least interest—because of its conventional strength—in the possibility of escalation, but the need exists for its nuclear threat to engage with the greatest range of contingencies because of its alliance commitments.

For now nuclear weapons continue to underpin one aspect of the current international system, the alliance network of the United States, without getting drawn regularly into everyday discourse on international affairs. It is an issue lurking in the background and only rarely pushed to the fore. When it is pushed to the fore—for example by North Korea when it wishes to draw attention to itself, or Russia when it wants the West not to intervene too strongly on behalf of Ukraine—anxieties are soon raised. It is difficult to see the dynamics that would lead any of the current conflicts to escalate into nuclear war, especially when the major powers have avoided skirmishes for some time, yet the anxieties that surface whenever this seems at all possible confirm how much the dreaded fear of a total war still weighs heavily on the international consciousness.

Recent wars have been less about great confrontations between states and more about civil wars, or ragged conflicts with many elements fighting within and over the same territorial space, often with links to criminality as well as terrorism. My earlier discussion on the Cold War stressed that the major transformation of the post-1945 order was the result of not so much change in interstate relations as in the “domestic order” of individual states. The progressive loss of legitimacy in Communist states was part of this. So too was the anti-colonial movement. Since 1991 most conflict has occurred within states rather than between them. These conflicts have on occasion led to considerable concern about the security of nuclear assets. President Obama made this a general theme of his administration, looking at a variety of ways in which terrorists and other non-state groups might get access to nuclear materials or weapons. The most dangerous cases would be those in which a state is breaking up—hence the concerns as the former Soviet Union was in disarray in the early 1990s about “loose nukes”; the fears about who is looking after Pakistani nuclear systems and how, as that country tries to cope with Islamist insurgents; or the uncertainty about the role played by nuclear weapons in North Korea’s internal politics.

The great shifts in international politics start in individual states. As I noted in the opening of this essay, a political order is a top-down concept, yet political change tends to start from the bottom up, with a radical movement or populist politician or economic discontent or social tensions that prove hard to contain. The history of nuclear weapons encourages us to think of them from the top of the international hierarchy, as the defining feature of the superpowers and as the great deterrent against a third world war, but we also need to keep an eye on them from the bottom as well. However stable any order—including the nuclear order—may look from the top, its greatest vulnerabilities may well be found at the bottom.

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