

Hudson Institute

# The Decline of Deterrence

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*Senior Fellow*

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The views herein, as well as any errors and omissions, remain the author's own and do not necessarily reflect the positions of any institution with which he is affiliated.

## ***Acronyms***

ASAT	Anti-Satellite
BMEWS	Ballistic Missile Early Warning System
C2	Command and Control
CCP	Chinese Communist Party
EMP	Electromagnetic Pulse
HEU	Highly Enriched Uranium
HUMINT	Human Intelligence
ICBM	Intercontinental Ballistic Missile
INF	Intermediate-Range Nuclear Forces
IRBM	Intermediate-Range Ballistic Missile
KT	Kilotons
MAD	Mutual Assured Destruction
MIRV	Multiple Independently Targeted Re-entry Vehicle
MRBM	Medium-Range Ballistic Missile
MT	Metric Tons/Megatons
NATO	North Atlantic Treaty Organization
NORAD	North American Air Defense Command
NSC	National Security Council
PGM	Precision-Guided Munitions
PLA	People's Liberation Army
SCADA	Supervisory Control and Data Acquisition
SIGINT	Signals Intelligence
SLBM	Submarine-Launched Ballistic Missile
SS	Surface-to-Surface
SSBN	Ballistic Missile Submarines
START	Strategic Arms Reduction Treaty
UAE	United Arab Emirates
UUV	Unmanned Underwater Vehicle

## *Executive Summary*

*The Department of Defense’s enduring mission is to provide combat-credible military forces needed to deter war and protect the security of our nation.<sup>1</sup>*

—National Defense Strategy of the United States of America

Since the end of World War II, the United States has relied on deterrence as the centerpiece of its defense strategy. This emphasis endures in the Trump administration’s National Security Strategy and National Defense Strategy. Yet as this study shows, the strategic environment in which deterrence must function has changed dramatically, and continues changing. Moreover, some lessons that we thought had emerged from our Cold War experience regarding the robustness of deterrence strategies have proven false. Similarly, some critical assumptions regarding how rationally humans behave when making decisions under conditions of risk have been overturned by advances in the cognitive and behavioral sciences.

Deterrence involves efforts to prevent a competitor (the object or “target”) from pursuing a proscribed action. Those employing deterrence seek to influence the target’s calculation of the costs, benefits, and risks associated with pursuing the proscribed action. Assuming a rational target, deterrence works by convincing the rival that it has an unacceptably low probability of achieving its goals (deterrence through denial) or that the costs involved in pursuing the proscribed action will exceed any benefits derived (deterrence through punishment).

While it cannot be proven that strategies based on deterrence have maintained the general peace for the past three-quarters of a century, there is strong circumstantial evidence supporting this. In particular, the introduction of nuclear weapons, with their immense destructive power, combined with the development of other increasingly capable weapons, has raised the prospective costs of war to such high levels that waging it is an increasingly unattractive proposition for “rational” policymakers who seek to maximize their overall anticipated gains and minimize projected costs.

That said, the international system is entering a new, more contentious era. The “unipolar era” that followed the Cold War and that saw the United States enjoy a rare period of singular military dominance has passed into history. Not only is military power becoming more diffused, thanks to the introduction of new kinds of military capability; it is also

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<sup>1</sup> James Mattis, *Summary of the 2018 National Defense Strategy of the United States of America* (Washington, DC: Department of Defense, n.d.), p. 1, <https://www.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

becoming increasingly multidimensional. Moreover, military competitions have expanded progressively into new parts of the globe and new domains to include space, cyberspace, and the seabed.

Given these and other ongoing changes in the international security environment, it seems fair to ask: Will strategies relying primarily on deterrence prove as effective in the coming years as they did during the Cold War and unipolar eras?

This study finds that changes in the geopolitical and military-technical environments are eroding the effectiveness of strategies based on deterrence. Moreover, relatively recent revelations of Cold War history and advances in the behavioral sciences raise important concerns regarding our understanding of how deterrence has worked in the past, as well as its limitations going forward. In brief, the efficacy of deterrence is being challenged across multiple fronts.

### **The Shifting Geopolitical Environment**

The United States confronts an international security system which, unlike the system between 1945 and the present, is not bipolar or unipolar, but multipolar. The emergence of major revisionist great powers in China and Russia, combined with the proliferation of nuclear weapons and other advanced military capabilities to second-tier powers, has increased the number of rivals the United States seeks to deter, providing more opportunities for deterrence to fail.

With respect to nuclear weapons, the radical reductions in U.S. and Russian Cold War nuclear arsenals, combined with the growth in Chinese, Indian, and Pakistani arsenals, is progressively shifting the competitive environment from the bipolar Cold War framework to a multipolar system. Consequently, some nuclear postures that contributed to stability during the Cold War—such as “parity”—may be problematic or even impossible to achieve.

The geopolitical environment is also considerably more dynamic than either the Cold War system or the U.S.-dominated unipolar system that followed it. This makes rapid—and potentially highly destabilizing—shifts in geopolitical alignments and the military balance relatively more likely, presenting additional challenges to executing strategies relying primarily on deterrence.

### **A Multidimensional Strategic Military Competition**

Conventional weapons have become increasingly precise, capable of effectively striking some targets once reserved solely for nuclear weapons. Advances in their design have

enabled the fielding of increasingly discriminate weapons. Thus the clear distinction that existed for most of the Cold War between conventional and nuclear weapons has become progressively blurred. Yet despite this trend, a significant number of Western political leaders believe nuclear weapons' only use is to deter others from employing nuclear weapons. This perceived decoupling could lower the perceived risks of waging conventional war. On the other hand, some civilian and military leaders in countries like China and Russia assert that certain types of nuclear weapons are, in some cases, available for use in a major conventional war. Deterrence may be compromised if Western leaders see the risks that nuclear weapons will be employed in a conventional war as minimal, while the Chinese and Russians view these weapons as available for use.

The introduction of cyberweapons, with their enormous but untested potential, has further muddied the deterrence waters. Insofar as cyberweapons reduce senior decision-makers' confidence in their early warning and command-and-control (C2) systems, they may be compelled to delegate nuclear (or strategic) force release authority to subordinate commanders, increasing substantially the number of individuals who can authorize a strategic attack. If even one of these individuals is more risk tolerant than their senior decision-maker(s), deterrence will be weakened.

If the prospective attacker's decision-makers believe the effectiveness of a rival's early warning and C2 systems is significantly compromised, this would logically reduce the anticipated costs (and risks) of executing a surprise attack during a crisis, all other factors being equal. If so, the efficacy of deterrence would be diminished.

The uncertainty over the relative value and effectiveness of these military capabilities is further complicated by the long absence of war between major military powers, which provides the ultimate test of military systems, force structures, and the doctrines governing their employment. As time passes, uncertainty increases with respect to the true nuclear, conventional, and cyber military balances and their interrelationships. The introduction of new capabilities will complicate matters even further. This heightens the chances that prospective belligerents will reach significantly different conclusions about the true military balance and, by extension, the risks of pursuing a proscribed course of action.

### **Proximity and Speed of Attack**

The decline in the efficacy of deterrence is also a consequence of geography. The proliferation of nuclear and other strategic weapons to states in relatively close proximity to one another is significantly reducing attack warning times compared to those that existed between the United States and Soviet Russia during most of the Cold War. Under such conditions, some senior policymakers may feel they need to place their strategic forces on "hair-trigger" alert in a crisis. The incentive to devolve release authority for strategic forces

to lower-level commanders would also likely increase. This could enhance deterrence, but it would also increase the risk of accidental or unauthorized use of strategic forces.

### **Expansion in New Domains**

The expansion of military competition in the relatively new domains of space, cyberspace, and the seabed finds a growing number of state and non-state rivals competing for advantage. In each domain, the competition favors the offense. This undermines deterrence through denial since, all other factors being equal, the costs associated with taking a proscribed action are less than those needed to block the action successfully.

In each domain, identifying the source of an attack—especially promptly—is relatively difficult compared to large-scale attacks in more traditional warfighting domains, such as land, air, and sea. This lowers the risk associated with pursuing a proscribed action in these domains and, in so doing, incentivizes risk-tolerant actors, eroding the efficacy of deterrence through punishment.

### **The Democratization of Destruction**

The rapidly increasing ability of non-state entities to inflict large-scale destruction also undermines deterrence, as some groups, like millenarian groups, simply wish to inflict destruction—to “watch the world burn.” In such cases, deterrence through denial is the only possible strategy, as deterrence through the threat of punishment would matter little to those who are willing—even eager—to give their lives to achieve their aims. Indeed, non-state groups have little, if anything, in the way of economic infrastructure and population against which to retaliate.

### **The Human Condition**

Over the past forty years, advances by scholars in the cognitive and behavioral sciences find that human beings cannot be counted on to act rationally in making decisions where risk is involved. Research also finds that there are impediments to our ability to understand how rivals calculate cost, benefit, and risk. Some of these impediments, especially those created by a cultural divide, may prove difficult, if not impossible, to bridge.

Those creating deterrence strategies can derive some comfort from prospect theory, which shows that people are generally less willing to take risks to acquire what they do not have than to preserve that which is theirs. Alas, all too often, both rivals view themselves as in a “domain of loss,” and are thus willing to run relatively high risks in order to prevail. Of course, the more risk tolerant an adversary is, the more difficult that adversary is to deter. Optimism bias, which appears to be prevalent among political leaders, can lead them to discount the dangers of pursuing risky courses of action and to “double down” when things

go badly, as opposed to cutting their losses. Again, a bias toward resolving uncertainty in one's favor increases a decision-maker's anticipated gains, reduces prospective losses, and/or diminishes the projected risks in pursuing a proscribed course of action. All work to undermine deterrence.

The need to be treated "fairly" and "honorably" can also skew a decision-maker's "rational" calculations of cost, benefit, and risk. This can find political leaders rejecting "win-win" deals in favor of "lose-lose" outcomes, further complicating the challenges involved in crafting effective deterrence strategies.

### **Some Modest Suggestions**

In light of these trends, a senior defense policymaker could be forgiven for concluding that strategies relying on deterrence are difficult to craft at best, and a fool's errand at worst. Yet although the effectiveness of deterrence strategies is declining, strategies based on deterrence should hardly be abandoned. Such strategies can and have been successful. Humans, when making decisions, *do* weigh the costs, benefits, and risks of their decisions. And even highly risk-tolerant leaders, including tyrants, are not necessarily reckless when it comes to making decisions under conditions of risk.

Simply stated, all is not lost when it comes to deterrence. True, there are formidable challenges involved in developing *any* effective strategy against a serious geopolitical rival. Still, there is nothing "automatic" about deterrence. Crafting effective deterrence strategies in today's environment will require hard and sustained intellectual effort by talented strategists.

Toward this end, some useful first steps to improve the crafting of contemporary strategies based on deterrence are listed here.

#### ***Have Decision-Makers Become "Human-Decision-Making Literate"***

Senior defense decision-makers and those responsible for constructing strategy need to understand the limitations on human decision-making under conditions of risk. This does not mean they must immerse themselves in the cognitive and behavioral sciences. It does, however, mean they must have a clear awareness of what these advances tell us regarding deterrence strategies' prospects for success.

#### ***Understand the Competition Better***

If you want to deter someone, particularly if that someone is a tyrant or has achieved absolute rule, it is a good idea to find out as much as possible about that individual. It might

be best to give attention here to identifying what these leaders most value and fear losing to enhance deterrence strategies based on punishment.

### ***Plan More Realistically***

Given that strategic warfare is increasingly multidimensional, the Defense Department should conduct a comprehensive net assessment of the strategic military balance. This means building upon the Nuclear Posture Review and Missile Defense Review, which focus on a narrow part of the competition. It also means developing a clear understanding of how the Chinese and Russians, in particular, view strategic and large-scale conventional warfare.

### ***Revise Escalation Ladders and Paths***

Deterrence strategies can benefit from a fundamental rethinking of vertical and horizontal escalation ladders, including cross-cutting conventional and strategic warfare escalation paths. Now that there are new means of promptly and effectively attacking strategic targets, like precision munitions and cyber payloads, along with nuclear weapons employing advanced designs, the Cold War conventional/nuclear vertical escalation ladder is badly in need of revision. The same is true for horizontal, or geographic escalation.

Once the revised escalation ladders and paths are completed, planners can work to identify those areas where the United States enjoys an advantage over its rivals and those where it does not. They can also pursue initiatives to establish positions of advantage where they are most needed to fortify deterrence. These efforts should be informed by identification of rival power escalation ladders/paths.

### ***Enhance Early Warning and Command-and-Control Systems***

Given the compression of attack warning times owing to increased geographic proximity and high-speed means of weapons delivery, efforts should be made to “buy back” warning time at a cost that does not exceed what it would take for rivals to cancel out the gains. Should this prove successful, it could strengthen deterrence by reducing, if only at the margins, the temptation to strike first in a crisis.

### ***Enhance Intelligence Efforts Associated with Attribution***

An inability to determine the source of an attack, and to do so promptly, risks undermining deterrence strategies based on the threat of inflicting prompt, unacceptable punishment on the target. The problem might be ameliorated through increased intelligence efforts, particularly human intelligence (HUMINT) and signals intelligence (SIGINT).

***Exercise Capabilities to Lower Uncertainty***

One way to reduce U.S. (and rival) uncertainty regarding the effectiveness of new capabilities is to conduct realistic exercises at the operational level of war—the level at which campaigns are conducted. While not a substitute for war, such exercises—especially when conducted on high-fidelity training ranges—can significantly enhance our understanding of the prospective effectiveness of various military doctrines, force structures, and capabilities. To the extent that they can, this may help reduce divergent views of the military balance and, in so doing, enhance the effectiveness of strategies relying on deterrence.

## ***Introduction***

*Deterrence is something you really have to work at.*<sup>2</sup>

—Andrew W. Marshall

**T**his study describes how changes in the geopolitical and military-technical environment are eroding the effectiveness of strategies based on deterrence, and how recent revelations about Cold War history and advances in the behavioral sciences are reducing confidence in their intellectual underpinnings. The study is principally concerned with the challenges confronting U.S. defense policymakers. That said, the presentation that follows would also be useful to any defense planners engaged in crafting and applying deterrence strategies.

Since the end of World War II, the United States has placed great reliance on deterrence as the centerpiece of its defense strategy. This emphasis endures in the Trump administration’s National Security Strategy and National Defense Strategy. Yet, as this study shows, the strategic environment in which deterrence must function has changed dramatically and continues changing at a rapid pace. Moreover, some lessons that we thought had emerged from our Cold War experience regarding the robustness of deterrence strategies have proven false. Similarly, some critical assumptions regarding how rationally humans behave when making decisions under conditions of risk have been overturned by advances in the cognitive and behavioral sciences.

For over seventy years, the world has been spared the catastrophic destruction inflicted by the two world wars that marked the first half of the twentieth century. Much of the credit for this has been accorded to defense strategies emphasizing deterrence, particularly as pursued by the Cold War superpowers, the United States and Soviet Russia. Following the Cold War and the Soviet Union’s collapse, senior U.S. national security policymakers have continued relying on deterrence as the main pillar of America’s defense strategy. Blessed with no great-power rivals and with overwhelming conventional military power, it was possible for senior U.S. defense policymakers to avoid the hard work involved in developing good strategy.<sup>3</sup>

Indeed, a succession of U.S. administrations, rather than focus on extending America’s favorable competitive position, accorded priority to building a post–Cold War international

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<sup>2</sup> Andrew W. Marshall, conversation with the author, February 13, 2017.

<sup>3</sup> Andrew F. Krepinevich and Barry D. Watts, “Lost at the NSC,” *National Interest* (January/February 2009): 63–72.

system based on collective security rather than balance of power politics.<sup>4</sup> The U.S. armed forces were accordingly directed to devote a relatively large amount of time and effort toward “shaping” the global environment rather than preserving their dominant position in key military competitions.

These efforts failed because the presumption that the international system was amenable to collective security proved false. Collective security has not succeeded when one or more of the great powers rejects the status quo. Yet this is the situation the United States confronts. Evidence is found in the rise of revisionist powers in China, Iran, and Russia and the hostile activities of a nuclear-armed North Korea. These states, along with radical non-state groups, reject the U.S.-led liberal international order and seek to replace it with one more to their own liking. In particular, as China and Russia have accumulated the means to contest the established order, they have become increasingly assertive in their efforts to undermine it. Consequently, the international system is entering a new, more contentious era. The “unipolar era” that followed the Cold War and saw the United States enjoy a rare period of singular military dominance has passed into history. Military power is becoming more diffused, and thanks to the introduction of new kinds of military capability, the military competition is increasingly multidimensional. Military operations have expanded into new parts of the globe and new domains, to include space, cyberspace, and the seabed.

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<sup>4</sup> Collective security assumes that peace will be preserved through global consensus among the great powers. It also assumes that international conflict is the product of “clouded thinking,” not a clash of interests among states and groups. It is rooted in the presumption that all major powers have the same interest in resisting specific violations of the international order, up to and including acts of aggression. Henry Kissinger, *Diplomacy* (New York: Simon & Schuster, 1994), pp. 51–53, 221–223, 246–250. This thinking can be seen in the Clinton administration’s “Partnership for Peace” initiative, which drew substantially on Ashton B. Carter, William J. Perry, and John D. Steinbruner, *A New Concept of Cooperative Security* (Washington, DC: The Brookings Institution, 1992). President George W. Bush extended this effort in the sense that he undertook to find common ground with Russia, declaring he had a sense of Russian president Vladimir Putin’s “soul” and found him “trustworthy.” Caroline Wyatt, “Bush and Putin: Best of Friends,” *BBC News*, June 16, 2001, <http://news.bbc.co.uk/2/hi/1392791.stm>. Although relations with Russia continued to decline, President Obama attempted, without success, to “reset” them on what was hoped would be a common respect for established international norms of behavior. Steven Mufson, “Bush Saw Putin’s ‘Soul.’ Obama Wants to Appeal to His Brain,” *Washington Post*, December 1, 2015, [https://www.washingtonpost.com/business/economy/bush-saw-putins-soul-obama-wants-to-appeal-to-his-brain/2015/12/01/264f0c7c-984b-11e5-8917-653b65c809eb\\_story.html](https://www.washingtonpost.com/business/economy/bush-saw-putins-soul-obama-wants-to-appeal-to-his-brain/2015/12/01/264f0c7c-984b-11e5-8917-653b65c809eb_story.html), and Geoff Cutmore and Antonia Matthews, “Russia-U.S. Relations Reset ‘Impossible:’ PM Medvedev,” *CNBC*, October 15, 2014, <http://www.cnbc.com/2014/10/15/russia-us-relations-reset-impossible-pm-medvedev.html>. In a similar vein, a succession of U.S. administrations encouraged a rising China to integrate itself into the existing international system and act as a responsible stakeholder.

Thus the United States finds its “unipolar moment”<sup>5</sup> having come and gone. The challenges to U.S. security are increasing at an alarming rate,<sup>6</sup> even as its fiscal foundation continues to erode.<sup>7</sup> The growing gap between U.S. security objectives and the means likely available to achieve them strongly suggests the need for a fresh approach to U.S. national security strategy in general, and defense strategy in particular.

As U.S. policymakers grapple with the challenges now confronting them, it comes as no surprise that they are inclined to rely heavily on deterrence as the cornerstone of America’s defense strategy. While it cannot be proven that strategies based on deterrence have maintained the general peace for the past three-quarters of a century, there is strong circumstantial evidence supporting this. In particular, the introduction of nuclear weapons, with their immense destructive power, combined with the development of other increasingly capable weapons, has raised the prospective costs of war to such high levels that waging it is increasingly unattractive for “rational” policymakers who seek to maximize their overall anticipated gains and minimize projected costs.

Yet there are reasons to believe that such reliance might be misplaced. Recent geopolitical and military-technical trends strongly suggest that the efficacy of deterrence is experiencing a significant—and perhaps even a precipitous—decline. Further complicating matters, histories of the Cold War reveal that deterrence was not as sturdy a bulwark against major war as was thought at the time. In addition, recent advances in the cognitive sciences throw some doubt on the psychological theories underpinning deterrence theory.

This study describes how and why deterrence is in relative decline as an effective element of a defense strategy whose objective is to avoid large-scale nuclear (“strategic”) and conventional war. It also offers some modest suggestions on what might be done to mitigate the erosion of deterrence.

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<sup>5</sup> The term “unipolar moment” stems from an article by Charles Krauthammer in 1990. It has come to refer to the period following the Cold War when the U.S. stood as the world’s leading power with no serious rivals—in effect, a “unipolar” international system. As Krauthammer also noted in his article, “No doubt, multipolarity will come in time.” And it has. Charles Krauthammer, “The Unipolar Moment,” *Foreign Affairs* 70, no. 1 (1990): 23.

<sup>6</sup> The National Defense Strategy Commission (on which the author served) found “the security and wellbeing of the United States are at greater risk than at any time in decades.” National Defense Strategy Commission, *Providing for the Common Defense* (Washington, DC: U.S. Institute of Peace, 2018), p. v.

<sup>7</sup> For an overview of the weakening economic position of the United States, see Andrew F. Krepinevich, *Preserving the Balance* (Washington, DC: CSBA, 2017), pp. 38–43, 59–67.

## Deterrence Defined

In its simplest form, deterrence involves efforts to prevent a competitor (the object, or “target”) from pursuing a proscribed action. Those employing deterrence seek to influence the target’s calculation of the costs, benefits, and risks associated with pursuing the proscribed action. Assuming a rational opponent—one that acts to maximize its overall anticipated gains and minimize anticipated costs—deterrence works by convincing the adversary that it has an unacceptably low probability of achieving its goals (deterrence through denial) or that the costs involved in pursuing the proscribed action will exceed any benefits derived (deterrence through punishment).<sup>8</sup>

China’s People’s Liberation Army (PLA), in its 2013 edition of *The Science of Military Strategy*, defines military deterrence as

the strategic operation, with the threat to use or the actual use of military capability in order to influence the adversary’s strategic judgments by making the adversary feel [it] difficult to achieve anticipated targets [deterrence through denial] or [that] the cost may exceed the benefit [deterrence through punishment], conducted by countries or political groups for certain political goals.<sup>9</sup>

For a strategy based on deterrence to be successful, five requirements must be satisfied. Let’s assume that State A seeks to deter State B. First, State A must communicate to State B that a certain action (or actions) on B’s part would trigger a response from State A. (These proscribed actions are sometimes referred to as “crossing red lines.”) Second, State B must clearly understand both the proscribed action and the prospective consequences<sup>10</sup> that would ensue should it cross State A’s red line.

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<sup>8</sup> See William W. Kaufmann, “The Requirements of Deterrence,” in *Military Policy and National Security*, ed. William W. Kaufmann (Princeton, NJ: Princeton University Press, 1956) and Alexander George and Richard Smoke, *Deterrence in American Foreign Policy: Theory and Practice* (New York: Columbia University Press, 1974).

<sup>9</sup> Research Department of Military Strategy, Academy of Military Sciences, *The Science of Military Strategy* (Military Science Press, 2013), p. 134, cited in Mingda Qiu, “China’s Science of Military Strategy: Cross-Domain Concepts in the 2013 Edition” (Cross Domain Deterrence Working Paper, University of California at San Diego, La Jolla, CA, September 2015), pp. 10, 139. The PLA emphasizes the importance of targeting the enemy’s population as well as its political and military leaders. Thus “the goal is to attract wide attention from and impose utmost fear to the adversary and its people psychologically. . . . [We should] use the civilian population as the medium to spread and magnify the fear by creating all sorts of [potential] striking effects to disrupt and reduce the enemy’s willingness to resist. [We should] try to spread the fear step by step but with increasing magnitude and impact, in order to maximize the effect of deterrence.”

<sup>10</sup> The term “prospective consequences” as employed here refers to those situations where significant ambiguity exists with respect to the actions State A will take if State B pursues the proscribed action. For example, prior to the onset of the First Gulf War, the United States sought to deter Iraq’s leader, Saddam Hussein, from employing chemical weapons in the event of war. American emissary Richard Armitage was

Third, State A's threat of action must be credible. In other words, State B must believe State A will take the action it has threatened to take if its red line is crossed, and that it will produce the effects threatened by State A. Fourth, assuming State B accepts State A's threat as credible, it must also believe that the prospective costs it will incur by crossing the red line will exceed its anticipated gains (deterrence through the threat of punishment), or that State A's action will preclude State B from achieving its objective (deterrence through denial).<sup>11</sup> Finally, State B must act in a "rational" manner, meaning in such a way that it maximizes its prospective gains and/or minimizes its losses. If these conditions are met, State A has successfully deterred State B.

For the purpose of this study, the discussion of deterrence as it pertains to major war will not be limited to nuclear weapons. It will focus on the deterrence of hostile action serious enough to cause loss of life and physical damage on a large scale. As Colin Gray points out, if the "subject is deterrence," then "it cannot sensibly be treated as either conventional or nuclear."<sup>12</sup> This stems partly from the growing blurring of the distinction between nuclear and conventional weapons (a topic I will elaborate upon presently). However, it is also the consequence of statements by senior U.S. and allied nuclear-power leaders that nuclear weapons have very narrow strategic and political utility.<sup>13</sup> Such statements imply a growing reliance on conventional forces to underwrite deterrence against non-nuclear forms of large-scale aggression.

## Structure

This study begins with a brief overview of the role deterrence played in avoiding nuclear and conventional war between the superpowers during the Cold War. This is followed by an extended assessment of the causes and implications of the decline in the effectiveness of deterrence. The study concludes with some illustrative recommendations as to how the

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instructed to say that if Iraq employed chemical weapons it "will be dealt with in the harshest fashion." While the American threat was somewhat ambiguous, in diplomatic terminology, a phrase such as "the harshest fashion" suggests the United States was threatening to destroy Iraq as a functioning society or (more likely) forcibly remove Saddam from power. Rick Atkinson, *Crusade* (New York: Houghton Mifflin, 1993), p. 124.

<sup>11</sup> For a discussion of deterrence theory, particularly as it was developed during the Cold War and especially as it pertained to nuclear weapons, see, for example, Bernard Brodie, *Strategy in the Missile Age* (Princeton, NJ: Princeton University Press, 1959), pp. 264–304; Lawrence Freedman, *The Evolution of Nuclear Strategy* (New York: St. Martin's Press, 1983), pp. 40–44, 193–94; and Thomas C. Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 1966), pp. 1–34.

<sup>12</sup> Colin S. Gray, *Modern Strategy* (Oxford: Oxford University Press, 1999), p. 167.

<sup>13</sup> John B. Sheldon, "A Fatal Disconnect: Conventional Deterrence in a Nuclear-Armed World," in *Returning to Fundamentals: Deterrence and U.S. National Security in the 21<sup>st</sup> Century*, by Robert Butterworth et al. (Washington, DC: George C. Marshall Institute, 2011), p. 28. See also Hew Strachan, "The Strategic Gap in British Defence Policy," *Survival* (August-September 2009): 56–57.

United States might adapt to these changes in the competitive environment to preserve, as much as possible, the utility of deterrence as a pillar of its defense strategy. The study's ultimate objective is to aid U.S. policymakers and defense planners in addressing this question: What role can—and should—deterrence play in U.S. defense strategy?

## **The Cold War and the Rise of Deterrence**

Deterrence as an element of strategy is as old as war itself, but it took on a new prominence in strategic thinking with the introduction of nuclear weapons. Shortly after the atomic attacks on Hiroshima and Nagasaki, which ushered in the Nuclear Age, strategist Bernard Brodie was moved to write: “Thus far the chief purpose of our military establishment has been to win wars. From now on the chief purpose must be to avert them.”<sup>14</sup> Brodie, of course, was reacting to the atomic bomb's immense destructive power.

As a student of military history, Brodie knew that earlier technical breakthroughs in military capability, from the stirrup to the crossbow, from gunpowder to air power, had always spread from one military to another.<sup>15</sup> Thus it was almost certainly only a matter of time before the United States would lose its nuclear monopoly. In fact, it lasted barely four years. In August 1949, Soviet Russia tested its first nuclear weapon, and by the mid-1950s, both superpowers had developed thermonuclear weapons (hydrogen bombs), whose yields were orders of magnitude greater than the fission weapons (atomic bombs) used against Japan. As Brodie predicted, a consensus emerged that nuclear weapons had made war between states armed with them so terrible that no rational leader would pursue it. To paraphrase British prime minister Stanley Baldwin, the inability of technology to provide for effective air and missile defenses meant the nuclear ballistic missile attack would “always get through” and inflict unimaginable destruction.<sup>16</sup>

Simply put, nuclear weapons favored the offense. Even if defenses could intercept over 90 percent of attacking aircraft and missiles, as U.S. and Russian arsenals grew to hundreds and then thousands of weapons, the 10 percent that made it through would inflict catastrophic damage. Moreover, it turned out during the Cold War that advances in missile defense technology could always be offset, and at lower cost, by improvements in nuclear

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<sup>14</sup> Bernard Brodie, “War in the Atomic Age” and “Implications for Military Policy,” in *The Absolute Weapon*, ed. Bernard Brodie, Yale Institute of International Studies, February 15, 1946, p. 62, unpublished paper.

<sup>15</sup> See Bernard and Fawn M. Brodie, *From Crossbow to H-Bomb* (Bloomington, IN: Indiana University Press, 1973).

<sup>16</sup> Stanley Baldwin, “A Fear for the Future,” *Times* (London), November 11, 1932, p. 7. Baldwin stated, “I think it is well for the man in the street to realise that there is no power on earth that can protect him from being bombed. Whatever people may tell him, the bomber will always get through.”

offensive missile forces, as through the introduction of penetration aids and missiles armed with multiple warheads (multiple independently targeted re-entry vehicles, or MIRVs).

Under these circumstances, another major conventional war had to be avoided—or deterred—lest it escalate to a nuclear exchange. Following thermonuclear weapons<sup>17</sup> testing by the United States in 1952 and Soviet Russia in 1953,<sup>18</sup> Winston Churchill, then serving his last term as Great Britain’s prime minister, was moved to hope that deterrence would work, and that “safety will be the sturdy child of terror, and survival the twin brother of annihilation.”<sup>19</sup> President John Kennedy concurred, observing that in a major war involving nuclear weapons, “even the fruits of victory would be ashes in our mouth.”<sup>20</sup>

For over forty years of Cold War, Churchill’s hope was fulfilled. The two nuclear superpowers not only refrained from using nuclear weapons, but also from engaging in direct conventional warfare—something the world’s major powers had twice failed to avoid in the first half of the twentieth century. The Americans and Russians sought to remain well below the nuclear and conventional war thresholds, limiting themselves to gaining advantage through supporting client states or non-state, irregular-warfare proxy forces.

## **The Post–Cold War Unipolar Moment**

With Soviet Russia’s collapse in 1991, the United States emerged as the world’s sole superpower, with by far its most capable conventional military forces. As during the Cold War, deterrence remained the centerpiece of a strategy designed to prevent a nuclear or

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<sup>17</sup> The destructive potential of thermonuclear weapons (hydrogen bombs) is vastly greater than that of fission weapons (atomic bombs). For example, the largest thermonuclear weapon ever tested, Russia’s Tsar Bomba (“King of Bombs”), had a yield of roughly 50 megatons (MTs), or roughly 4,000 times that of the fission bomb used against Hiroshima. (The Russian code-name for the bomb was “Big Ivan.”) By comparison, the largest fission bomb ever tested, the American “Ivy King,” had a yield of roughly 500 kilotons (KTs), or 1 percent of the yield of Big Ivan. Stephen Dowling, “The Monster Atomic Bomb That Was Too Big to Use,” BBC, August 16, 2017, <http://www.bbc.com/future/story/20170816-the-monster-atomic-bomb-that-was-too-big-to-use>; “Operation Ivy Atomic Test,” AtomCentral.com, <http://www.atomcentral.com/operation-ivy.aspx>; and Vitaly I. Khalturin et al., “A Review of Nuclear Testing by the Soviet Union at Novaya Zemlya, 1955–1990,” *Science and Global Security* 13 (2005): 18.

<sup>18</sup> The first Russian test of a hydrogen bomb along the lines of the American 1952 test did not occur until November 1955.

<sup>19</sup> Winston Churchill, Speech before the House of Commons, March 1, 1955, [http://hansard.millbanksystems.com/commons/1955/mar/01/defence#S5CV0537P0\\_19550301\\_HOC\\_281](http://hansard.millbanksystems.com/commons/1955/mar/01/defence#S5CV0537P0_19550301_HOC_281).

<sup>20</sup> President John F. Kennedy, “Radio and Television Report to the American People on the Soviet Arms Buildup in Cuba,” October 22, 1962, John F. Kennedy Presidential Library, <https://www.jfklibrary.org/Asset-Viewer/sUVmCh-sB0moLfrBcaHaSg.aspx>.

major conventional war.<sup>21</sup> And why not? Achieving one's security objectives without resorting to force is almost always preferable to securing them through war. Moreover, many policymakers and members of the security studies community concluded that despite some close calls—the Cuban Missile Crisis in particular—deterrence had proven itself. As Zbigniew Brzezinski noted, “We defended our allies in Europe for 40 years during the worst days of the Cold War—very threatening days of the Cold War—and nothing happened. So deterrence does work.”<sup>22</sup> Brzezinski was right. But did deterrence work as well as was generally assumed? And is its effectiveness as the cornerstone of U.S. defense strategy likely to endure?

Some Western policymakers and members of the strategic studies community appear to take Brzezinski's observation too literally. They seem to believe that deterring a nuclear conflict is not especially demanding. They also assert that the sole purpose of nuclear weapons is to prevent adversaries from employing their nuclear weapons. If so, this arguably leaves the world “safe” for conventional war without the prospect of escalation to nuclear use. Those who reflect this mindset typically favor further deep cuts to the U.S. nuclear arsenal. In their view, Cold War nuclear scenarios, strategies, and contingency planning are artifacts of a bygone era.

Such views are epitomized by France's former foreign minister, Hubert Védrine. In responding to concerns over Iran's prospective development of nuclear weapons, Védrine asserted that French president Jacques Chirac “said things that many experts are saying around the world, even in the United States. That is to say, that *a country that possesses the bomb does not use it and automatically enters the system of deterrence and doesn't take absurd risks.*”<sup>23</sup> [Italics in this and the following paragraphs are mine.]

Indeed, President Chirac stated that “*our [nuclear] deterrent guarantees, in the first place, that France's survival will never be placed into question by a major military power with hostile intentions.*”<sup>24</sup> Chirac also declared that the French nuclear “deterrent force *guarantees* France against the possible use of weapons of mass destruction, of whatever

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<sup>21</sup> Although the United States fought in two conventional wars against Iraq, in 1991 and again in 2003, they were not the result of a failure of deterrence, but were wars initiated by two U.S.-led coalitions.

<sup>22</sup> “A Conversation with Zbigniew Brzezinski,” Council on Foreign Relations, March 29, 2012, <https://www.cfr.org/event/conversation-zbigniew-brzezinski>.

<sup>23</sup> Elaine Sciolino, “Chirac's Iran Gaffe Reveals a Strategy: Containment,” *New York Times*, February 3, 2007, <https://www.nytimes.com/2007/02/03/world/europe/03france.html>.

<sup>24</sup> Jacques Chirac, speech at the Institut des Hautes Études de Défense Nationale, June 8, 2001, and Jacques Chirac, Discours à l'occasion de la réception des ambassadeurs, Palais de l'Élysée, August 31, 1995, p. 10, cited in David S. Yost, “France's Nuclear Deterrence Strategy: Concepts and Operational Implementation,” in *Getting MAD: Nuclear Mutual Assured Destruction, Its Origins and Practice*, ed. Henry D. Sokolski (Carlisle, PA: U.S. Army War College Strategic Studies Institute, November 2004), pp. 212, 220.

type they may be. The notion of deterrence in the face of threats from wherever they may come retains—and will retain for a long time to come—all its meaning.”<sup>25</sup>

Chirac’s views were echoed by France’s chief of staff of the armed forces, General Henri Bentégeat, who stated: “Deterrence has been adapted to remain credible within the enduring framework of a non-use policy.”<sup>26</sup> In other words, France’s political and military leadership asserted that its nuclear arsenal guarantees that their country will not be subjected to nuclear attack. Given France’s relatively modest nuclear arsenal, these views suggest that deterrence against nuclear attack can be readily maintained (“automatically,” according to Védrine) with high confidence (it “guarantees” in Chirac’s words) with far smaller arsenals than are currently maintained by either Russia or the United States.

A significant number of senior American political and military leaders have made similar statements regarding the efficacy of nuclear weapons in deterring nuclear use by others. Former president Bill Clinton asserted that “deterrence still works, just like it did between us and the Soviet Union.” William Perry, who served as secretary of defense in the Clinton administration, stated that “deterrence has protected us from the established nuclear arsenals for decades, and it will continue to protect us.” Clinton’s deputy secretary of defense, John Deutch, declared that “deterrence is *assured* by having a survivable [nuclear] capability to hold at risk what potentially hostile leaders value, and we will maintain that capability.”<sup>27</sup>

Further echoing the views of those French leaders cited above, a group of distinguished U.S. security experts, including a former secretary of state, two former defense secretaries, three former national security advisors, and a former chairman of the Joint Chiefs of Staff, declared that “deterring nuclear attack by today’s Russia (and by China for the foreseeable future) can be achieved at significantly lower [nuclear force] levels than are now planned” and that “an operationally deployed force of fewer than 1,000 nuclear weapons may well be justified.”<sup>28</sup> Other defense experts have argued for similar or greater reductions in the

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<sup>25</sup> Cited *ibid.*, p. 212.

<sup>26</sup> Audition du général Henri Bentégeat, chef d’état-major des armées, sur le projet de loi relatif à la programmation militaire pour les années 2003 à 2008 (no. 187), Commission de la Défense Nationale et des Forces Armées, Compte Rendu no. 19, November 13, 2002, cited *ibid.*, p. 223.

<sup>27</sup> Sebastian Rotella, “At Davos Forum, Every Topic Is Fair Game for Bill Clinton,” *Los Angeles Times*, January 28, 2005, <http://articles.latimes.com/2005/jan/28/world/fg-clinton27>; Bill Gertz, “Perry: Missile Defense Unnecessary,” *Washington Times*, April 26, 1996, p. A6; and John Deutch, Testimony, U.S. House Committee on Foreign Affairs, Nuclear Posture Hearings (Washington, DC: U.S. Government Printing Office, 1995), p. 36, cited in Keith B. Payne, *The Great American Gamble* (Fairfax, VA: National Institute Press, 2008), pp. 210–11.

<sup>28</sup> The National Security Advisory Group, *Reducing Nuclear Threats and Preventing Nuclear Terrorism*, Belfer Center, Harvard University, Kennedy School of Government, October 19, 2017,

U.S. nuclear arsenal.<sup>29</sup> One group, Global Zero, established a Nuclear Policy Commission comprising former senior U.S. defense officials, including former secretary of defense Chuck Hagel and former vice chairman of the Joint Chiefs of Staff, General (Ret.) James Cartwright. The commission presented a plan calling for the United States to reduce its nuclear arsenal to a maximum of 900 weapons, in coordination with Russia or, if need be, unilaterally.<sup>30</sup> The authors assert that such reductions are possible since deterrence based on the threat of retaliation need not be a cornerstone of U.S. strategy. Rather, they argue, “Security is mainly a state of mind, not a physical condition.” Therefore, while “there remains a physical technical side of MAD [mutual assured destruction] in our relations [with Russia], it is increasingly peripheral” since “there is no conceivable situation in the contemporary world in which it would be in either country’s national security interest to initiate a nuclear attack against the other side.”<sup>31</sup> Reflecting at a minimum his general approval of the group’s efforts, President Barack Obama declared, “Global Zero will always have a partner in me and my administration.”<sup>32</sup>

In brief, a significant number of senior Western policymakers and military leaders have concluded, with relatively high confidence, that nuclear use by others can be deterred with nuclear arsenals substantially lower than those possessed by the United States or Russia today. These views, however, are not universally shared. There are nuclear-armed powers that see the situation very differently. For them, possessing significant numbers of nuclear weapons does not guarantee their homelands will be immune from attack by another state. Nor do they believe that nuclear weapons’ only value is to deter adversaries from using nuclear weapons against them. Indeed, their military doctrines assume the use of nuclear weapons under certain conditions. Simply put, they fundamentally disagree with the view that nuclear powers “automatically enter the system of deterrence.” As I will elaborate upon presently, when other geopolitical and military-technical trends are taken into

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<https://www.belfercenter.org/sites/default/files/files/publication/Reducing%20Nuclear%20Threats-FINAL.pdf>.

<sup>29</sup> Bruce Blair et al., “Smaller and Safer: A New Plan for Nuclear Postures,” *Foreign Affairs* (September/October 2010), <https://www.foreignaffairs.com/articles/russian-federation/2010-09-01/smaller-and-safer>. The authors assert that “the United States and Russia could limit their strategic nuclear arsenals to a total level of 1,000 warheads each on no more than 500 deployed launchers without weakening their respective security.” (Note that the current New START agreement allows for the United States and Russia to maintain 1,550 deployed strategic nuclear weapons. It says nothing regarding so-called non-strategic or tactical nuclear weapons. Current estimates find the Russians with between 1,000-6,000 such weapons and the United States with roughly 760.) Amy F. Woolf, “Nonstrategic Nuclear Weapons,” Congressional Research Service, February 21, 2017, <https://fas.org/sgp/crs/nuke/RL32572.pdf>.

<sup>30</sup> Global Zero U.S. Nuclear Policy Commission, *Modernizing U.S. Nuclear Strategy, Force Structure and Posture*, May 2012, p. 1, [https://www.globalzero.org/files/gz\\_us\\_nuclear\\_policy\\_commission\\_report.pdf](https://www.globalzero.org/files/gz_us_nuclear_policy_commission_report.pdf).

<sup>31</sup> *Ibid.*, pp. 1–2.

<sup>32</sup> *Ibid.*, p. ii.

consideration, along with our growing understanding of human behavior, the positions taken by Western leaders and experts described above are very much at odds with the facts.

Even as the United States basked in the glow of its “unipolar moment,” the effectiveness of deterrence was beginning to erode. A number of emerging geopolitical and military-technical trends are causing this erosion to proceed at a worrisome rate. These trends are in many cases cross-cutting. Moreover, confidence in the efficacy of deterrence is also being weakened by detailed studies of the histories of the Cold War and the two Gulf wars. These histories reveal that it is difficult, if not impossible, to determine whether attempts at deterrence were successful, or why.<sup>33</sup> They show, as Richard Betts notes, that “historical support for the idea that calculation of probabilities of success in terms of the prewar balance of forces exerts a decisive effect on deterrence would have to come from cases in which a government wished to start a war, but refrained because the balance was insufficiently favorable. Clear examples of this sort in the last half-century are hard to find.”<sup>34</sup> Robert Butterworth concurs, pointing out that deterrence involves “seeking security through a concept that requires unavailable data about unknown processes, that is not empirically testable, and that cannot be shown to be working.”<sup>35</sup> Finally, as we shall see presently, advances in the social and cognitive sciences serve to further weaken confidence in deterrence as a firm pillar of defense strategy.

That being said, the lack of a major-power conflict in the past seventy-four years, following two such conflicts in the preceding thirty years, provides at least some modest evidence that deterrence worked, despite our inability to assign causality. The danger is that we may continue placing unwarranted confidence in deterrence in the face of major changes in the character of the security competition.

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<sup>33</sup> Robert Butterworth, “Nuclear Force Planning: Odlin or Onan?,” in *Returning to Fundamentals*, p. 6.

<sup>34</sup> Richard K. Betts, “Conventional Deterrence: Predictive Uncertainty and Policy Confidence,” *World Politics* (January 1985): 155.

<sup>35</sup> Butterworth, “Nuclear Force Planning,” p. 7.

## *A Multipolar Competition*

*Deterrence is a psychological phenomenon. It depends above all on what a potential aggressor considers an unacceptable risk.*<sup>36</sup>

—Henry Kissinger

The Cold War was characterized by a bipolar international system and a corresponding bipolar nuclear and conventional military competition between the United States and Soviet Russia. While a few other states, such as China, France, and Great Britain, also possessed nuclear arms, their arsenals were very small compared to those of the two superpowers.<sup>37</sup> Moreover, the two European nuclear powers were also long-standing U.S. allies. While China was an independent actor for much of the latter part of the Cold War, its arsenal remained modest, numbering but a few hundred weapons, while the superpower arsenals ran into the tens of thousands. Israel, like China an independent power (although closely tied to the United States), also maintained a small nuclear arsenal. The bipolar character of the military competition extended to conventional forces, where the U.S. and Russian militaries' combat potential vastly exceeded that of any other military power.

Following the Cold War, the United States enjoyed a near monopoly in battle networks and highly accurate munitions that enabled it to dominate the emerging precision-strike-warfare regime. Indeed, the United States had such an enormous military advantage over any other power or group of powers that it could reduce its armed forces substantially and still enjoy a significant margin of strength. Thus, with respect to deterrence in the nuclear age, for over seventy years the United States has been in the relatively enviable position of confronting either one major military rival, or none.

The world is far different today. Both the United States and Russia have much smaller nuclear arsenals than they did at the Cold War's end. The New START (Strategic Arms

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<sup>36</sup> Henry Kissinger, *White House Years* (Boston: Little, Brown and Co., 1979), p. 67.

<sup>37</sup> The United States possessed over 30,000 nuclear weapons by the early 1960s and over 20,000 at the Cold War's end. By the early 1960s the Soviet Union had several thousand weapons, with its inventory peaking in the mid-1980s at over 40,000. When the Berlin Wall fell, the USSR's nuclear weapons inventory stood at over 35,000. Data provided by the Natural Resources Defense Council, "Table of U.S. Nuclear Warheads," <http://www.nrdc.org/nuclear/nudb/datab9.asp> and "Table of USSR/Russian Nuclear Warheads," <http://www.nrdc.org/nuclear/nudb/datab10.asp>. By contrast, Great Britain's nuclear forces never exceeded 400 weapons, while France's inventory peaked at roughly 500. China's nuclear arsenal is believed never to have numbered more than some 450 weapons. Data provided by the Natural Resources Defense Council, "Table of Global Nuclear Weapons Stockpiles, 1945–2002," <http://www.nrdc.org/nuclear/nudb/datab19.asp>.

Reduction Treaty) limits each country to 1,550 strategic nuclear weapons. At the same time, China has emerged as a great power engaged in a major buildup of its strategic and conventional forces. Once again, Russia appears to enjoy a conventional force advantage over the European NATO allies. Other states—India, North Korea, and Pakistan—have joined the nuclear club, and more, like Iran, appear to be seeking entry. These developments signal a shift from the bipolar nuclear and conventional military competitions that dominated the Cold War to an increasingly multipolar competition. For example, there are now regional multipolar nuclear balances that must be taken into account, such as that between India and its nuclear-armed rivals, China and Pakistan. For its part, China must account for India’s strategic capabilities as well as those of Russia and the United States.

Should Iran acquire a nuclear capability, it could trigger a proliferation cascade in the Middle East, with Saudi Arabia and Turkey the prospective candidates for crossing the nuclear threshold, perhaps along with Egypt and the United Arab Emirates (UAE).<sup>38</sup> If Pakistan, which has close ties to Saudi Arabia, facilitates the latter’s acquisition of nuclear weapons, this could link any Middle East nuclear competition with the South Asian nuclear rivalry. The growing number of nuclear-armed rivals creates one obvious problem for policymakers and defense planners in that strategies and associated actions aimed at deterring one rival may undermine efforts to deter another. As I will elaborate upon presently, both China and Russia have declared that proposed U.S. missile defense deployments to South Korea and Eastern Europe, respectively, are part of an American attempt to achieve absolute security by threatening their nuclear forces’ survivability.<sup>39</sup> In brief, the world is confronting several existing or potential overlapping “n-player” (multipolar) military competitions in general, and nuclear competitions in particular. As General (Ret.) Robert Kehler, the former commander of U.S. Strategic Command notes, “Operations against a regional adversary either having or presumed to have nuclear

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<sup>38</sup> See for example, Andrew F. Krepinevich and Jacob Cohn, *Rethinking Armageddon* (Washington, DC: CSBA, 2016); Andrew F. Krepinevich, *Critical Mass: Nuclear Proliferation in the Middle East* (Washington, DC: CSBA, 2013); Commission on the Prevention of Weapons of Mass Destruction, Proliferation and Terrorism, *World at Risk* (New York: Vintage Books, December 2008), pp. 61–63; Jason Burke, “Riyadh Will Build Nuclear Weapons if Iran Gets Them, Saudi Prince Warns,” *Guardian*, June 29, 2011, <https://www.theguardian.com/world/2011/jun/29/saudi-build-nuclear-weapons-iran>; and Daniel Coats and Charles Robb, *Meeting the Challenge: U.S. Policy Toward Iranian Nuclear Development* (Washington, DC: Bipartisan Policy Center, September 2008), pp. 52–53.

<sup>39</sup> Andrew E. Kramer, “Russia Calls New U.S. Missile Defense System a ‘Direct Threat,’” *New York Times*, May 12, 2016, <https://www.nytimes.com/2016/05/13/world/europe/russia-nato-us-romania-missile-defense.html>; and Etahn Meick and Nargiza Salidjanova, *China’s Response to U.S.-South Korean Missile Defense System Deployment and Its Implications*, U.S.-China Economic and Security Review Commission, July 26, 2017, [https://www.uscc.gov/sites/default/files/Research/Report\\_China%27s%20Response%20to%20THAAD%20Deployment%20and%20its%20Implications.pdf](https://www.uscc.gov/sites/default/files/Research/Report_China%27s%20Response%20to%20THAAD%20Deployment%20and%20its%20Implications.pdf).

weapons would present problems that have never been directly faced and are not yet fully understood.”<sup>40</sup> Similar uncertainties would likely apply with respect to deterring such adversaries.<sup>41</sup>

In a multipolar nuclear world, many of the conditions that contributed to “stability” during the bipolar U.S.-Soviet Cold War nuclear competition would no longer obtain. For example, “parity”—having a nuclear capability comparable to that of your existing or prospective rival(s)—is not an option for all states engaged in an n-player competition. Nor is it clear that all nuclear powers would have the resources to establish a mutual assured destruction (i.e., secure second-strike) capability, another hallmark of Cold War deterrence strategy. Indeed, relative to the Cold War bipolar nuclear competition, multipolar nuclear competitions would likely exhibit higher levels of crisis instability, with corresponding negative implications for the efficacy of deterrence.

Consider, for example, a situation in which Russia and the United States have reduced their nuclear arsenals to 1,000 weapons each,<sup>42</sup> while China has increased its nuclear arsenal to 1,000 weapons.<sup>43</sup> Each nuclear power would have to contend with two rivals whose

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<sup>40</sup> C. Robert Kehler, “Nuclear-Armed Adversaries and the Joint Commander,” *Naval War College Review* (Winter 1996): 7–18.

<sup>41</sup> See, for example, issues relating to deterring Iran and North Korea in Krepinevich and Cohn, *Rethinking Armageddon*, pp. 19–42, 65–81.

<sup>42</sup> As noted above, a significant number of former senior U.S. civilian and military officials believe this a reasonable force posture for the United States, with some arguing for lower levels if other powers (such as China) can be brought into multipolar arms reduction negotiations.

<sup>43</sup> China’s *Global Times* paper, a reliable barometer of CCP views, states that China needs to “build more strategic nuclear arms and accelerate the development of the DF-41 intercontinental ballistic missile.” Gareth Davis, “China Needs More Nuclear Weapons to Deal With Trump,” *Daily Mail*, December 8, 2016, <http://www.dailymail.co.uk/news/article-4012440/China-build-nuclear-arms-prepare-Trump-media.html>. Based on China’s ongoing modernization and expansion of its air and missile delivery systems and fissile material production, it has the potential to field a nuclear arsenal of 1,000 weapons within the next decade. Zachary Keck, “The Big China Nuclear Threat No One Is Talking About,” *National Interest*, June 2, 2017, <http://nationalinterest.org/blog/the-buzz/the-big-china-nuclear-threat-no-one-talking-about-20983>. The Chinese have been highly opaque regarding their stockpiles of fissionable materials, leading to much speculation on the part of analysts regarding its true size. Estimates place China’s current nuclear weapons inventory at roughly 250, while stockpiles of fissionable material are estimated at roughly 16 metric tons (MT) of highly enriched uranium (with 20 percent uncertainty). (One metric ton = 2,205 pounds, or 1,000 kg.) Thus the amount could be anywhere between 12–20 MT. China is also estimated to have roughly 1.8 MT of weapons-grade plutonium (with 10–30 percent uncertainty). Thus the true figure could be between 1.3–2.3 MT. International Panel on Fissile Materials, *Global Fissile Material Report 2013: Increasing Transparency of Nuclear Warhead and Fissile Material Stocks as a Step toward Disarmament*, pp. 15, 17, 19, 24, <http://fissilematerials.org/library/gfmr13.pdf>. Hui Zhang, one of the foremost experts on China’s nuclear industry, estimates that by 2020 China will have an *excess* enrichment capability of three million separative work units (SWU) per year, meaning it will be able to produce around several hundred bombs’ worth of highly enriched uranium *each year* without sacrificing any of its nuclear energy needs. Hui Zhang,

combined arsenals are twice the size of its own. It could be much more difficult to sustain force postures established during the Cold War to enhance crisis stability<sup>44</sup> and deter

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*China's Uranium Enrichment Capacity: Rapid Expansion to Meet Commercial Needs*, Belfer Center, Harvard University, Kennedy School of Government, August 2015, <https://www.belfercenter.org/sites/default/files/legacy/files/chinasuraniumenrichmentcapacity.pdf>.

The amount of highly enriched uranium (HEU, or 90 percent U-235) needed to make a nuclear weapon varies based upon the level of enrichment of the uranium used, the desired yield, and the design of the weapon. All other factors being equal, the higher the enrichment, the less material required to make the weapon. Similarly, the more sophisticated the design, the less fissile material is needed. Assuming the weapon is using HEU, a simple gun-type design of the kind used in the "Little Boy" bomb dropped on Hiroshima would require 40–50 kg. A sophisticated implosion weapon would require far less HEU, roughly 9–12 kg. For a sophisticated plutonium implosion design, the amount of plutonium needed would be around 2–4 kg. "Weapon Materials Basics (2009)," Union of Concerned Scientists, <http://www.ucsusa.org/nuclear-weapons/nuclear-terrorism/fissile-materials-basics#.VieQsEurRo>.

Assuming the Chinese possess and employed this more sophisticated implosion weapon design, taking both the upper and lower range estimates for Chinese fissile material, along with the upper and lower estimates of the HEU and plutonium required for a weapon, a *very rough estimate* of the Chinese nuclear arsenal would place it between 300 and 1,200 weapons. Even this broad estimate should be treated with care. As noted, the Chinese have resisted efforts to demonstrate transparency regarding their fissile material production capability. Moreover, more sophisticated designs than the one used to estimate the Chinese nuclear arsenal are capable of generating a nuclear explosion *with even less fissile material*. For example, a plutonium weapon with 25 kg of plutonium that used the "Fat Man" design employed in the weapon dropped on Nagasaki would generate a yield of over 100 KT, or some five times the yield of the actual "Fat Man" bomb. (That bomb contained 6.2 kg of plutonium and achieved a yield of roughly 21 KT.) Taking still another example, the U.S. Mark 18 fission design was tested with a core of 75 kg of HEU to achieve a yield of 500 KT. (Again, the "Little Boy" design, which generated a yield of roughly 15 KT, used about 40–50 kg of HEU.) With regard to thermonuclear weapon designs, the same principles hold: that is, the yield is a function of the quantity of fissile materials and the weapon design, including the use of materials inherent to the design (such as tritium and lithium-6 deuteride). Thus the U.S. W-87 nuclear warhead can have its 300 KT yield increased to 450 KT by adding an HEU "sleeve" or "rings" to the design. The U.S. W-88 Trident warhead's yield suggests that it is equipped with the HEU sleeve. The HEU sleeve has a lower percentage of weapons-grade U-235 (in the range of 20–80 percent enrichment) and is used mostly in thermonuclear weapon tampers. Carey Sublette, "Nuclear Weapons Frequently Asked Questions," section 4.0, "Engineering and Design of Nuclear Weapons," Nuclear Weapons Archive, updated July 3, 2007, <http://nuclearweaponarchive.org/>. See especially sections 4.2, "Fission Weapon Designs" and 4.5, "Thermonuclear Weapon Designs." See also "Complete List of All U.S. Nuclear Weapons," Nuclear Weapons Archive, updated October 14, 2006, <http://nuclearweaponarchive.org/Usa/Weapons/Allbombs.html> and Andrew Foland, "How Much Uranium?," *Nuclear Mangos*, blog, updated July 1, 2008, <http://nuclearmangos.blogspot.com/2008/07/how-much-uranium.html>. It is also possible that China could acquire plutonium or HEU from two states, North Korea and Pakistan, to which it provided assistance in their efforts to create a nuclear arsenal. Thomas C. Reed and Danny B. Stillman, *The Nuclear Express* (Minneapolis, MN: Zenith Press, 2009), pp. 249–50, 252–53, 260–63.

<sup>44</sup> There is no single, universally accepted definition of "crisis stability." As used in this assessment, "crisis stability" refers to a critical situation where the potential for a decisive change in the security fortunes of two or more rivals exists, and yet even risk-tolerant decision-makers view the anticipated costs of attacking as far outweighing the prospective benefits. To the extent crisis stability is eroded and the situation

nuclear use, such as those designed to maintain a rough nuclear parity with a country's rivals as well as a secure second-strike capability—one that could withstand an attack by both rivals and still retain sufficient forces to inflict unacceptable punishment on both.

The challenge is further compounded when minor nuclear-power arsenals are taken into account. In the case presented here, the United States would need to consider not only the combined arsenals of China and Russia, but those of North Korea and perhaps Iran and Pakistan as well. Russia would likely include the British and French arsenals, along with those of the Americans and Chinese, in its strategic calculations. Looking out a decade or so and given current trends, the Pakistani and North Korean arsenals could reach well into the hundreds—and Pakistan may be there already. Arsenals of this size would have been minor factors during the Cold War, when the U.S. and Russian nuclear inventories numbered 20,000 weapons or more. They cannot be easily discounted in a world where American and Russian nuclear forces have each been reduced by over 90 percent. In this multipolar nuclear competition, each major power would very likely want to hedge against

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becomes unstable (“crisis instability”), so, too, is deterrence eroded, in the sense that the decision-maker’s cost-benefit-risk calculus shifts in favor of pursuing an action that the decision-maker’s rival seeks to discourage.

The concept of crisis stability emerged in the 1950s when defense strategists realized that if the United States would have a strong incentive to launch its nuclear forces upon receiving warning of a Soviet nuclear attack, then the Soviet Union might have a similar incentive. As Albert Wohlstetter and Fred Hoffman noted, if “striking the first blow is the only means of defense, any delay in striking the first blow by either side risks the chance that the enemy will be the only one to have this prerogative.” Their views were echoed by Thomas Schelling, who argued that stability does not exist in a situation where adversaries confront “the fear of being a poor second for not going first.” The link between crisis instability and deterrence was pointed out by William Kaufmann, who noted that under circumstances like those described by Schelling, deterrence “has become essentially unstable.”

Over time this concept was also described as “first-strike stability” by Glenn Kent and David Thaler. They defined it as a situation with two adversaries where, “after considering the vulnerability of strategic forces on both sides, neither leader perceives the other as pressured by the posture of forces to strike first in a crisis [and n]either leader sees an advantage in striking first to avoid the potentially worse outcome of incurring a first strike if he waits.” But as Elbridge Colby notes, “crisis stability” encompasses more than first-strike stability in that it addresses “any pressures, including psychological ones, that would push a crisis towards spinning out of control.” As we shall see presently, situations may exist where even adversaries in a condition of “first-strike stability” may find themselves contemplating striking first.

See Michael S. Gerson, “The Origins of Strategic Stability: The United States and the Threat of Surprise Attack,” in *Strategic Stability: Contending Interpretations*, ed. Elbridge A. Colby and Michael S. Gerson (Carlisle, PA: U.S. Army War College Press, February 2013), pp. 2, 26–27; Albert Wohlstetter and Fred Hoffman, *Defending a Strategic Force after 1960* (Santa Monica, CA: RAND, 1954), pp. 3–4; T. C. Schelling, *Surprise Attack and Disarmament* (Santa Monica, CA: RAND, December 10, 1958), p. 2; William W. Kaufmann, *The Evolution of Deterrence* (Santa Monica, CA: RAND, unpublished paper, October 2, 1958), p. 26; Glenn A. Kent and David E. Thaler, *First-Strike Stability: A Methodology for Evaluating Strategic Forces* (Santa Monica, CA: RAND, 1989), p. v; and Elbridge Colby, “Defining Strategic Stability: Reconciling Stability and Deterrence,” in *Strategic Stability*, p. 49.

the possibility that its two rivals could join in an alliance against it. In that case, the power threatened with isolation might want to increase its arsenal to offset, at least partially, the 1,000-weapon shortfall it would confront. Indeed, neither Russia nor the United States has been comfortable with the other having a significant advantage, as reflected in arms control agreements and their nuclear force programs.<sup>45</sup> This could trigger an arms race, as each major nuclear power seeks to hedge against the possible emergence of a new coalition of major (and not-so-minor) nuclear powers.<sup>46</sup>

Finally, let us assume that the historical norm prevails—that there is competition among a cluster of military powers characterized by formal and informal alignments, as occurred in late-nineteenth- and early-twentieth-century Europe. Then France and Russia were aligned with one another, as were Germany and Austria-Hungary. Britain leaned toward the former, while the Ottoman Empire tilted toward the latter. On paper, Italy was aligned with Germany and Austria-Hungary, but in the war that followed it ended up siding with France and Russia. In brief, the system was neither highly dynamic nor rigidly static, but reflected the predominant characteristic of the international system in the modern era (post-Treaty of Westphalia). In this international system it was possible for the military balance to shift dramatically in a short period of time.

The dynamics of a multipolar military competition among nuclear-armed powers could erode deterrence. The potential for a crisis to escalate out of control would likely be significantly greater in the emerging multipolar nuclear system than in the bipolar Cold War international system. For example, a crisis that began with a confrontation between India and Pakistan could become less stable were China to weigh in on the side of Pakistan,

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<sup>45</sup> The first Strategic Arms Limitations Treaty, SALT I, signed in 1972, placed ceilings on the number of strategic launchers each side could maintain but did not include strategic bombers. SALT I was followed by SALT II, which limited the United States and the Soviet Union to 2,250 delivery vehicles each (intercontinental ballistic missiles [ICBMs], submarine-launched ballistic missiles [SLBMs], and strategic bombers). The treaty was signed in 1979. Although it was never ratified by the U.S. Senate, both countries pledged to abide by its terms. The first Strategic Arms Reduction Treaty (START I), signed in 1991, limited each side to 1,600 delivery vehicles carrying no more than 6,000 warheads. START II, signed only two years later, cut the number of weapons each side could possess by roughly half. By 2002, both countries had completed negotiations and signed the Strategic Offensive Reductions Treaty (SORT), cutting their strategic arsenals to between 1,700–2,200 warheads. In 2010 the New START agreement was signed, limiting each side to 1,550 strategic nuclear warheads. Arms Control Association, “U.S.-Russian Nuclear Arms Control Agreements at a Glance,” <https://www.armscontrol.org/factsheets/USRussiaNuclearAgreementsMarch2010>.

<sup>46</sup> Yet other nuclear powers have not followed a similar course of action. India, for example, has not sought to keep pace with Pakistan’s ambitious rate of nuclear weapons production, although this may be changing. The same might be said of China with regard to Russia and the United States. But with the rise of China’s economic might, this, too, is changing. See, for example, Adrian Levy, “Experts Worry That India Is Creating New Fuel for an Arsenal of H-Bombs,” Center for Public Integrity, December 16, 2015, <http://www.publicintegrity.org/2015/12/16/18874/experts-worry-india-creating-new-fuel-arsenal-h-bombs>.

or if China's intervention triggered Russian involvement on India's behalf. Simply put, increasing the number of decision centers in a crisis in which the prospective belligerents are all armed with nuclear weapons would almost certainly pose challenges significantly different from, and quite likely more destabilizing than, those associated with a confrontation between the two Cold War nuclear powers.<sup>47</sup>

## Challenges to Western Views on Deterrence

History and current trends also suggest that when nuclear powers have conventional military power that is inferior to that of their rivals, it may be difficult to deter them from adopting military doctrines calling for the use of nuclear weapons in the event of war. These doctrines clearly challenge the belief, popular among a substantial number of Western policymakers, that nuclear weapons' only purpose is to deter rivals from using nuclear weapons.

In fact, several states, most notably Pakistan and Russia, envision employing nuclear weapons to offset their conventional inferiority against hostile military powers, and they have adopted military doctrines to that effect. Russia's doctrine calls for nuclear weapons to support two principal objectives: deterring a nuclear attack on the Russian homeland, and terminating on acceptable terms a conventional war in which the tide has shifted against Russia.<sup>48</sup>

Russia is backing its words with actions. Since 1999, the Russians have "employed" very-low-yield nuclear weapons in several large-scale military exercises.<sup>49</sup> In the Zapad-1999 (West-1999) exercise, the Russian military, in responding to a NATO attack on the Kaliningrad oblast, conducted a limited nuclear strike with four air-launched cruise missiles.<sup>50</sup> In Vostok-2010 (East-2010) in eastern Russia, two live launches of nuclear-capable Tochka-U (SS-21) missiles were conducted against the command post of a

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<sup>47</sup> To be sure, Cold War French theories of deterrence stressed the stabilizing impact of additional centers of decision to justify French nuclear forces—a position the United States rejected.

<sup>48</sup> Dima Adamsky, "Russian Regional Nuclear Developments," Long Term Strategy Group, September 2010, p. 20. See also Mark Schneider, *The Nuclear Forces and Doctrine of the Russian Federation*, National Institute Press, Publication No. 0003, 2006 and Stephen J. Blank, ed., *Russian Nuclear Weapons: Past, Present, and Future* (Carlisle, PA: Strategic Studies Institute, November 2011).

<sup>49</sup> Miriam John and Joseph Braddock, *The Nuclear Weapons Effects National Enterprise*, Defense Science Board/Threat Reduction Advisory Committee, June 2010, pp. 8–9.

<sup>50</sup> Nikolai N. Sokov, "The Evolving Role of Nuclear Weapons in Russia's Security Policy," in *Engaging China and Russia on Nuclear Disarmament*, ed. Cristinia Hansell and William C. Potter (Monterey, CA: Center for Nonproliferation Studies, April 2009), p. 78 and Gunnar Arbman and Charles Thornton, "Russia's Tactical Nuclear Weapons: Part I: Background and Policy Issues," Swedish Defense Research Agency, November 2003, pp. 29–30.

hypothetical opponent.<sup>51</sup> The Russians apparently believe that their large strategic nuclear arsenal will deter the opponent from responding in kind or escalating to large-scale nuclear use, and that their employment of “tactical” nuclear weapons will enable them to terminate a conflict on conditions acceptable to Moscow.

With respect to Pakistan, the principal roles of its nuclear arsenal are to deter the use of nuclear weapons against its territory; deter a military invasion by India’s superior conventional forces; and avoid ruinous defeat in any conventional conflict that does occur.<sup>52</sup> Pakistan, in keeping with its doctrine, has refused to join India in a “no-first-use” pledge. To further enhance deterrence, Pakistan has also left considerable ambiguity about how it would employ its nuclear weapons.<sup>53</sup>

The best elaboration of Pakistani nuclear policy and doctrine may have come from Lieutenant General (Ret.) Khalid Kidwai, who served as head of the Pakistani military’s Strategic Plans Division—the organization responsible for overseeing, coordinating, and protecting the nation’s nuclear arsenal. Kidwai declared that Pakistan would employ nuclear weapons under four conditions: (1) if India conquered a large portion of Pakistan’s territory; (2) if India destroyed a large portion of Pakistan’s air or ground forces;<sup>54</sup> (3) if

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<sup>51</sup> Roger McDermott, “Reflections on Vostok 2010: Selling an Image,” *Eurasia Daily Monitor* 7, no. 134 (July 13, 2010), [http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews%5Btt\\_news%5D=36614](http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=36614).

<sup>52</sup> Peter Lavoy, “Islamabad’s Nuclear Posture: Its Premises and Implementation,” in *Pakistan’s Nuclear Future: Worries Beyond War*, ed. Henry D. Sokolski (Carlisle, PA: Strategic Studies Institute, 2008), p. 134 and Peter Lavoy, “Pakistan’s Nuclear Doctrine,” in *Prospects for Peace in South Asia*, ed. Rafiq Dossani and Henry S. Rowen (Stanford: Stanford University Press, 2005), p. 284.

<sup>53</sup> Some analysts, for instance, maintain that Pakistan would strike a mixture of Indian civilian and military targets. Others assert that Pakistani nuclear strikes would be limited solely to counter-value targets. Lavoy, “Islamabad’s Nuclear Posture,” p. 139; Zafar Iqbal Cheema, “Pakistan’s Nuclear Use Doctrine and Command and Control,” in *Planning the Unthinkable: How New Powers Will Use Nuclear, Biological, and Chemical Weapons*, ed. Peter R. Lavoy, Scott D. Sagan, and James J. Wirtz (Ithaca, NY: Cornell University Press, 2000), p. 179; Gregory S. Jones, “Pakistan’s ‘Minimum Deterrent’ Nuclear Force Requirements,” in *Pakistan’s Nuclear Future*, pp. 90–91; and A. H. Nayyar and Zia Mian, “The Limited Military Utility of Pakistan’s Battle-Field Use of Nuclear Weapons in Response to Large-Scale Indian Conventional Attack,” Pakistan Security Research Unit, Brief No. 61.

<sup>54</sup> The Indian military’s Cold Start doctrine requires the armed forces to be capable of seizing a significant portion of Pakistani territory swiftly before other powers intervene and demand a ceasefire. The doctrine also requires Indian forces to base close to the border with Pakistan to enable rapid strikes and the consolidation of gains before Pakistan can employ its nuclear weapons to halt the Indian incursion. India refused to comment on the doctrine’s existence when it was first identified as a “concept” by the Indian Army in 2004. This changed when, in January 2017, General Bipin Rawat, India’s new chief of army staff, mentioned it in an interview. “What Is India’s ‘Cold Start’ Military Doctrine?,” *Economist*, January 31, 2017, <https://www.economist.com/blogs/economist-explains/2017/02/economist-explains> and Ankit Panda, “A Slip of the Tongue on India’s Once-Hyped ‘Cold Start’ Doctrine?,” *Diplomat*, January 7, 2017, <http://thediplomat.com/2017/01/a-slip-of-the-tongue-on-indias-once-hyped-cold-start-doctrine/>. See also

India attempted to economically strangle Pakistan, for instance, through a maritime blockade; or (4) if India destabilized Pakistan politically or was responsible for instigating a large-scale domestic uprising.<sup>55</sup> The general might have included a fifth circumstance: if India attacked Pakistan's nuclear forces.

Of course, the ultimate purpose of both the Russian and Pakistani military doctrines is to deter war in the first place, in part by threatening to escalate to nuclear use in a war—even one they initiate—that is going against them. However, their doctrines also call for employing nuclear weapons to terminate an unsuccessful conventional war, regardless of how it started. Would this strategy prove effective in deterring Western nuclear powers whose political leaders do not envision any nuclear-armed state employing nuclear weapons, except in response to a nuclear attack? It seems problematic. The U.S. military and the American strategic studies community need to devote more thought to how the United States could deter the Russians from executing their doctrine—for example, in response to a NATO counter-offensive following a Russian attack on the Baltic States. Furthermore, until recently, the United States has not taken steps to enhance the flexibility of its nuclear forces in particular, or its strategic forces in general, to expand its options for addressing such a contingency.<sup>56</sup>

## Summary

The United States confronts an international security system that is no longer bipolar or unipolar, as it was between 1945 and the first decade of the new century, but multipolar. This is particularly so with respect to nuclear weapons. The emergence of major revisionist powers in China and Russia, combined with the proliferation of nuclear weapons and other advanced military capabilities to second-tier powers, has increased the number of rivals the United States seeks to deter. The increase in the number of hostile states and groups

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Scott D. Sagan, "The Evolution of Pakistani and Indian Nuclear Doctrine," in *Inside Nuclear South Asia*, ed. Scott D. Sagan (Stanford: Stanford University Press, 2009), p. 234.

<sup>55</sup> Paolo Cotta-Ramusino and Maurizio Martellini, "Report on Nuclear Safety, Nuclear Stability and Nuclear Strategy in Pakistan," Pugwash Conferences on Science and World Affairs, January 14, 2002, <https://pugwash.org/2002/01/14/report-on-nuclear-safety-nuclear-stability-and-nuclear-strategy-in-pakistan/>.

<sup>56</sup> The United States is developing a low-yield "precision" B-61-12 gravity bomb with the ability to vary its yield to between 0.3 KT and 50 KT. Dave Majumdar, "America's Most Dangerous Nuclear Weapon Passes Critical Test," *National Interest*, November 20, 2015, <http://nationalinterest.org/blog/the-buzz/americas-most-dangerous-nuclear-weapon-passes-critical-test-14403>. The Trump administration's recently completed Nuclear Posture Review does recommend a modest first step to address this problem. See Department of Defense, *Nuclear Posture Review*, February 2018, pp. 53–55, <https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>. It is far from clear, however, that Congress will adopt these recommendations.

provides more opportunities for deterrence to fail. As shown by U.S. ballistic missile defenses deployed to South Korea and Eastern Europe, in some cases, efforts designed to deter one rival could undermine efforts to deter another, further exacerbating the challenge to deterrence strategies.<sup>57</sup>

With respect to nuclear weapons, the radical reductions in U.S. and Russian Cold War nuclear arsenals, combined with the growth in Chinese, Indian, and Pakistani arsenals, is progressively shifting the competitive environment from the bipolar Cold War framework to a multipolar system. Consequently, some touchstone nuclear postures that contributed to stability during the U.S.-Soviet Cold War—such as “parity” and “assured destruction”—may be problematic or even impossible to achieve.

The multipolar strategic environment is also considerably more dynamic than either the Cold War system or the U.S.-dominated unipolar system that followed it. This dynamic environment makes rapid—and potentially highly destabilizing—shifts in the military balance possible, presenting yet additional problems with executing strategies relying principally on deterrence.

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<sup>57</sup> I will elaborate presently upon Chinese and Russian concerns over U.S. missile defenses.

## ***Multidimensional Strategic Warfare***

*To put an end to Cold War thinking, we will reduce the role of nuclear weapons in our national security strategy, and urge others to do the same.*<sup>58</sup>

—Barack H. Obama

**T**he Cold War's bipolar military competition has given way to an increasingly multipolar competition. Moreover, it has become increasingly multidimensional, with worrisome implications for deterrence. In the Cold War, one could assume that strategic deterrence meant nuclear deterrence. Put another way, one country could inflict prompt, devastating harm on another only by using a substantial number of nuclear weapons. With the advent of precision warfare and (perhaps) cyberwarfare, this is no longer true.

Beginning in the early 1990s and for roughly two decades, the U.S. military, the first to exploit the potential of precision-guided munitions and battle networks, possessed a near monopoly on the ability to wage precision warfare. This led to efforts by rival powers to offset the U.S. advantage. As described above, one offset strategy centers on acquiring nuclear weapons; another (for established nuclear powers) calls for an increased willingness to use nuclear weapons in the event of conventional war with the United States. Still another sees rivals focusing on acquiring precision-warfare capabilities to reduce or even eliminate the U.S. advantage in this area. This, in fact, is occurring, with China leading the way. Another method of closing the gap involves developing a cyber arsenal capable of degrading U.S. forces and inflicting significant damage on critical U.S. domestic infrastructure.

## **Multidimensional Strategic Forces**

While nuclear weapons seem certain to remain the ultimate means for striking strategic targets—those that are central to a state's material capability or its will to prosecute war—conventional precision-guided munitions (PGMs), cyberweapons, and undersea warfare systems appear capable of promptly and effectively neutralizing or destroying some strategic targets formerly reserved solely for nuclear weapons. PGMs were first used in large numbers by the United States during the latter stages of the Vietnam War. They were employed intensively, again by the United States, for the first time in the 1991 Gulf War.<sup>59</sup>

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<sup>58</sup> The White House, Office of the Press Secretary, "Remarks by President Barack Obama," Hradcany Square, Prague, Czech Republic, April 5, 2009, <https://obamawhitehouse.archives.gov/the-press-office/remarks-president-barack-obama-prague-delivered>.

<sup>59</sup> The first extensive use of precision-guided munitions occurred during the Vietnam War. The U.S. Air Force employed over 4,000 laser-guided bombs against North Vietnam between April 1972 and January

In the latter conflict, their high accuracy enabled the U.S. military to promptly destroy or otherwise neutralize strategic targets in Iraq (such as parts of the electric power grid), with high confidence and with much smaller strike packages than had heretofore been possible.<sup>60</sup>

More recently, cyber payloads have been added to the mix. They appear to have the potential to disable or corrupt early warning and command-and-control (C2) systems.<sup>61</sup> Cyberweapons may be able to do so without being detected, further compromising the target's ability to identify—and respond promptly and effectively to—an attack. Moreover, not only have cyberweapons provided a new means of attacking strategic targets, but their potential effectiveness may be enhanced by changes in the target base. The transformation of advanced economies into industrial-information hybrids appears to render them increasingly susceptible to strategic cyberstrikes against critical infrastructure, including the power grid, transportation systems, and the financial sector.<sup>62</sup>

These trends raise questions regarding the efficacy of deterrence in two ways. First, by reducing confidence in the effectiveness of early warning and C2 systems, they lower the perceived risks associated with mounting a successful surprise attack. Second, strikes executed predominantly, or exclusively, by non-nuclear means (such as PGMs and cyber payloads) may be able to realize strategic effects (like disabling key components of the enemy's critical economic infrastructure or destroying a substantial portion of his nuclear forces) without crossing the threshold of nuclear use. If so, this reduces the perceived risk of engaging in strategic warfare. In fact, both the Chinese and the Russians have accused the United States, which currently enjoys a lead in precision-warfare capabilities as well as

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1973, an average of 400 weapons per month. The first intensive use of PGMs occurred during the First Gulf War, when over 17,000 were employed over a period of forty-three days (January 17, 1991 to February 28, 1991), an average of nearly 400 weapons *per day*. Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey: Summary Report* (Washington, DC: Government Printing Office, 1993), p. 226.

<sup>60</sup> For example, during all of 1943, the U.S. Eighth Air Force was able to strike roughly fifty strategic targets in Germany. In the 1991 Gulf War, however, the U.S.-dominated Coalition air forces struck approximately three times as many targets *on the first day* of the war. *Ibid.*, p. 189; Christopher Bowie, *Untying the Bloody Scarf: Casualties, Stealth, and the Revolution in Aerial Combat* (Arlington, VA: IRIS Independent Research, 1998), p. 14; and General Ronald R. Fogleman, "Getting the Air Force into the 21st Century," speech delivered to the Air Force Association's Air Warfare Symposium, Orlando, Florida, February 24, 1995.

<sup>61</sup> There are, for example, some who believe the Israeli attack on September 6, 2007, against a Syrian nuclear reactor under construction, was facilitated by a cyberattack that corrupted the Syrians' integrated air defense system (IADS). Richard A. Clarke and Robert K. Knake, *Cyber War* (New York: Harper Collins, 2010), p. 7.

<sup>62</sup> Krepinevich, *Cyber Warfare: A "Nuclear Option?"* (Washington, DC: CSBA, 2012), pp. 39–45.

advanced air and missile defenses, of combining them with cyber payloads in an effort to achieve absolute security.

Returning to our earlier example of a multipolar great-power nuclear regime, consider China's nightmare scenario, which centers on a U.S. attack on the PLA's nuclear forces and supporting cyber capabilities. In this scenario, American cyberattacks pave the way by disrupting or inserting false information into Chinese early warning and C2 systems. These attacks are coordinated with U.S. conventional ("prompt global") precision strikes against PLA nuclear forces and supplemented, where necessary, by a modest number of nuclear strikes. The attacks destroy roughly 80–90 percent of China's nuclear forces, leaving Beijing (in our example) with only 100–200 of its original 1,000 weapons available for a retaliatory strike.<sup>63</sup>

Following the attack, China's leaders confront a dilemma. The damage to China's nuclear (and perhaps cyber) forces from the American counterforce strike has been substantial, but the country's cities and economic foundation remain almost entirely unscathed. In the absence of a second-wave U.S. attack targeting the PLA's residual nuclear forces, China still has the ability, despite the depletion of its strategic forces, to inflict substantial damage on the United States, though it is possible that a majority of the PLA's counterstrike force will be intercepted by U.S. air and missile defenses.<sup>64</sup> Moreover, any "broken-back" Chinese nuclear attack on U.S. economic and population centers would risk triggering a corresponding and devastating U.S. strike against China's population and economic infrastructure, likely bringing about the end of the rule of the Chinese Communist Party (CCP). Complicating matters still further, should China launch such an attack against the United States, CCP leaders would also be leaving their country vulnerable to coercion or

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<sup>63</sup> From a U.S. perspective, China appears to enjoy a secure second-strike assured-destruction capability. This is in no small part owing to the "Underground Great Wall," a network of roughly 3,000 miles of subterranean tunnels that house China's nuclear ballistic missile force. As they say, however, deterrence is in the eye of the beholder. The Chinese may have concerns that the tunnel's exit points could be blocked in an attack and/or that a significant portion of their nuclear missile force could still be destroyed if the U.S. could identify the location of missiles in the tunnel. (One recalls here concerns over various deployment schemes for the M-X, or "Peacekeeper" ICBM, and their ability to ensure the missiles' survivability in the event of a Soviet attack.) James R. Holmes, "China's Underground Great Wall," *Diplomat*, August 20, 2011, <https://thediplomat.com/2011/08/chinas-underground-great-wall/> and Hui Zhang, "China's Underground Great Wall," Belfer Center, Harvard University, Kennedy School of Government, January 31, 2012, <https://www.belfercenter.org/publication/chinas-underground-great-wall-subterranean-ballistic-missiles>. With respect to the M-X missile's survivability, see Eugene Sevin, "The MX/Peacekeeper and SICBM: A Search for Survivable Basing," *Defense Systems Information Analysis Center* (Winter 2017), <https://www.dsiac.org/resources/journals/dsiac/winter-2017-volume-4-number-1/mxpeacekeeper-and-sicbm-search-survivable>.

<sup>64</sup> One would also anticipate that U.S. leaders would have taken steps to minimize the effects of a Chinese counter-cyberstrike on U.S. military forces and the country's critical infrastructure.

attack from Russia, which, in our example, retains its full arsenal of 1,000 nuclear weapons and its cyber payloads as well.

Is this thought experiment fanciful? Perhaps.<sup>65</sup> But where deterrence is concerned, the only perspective that counts is that held by the target of deterrence, in this case the CCP leadership. Beijing's actions and the PLA's military writings strongly suggest that Chinese political and military leaders take this contingency very seriously. They view what Cold War Pentagon planners (as well as many contemporary American planners) called the "nuclear balance" as a multidimensional "strategic balance" that encompasses a wide range of military capabilities in addition to nuclear weapons and their delivery systems.

Their perspective is also very consistent with the view of Russian policymakers and political leaders. As Russian defense expert Alexei Arbatov points out:

The growing American reliance on ballistic missile defense and conventional weapons for deterrence, as specified in the [2010 Obama administration's] Nuclear Posture Review, worries Russia (and China). There are no legal or technical restrictions that confine these capabilities to deterrence merely of rogue states. The Nuclear Posture Review declares that "missile defenses and any future U.S. conventionally-armed long-range ballistic missile systems are designed to address newly emerging regional threats, and are not intended to affect the strategic balance with Russia." Nevertheless, Russian policymakers worry that future ballistic missile defense capabilities could undermine Russia's potential for strategic retaliation, and that U.S. strategic conventional precision-guided weapons (cruise and ballistic missiles) have a growing counterforce capability, meaning that they increasingly pose a threat to Russia's nuclear capabilities.<sup>66</sup>

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<sup>65</sup> For example, the U.S. military's prompt global (precision) strike capability is today more of an aspiration than a reality. Moreover, U.S. air and missile defenses, while impressive, have never been tested in a great-power war of the kind depicted here. Nor is it clear that Washington would commit to a "cosmic roll of the dice" attack that depended for its success on these kinds of capabilities, as well as the prospective effectiveness of cyber payloads.

<sup>66</sup> Alexei Arbatov, *Gambit or Endgame? The New State of Arms Control* (Washington, DC: Carnegie Endowment for International Peace, 2011), p. 9. It is important to note that the Russians have not abandoned the field. Moscow asserts it has developed an unmanned underwater vehicle-delivered nuclear weapon capable of attacking the United States while avoiding the American missile defense umbrella. This, along with Russian president Vladimir Putin's recent revelation of new, more capable missiles under development, indicates that the strategic military competition remains dynamic and shows no signs of ending in the foreseeable future. Franz-Stefan Gady, "Russia Tests Nuclear-Capable Underwater Drone," *Diplomat*, December 14, 2016, <https://thediplomat.com/2016/12/russia-tests-nuclear-capable-underwater-drone/> and Dave Majumdar, "Just How Much of a Threat is Russia's Status-6 Nuclear Torpedo?," *National Interest*, January 16, 2018, <http://nationalinterest.org/blog/the-buzz/just-how-much-threat-russias-status-6-nuclear-torpedo-24094>. See also Neil MacFarquhar and David E. Sanger, "Putin's 'Invincible' Missile Is Aimed at U.S. Vulnerabilities," *New York Times*, March 1, 2018, <https://www.nytimes.com/2018/03/01/world/europe/russia-putin-speech.html>.

Through military writings and official Ministry of Defense reports, Russia's government and strategic studies community are expressing concerns over the potential of U.S. conventional weapons to disarm Russia's strategic nuclear forces, missile early warning systems, and combat command centers in a counterforce strike.<sup>67</sup> As Arbatov notes, Russia's leaders argue that the U.S. ballistic missile defense program is designed to degrade the effectiveness of Russia's nuclear forces and provide Washington with a strategic advantage that can be used to exert political pressure on Moscow. Russian fears have grown over time, arguably beginning with the First Gulf War. They were heightened from Russian "lessons learned" efforts in the wake of the 1999 U.S.-led NATO campaign in the Balkans (Operation Allied Force) and the Second Gulf War against Iraq (Operation Iraqi Freedom).

Echoing these lessons and Chinese fears, Arbatov states that "the main unspoken assumption behind this threat perception is that *traditional nuclear deterrence may not be effective against conventional counterforce threats*, since nuclear retaliation in case of such an attack would invite suicide by follow-on nuclear strikes and thus lacks credibility" [my emphasis].<sup>68</sup> From Russia's perspective, in this multidimensional strategic competition, it makes no sense to engage in further nuclear arms reduction agreements with the United States as long as the U.S. military maintains, by Moscow's estimates, some 2,000–3,000 conventional weapons on strategic platforms such as guided-missile nuclear-powered submarines (SSGNs) and long-range bombers.<sup>69</sup>

Remarkably, despite the U.S. Defense Department's focus on deterrence and the holistic approach taken by both the Chinese and the Russians, the Defense Department continues to conduct *Nuclear Posture Reviews* rather than *Strategic Posture Reviews*. These reviews have yet to address fully the multidimensional aspect of the strategic military balance described above.<sup>70</sup>

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<sup>67</sup> Alexander Khramchikhin, "Diagnosis: National Air Defense in Ruins," *Independent Military Review* (NVO) (February 19–25, 2010), cited in Arbatov, *Gambit or Endgame?*, p. 19.

<sup>68</sup> Arbatov, *Gambit or Endgame?*, pp. 17, 21.

<sup>69</sup> *Ibid.*, pp. 20–21.

<sup>70</sup> To its credit, the 2018 Nuclear Posture Review identifies the challenges associated with "significant non-nuclear strategic attacks." In particular, it states that "the United States would only consider the employment of nuclear weapons in extreme circumstances to defend the vital interests of the United States, its allies, and partners. Extreme circumstances could include significant non-nuclear strategic attacks." In stating U.S. strategy for addressing deterrence against strategic attacks, the Nuclear Posture Review is more aspirational than strategic in its design. Its "tailored strategies" focus primarily on objectives, not strategy. For example, with respect to Russia it declares:

Our strategy will ensure Russia understands that any use of nuclear weapons, however limited, is unacceptable.

## **The Blurring Firebreak**

The blurring of the once relatively clear “firebreak” between conventional and nuclear weapons use is a major feature of the transition to a multidimensional strategic-strike regime, coupled with the emergence of a precision-strike regime. During the Cold War, the firebreak was relatively unambiguous compared to the situation that emerged following the revolution in precision warfare. Even in the latter stages of the Cold War, Herman Kahn could still declare, “There are very large and very clear ‘firebreaks’ between nuclear and conventional war.”<sup>71</sup>

The first large-scale, intensive use of precision-guided weaponry in the First Gulf War preceded Soviet Russia’s collapse by only a few months. In the years leading up to that war, Russian military theorists had written on the potential of precision-guided weaponry, combined with modern sensors and communications systems, to form a “reconnaissance-strike complex” that would usher in a “military-technical revolution” or a “revolution in military affairs.” In 1984, Soviet marshal Nikolai Ogarkov declared:

Rapid changes in the development of conventional means of destruction and the emergence in the developed countries of automated reconnaissance-strike complexes, long-range high-accuracy terminally-guided combat systems, unmanned flying machines, and qualitatively new electronic control systems make many types of weapons global and make it possible to sharply increase, by at least an order of magnitude, the destructive potential of conventional weapons, bringing them closer, so to speak, to weapons of mass destruction in terms of effectiveness.<sup>72</sup>

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The U.S. deterrent tailored to Russia, therefore, will be capable of holding at risk, under all conditions, what Russia’s leadership most values. It will pose insurmountable difficulties to any Russian strategy of aggression against the United States, its allies, or partners and ensure the credible prospect of unacceptably dire costs to the Russian leadership if it were to choose aggression.

This strategy will ensure Russia understands it has no advantages in will, non-nuclear capabilities, or nuclear escalation options that enable it to anticipate a possible benefit from non-nuclear aggression or limited nuclear escalation.

Simply put, these are the objectives, or outcomes, the Defense Department would like its deterrence strategy to achieve, and the kinds of capabilities it desires—those capable of “holding at risk, under all conditions, what Russia’s leaders value most.” A strategy needs to state how these objectives will be achieved and what specific means (capabilities) can be employed. Moreover, since the United States has tailored deterrence strategies for China and North Korea, the strategy should also describe how deterrence can be maintained in the event of simultaneous challenges from more than one rival. See *Nuclear Posture Review 2018*, pp. 21, 30–31.

<sup>71</sup> Herman Kahn, *Thinking about the Unthinkable in the 1980s* (New York: Simon & Schuster, 1984), p. 29.

<sup>72</sup> Interview with marshal of the Soviet Union N. V. Ogarkov, chief of the General Staff, “The Defense of Socialism: Experience of History and the Present Day,” *Red Star*, May 9, 1984, pp. 2–3, cited in Michael J. Sterling, *Soviet Reactions to NATO’s Emerging Technologies for Deep Attack* (Santa Monica, CA: RAND, August 1985), p. 8.

That same year an article published in the Russian journal *Ekonomika, Politika, Ideologiya* argued that the weaponry described by Ogarkov had a power and effectiveness “similar to weapons of mass destruction in terms of their combat features.”<sup>73</sup>

Some Americans shared Ogarkov’s concerns; indeed, they may have been their principal source! Nearly a decade earlier, U.S. defense planners were busy working on the Long Range Research and Development Planning Program. Its purpose was to identify technologies that could provide “the National Command Authority with a variety of response options as alternatives to massive nuclear destruction.” They concluded: “Near zero miss, non-nuclear weapons could provide the National Command Authority with a variety of strategic response options as alternative[s] to massive nuclear destruction.” Their findings anticipated Chinese and (especially) Russian fears in noting that “it is not outside the realm of possibility for the United States, while maintaining or improving present military capabilities, safely to take the lead in reducing the world inventory of theater nuclear weapons as it once led the world in the introduction of nuclear weapons.”<sup>74</sup> Following the First Gulf War, Paul Nitze, principal author of the famed U.S. Cold War strategy document NSC-68, stated that the United States should consider “converting its principal strategic deterrent from nuclear weapons to a more credible deterrence based at least in part on ‘smart’ conventional weapons. . . . [T]here should be a conscious decision by the government to pursue the conversion of our strategic deterrent from nuclear to conventional weapons.”<sup>75</sup> [Italics in this paragraph are mine.]

The shift toward a multidimensional strategic strike competition has persisted over time. More recently, a group of U.S. defense experts recommended:

A major effort should go into developing a range of conventional strike weapons and operational concepts that would give the President more credible and technically suitable options for dealing with new and evolving threats. Such an effort could produce conventional forces capable of *performing some missions*

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<sup>73</sup> V. R. Bogdanov and A. I. Podberezkin, “Notes on the Qualitative Arms Race,” *Ekonomika, Politika, Ideologiya* (March 1984): 125. The term “weapons of mass destruction,” as used by Soviet writers, includes chemical and biological weapons in addition to nuclear weapons. In this context, however, the reference is clearly to nuclear weapons. Cited in Sterling, *Soviet Reactions*, p. 8.

<sup>74</sup> Dominic A. Paolucci, *Summary Report of the Long Range Research and Development Planning Program* (Falls Church, VA: Lulejian and Associates, February 7, 1975), p. 45, cited in Barry D. Watts, *Nuclear-Conventional Firebreaks and the Nuclear Taboo* (Washington, DC: CSBA, 2013), p. 17.

<sup>75</sup> Importantly, Nitze declared as well: “We will also need to maintain an overwhelming nuclear strategic capability, though not necessarily to use such weapons—even in retaliation—if we can disarm an aggressor with smart non-nuclear strategic weapons.” Paul Nitze, “Is It Time to Junk Our Nukes? The New World Disorder Makes Them Obsolete,” *Washington Post*, January 16, 1994, [https://www.washingtonpost.com/archive/opinions/1994/01/16/is-it-time-to-junk-our-nukes-the-new-world-disorder-makes-them-obsolete/e3580886-a891-462f-98bc-b3deaf07fdbd/?utm\\_term=.263f181be03a](https://www.washingtonpost.com/archive/opinions/1994/01/16/is-it-time-to-junk-our-nukes-the-new-world-disorder-makes-them-obsolete/e3580886-a891-462f-98bc-b3deaf07fdbd/?utm_term=.263f181be03a).

*previously assigned to nuclear weapons* as well as missions that have assumed greater urgency in recent years (e.g., prompt targeting of terrorists and mobile/relocatable weapons systems). It could therefore help reduce U.S. reliance on nuclear weapons in its defense strategy [my emphasis].<sup>76</sup>

One Russian defense analyst, reflecting the general view of many of his colleagues, finds American precision-warfare forces effective in both conventional and nuclear contingencies:

The high-precision weapons in the U.S. armed forces' arsenal today can be used to destroy a wide range of targets, including hardened fixed facilities (underground bunkers, reinforced structures and bridges), and mobile armored targets (tanks, armored vehicles and artillery). With due targeting, the existing types of cluster bombs can effectively destroy mobile land-based ICBMs. High-precision weapons could also pose a threat to existing silo-based launchers.<sup>77</sup>

Both China and Russia are working to offset this advantage, in part by developing their own precision-strike forces and cyber payloads. Once again, Russia's military doctrine points to a set of security priorities that are very different from those of the United States. The threat of a U.S.-NATO "air-space strike" capability falls near the top of the list, and Russia's threat assessments and defense programs reflect this priority. Russian doctrine states that the armed forces' central mission, second only to nuclear deterrence, is "to ensure the air defense of most important military facilities of the Russian Federation and [provide for] readiness to rebuff strikes by means of air and space attack." The notion of "air and space attack" apparently refers to Ogarkov's "reconnaissance-strike complexes," or what the U.S. military might refer to as the integration of battle networks with precision-

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<sup>76</sup> National Security Advisory Group, *Reducing Nuclear Threats*.

<sup>77</sup> Evgeny Myasnikov, "Counterforce Potential of High-Precision Weapons," in *Nuclear Disarmament: New Technology, Weapons, and Treaties*, ed. Alexei Arbatov and Vladimir Dvorkin (Moscow: Carnegie Moscow Center, 2009), p. 107. Arbatov notes (*Gambit or Endgame*, p. 20):

The Prompt Global Strike operational concept is especially worrying to the Russian expert community. The United States officially claims otherwise, but Russia considers conventional cruise missiles, as well as future ballistic and orbital systems with accurate conventional warheads, as part of the concept. More importantly, Russians just cannot believe that such complicated and expensive systems are only meant to target terrorists, who can be dealt with by much cheaper and simpler weapons. The idea that America needs weapons with short flight times to destroy reckless state leaders and terrorists looks ridiculous to most Russian experts. They consider the hardest and most time-consuming problem to be locating the target in the first place; the few hours of advantage in timing provided by ballistic or orbital systems isn't enough to make them cost effective compared to supersonic aircraft or long-range cruise missiles.

strike forces.<sup>78</sup> As noted above, the Russians are also seeking to offset the U.S. advantage in precision warfare by enhancing their nuclear arsenal and changing nuclear doctrine.<sup>79</sup>

Assuming the Russians believe in the efficacy of their doctrine, these developments weaken deterrence in two ways. First, they make Russian *conventional aggression* appear less risky, since if things go badly the Russians can play their nuclear trump card. Second, they reduce the perceived costs of *escalating to nuclear use*, since Russia's low-yield nuclear weapons, while more destructive than any conventional weapon, are far less lethal than the weapon employed against Hiroshima.

China has pursued its own offset path. The CCP seeks to fortify the deterrence pillar of its defense strategy through a combination of capabilities that include nuclear forces; "informatized" conventional forces; information warfare forces; a flexible space force; and something it refers to as an "innovative and developmental civilian deterrence force."<sup>80</sup>

According to the PLA:

Brand-new methods of deterrence, based on new theory, new mechanism[s] and new technology, could effectively create more uncertainty when the adversary is evaluating the two sides' military capabilities, and affect the adversary's original strategic plan. In this way, the credibility of deterrence is enhanced. In particular, the emergence of new deterrence forces, based on new technology such as information, cyberspace, space, and new-material technologies, is revolutionarily changing the mechanism, method, and area of operation. *It heralds a completely new method of deterrence, symbolized by constructing [an] asymmetrical method of deterrence [my emphasis].*<sup>81</sup>

Yet the Chinese have not elaborated upon what they mean by a "completely new method of deterrence." It would seem essential for them to communicate to those they seek to deter just how this "new method" applies to them.

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<sup>78</sup> Arbatov, *Gambit or Endgame?*, p. 19. This philosophy is reflected in the Russian military's aerospace defense concept. It emphasizes strengthening air-space defense and integrating ballistic missile defense, air defense, early warning, and space control systems. "Presidential Address to the Federal Assembly of the Russian Federation," November 30, 2010, <http://eng.kremlin.ru/news/1384>.

<sup>79</sup> As noted above, since 1999, the use of very-low-yield nuclear weapons has been regularly included in operational-strategic exercises conducted by the Russian General Staff. That being said, Russia's efforts to develop a "nuclear scalpel" are controversial. There is a debate over whether the Russian doctrine of "escalate to de-escalate" has actually led to any operational changes in Russian nuclear posture. See Dima Adamsky, "Nuclear Incoherence: Deterrence Theory and Non-Strategic Nuclear Weapons in Russia," *Journal of Strategic Studies* (January 2014): 91–134.

<sup>80</sup> Research Department of Military Strategy, *Science of Military Strategy*, p. 148, cited in Qiu, "China's Science of Military Strategy," p. 13.

<sup>81</sup> Qiu, "China's Science of Military Strategy," p. 14.

Like the Russians, the Chinese appear to be willing to employ nuclear weapons in situations where an adversary has not used them first. The 2001 English version of the PLA's *Science of Strategy* addresses what it sees as the central role of the struggle for dominance between opposing information systems in local "high-tech" wars. It also contains the following observation concerning nuclear-generated electromagnetic pulse (EMP) weapons:

As information technology develops and it has more influence on the function of nuclear weapons, the discharge of nuclear energy will also be included into information control and applied in the struggle over the control of information rights (such as the electromagnetic pulse weapon being developed). *Nuclear weapons may walk out of deterrence and be used in actual combat* [my emphasis].<sup>82</sup>

The 2004 *Science of Second Artillery Campaigns* suggests that China could drop or place conditions on its long-standing no-first-use policy when an enemy is threatening to carry out conventional strikes against its nuclear facilities or other strategic targets, or if it is losing a conventional war in which the stakes are very high.<sup>83</sup>

Nan Li, an analyst at the National University of Singapore, notes that some Chinese strategists envision first use of nuclear weapons in certain situations, including a Taiwanese declaration of independence; attacks targeting China's nuclear weapons or nuclear command-and-control systems; a conventional attack with force equivalent to a nuclear attack; and in circumstances where the survival of the regime is at risk.<sup>84</sup>

The Pentagon's 2010 annual report on the Chinese military stated: "The no-first-use nuclear policy is ambiguous and Chinese officials have not clarified it. . . . There is some ambiguity over the conditions under which China's [no-first-use] policy would apply, including whether strikes on what China considers its own territory, demonstration strikes, or high-altitude bursts would constitute a first use." The report also notes that "some PLA officers have written publicly of the need to spell out conditions under which China might need to use nuclear weapons—for example, if an enemy's conventional attack threatened the survival of China's nuclear force, or of the regime itself."<sup>85</sup> The 2018 report continues this theme in noting that "China has long maintained a 'no first use' (NFU) policy, although

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<sup>82</sup> Peng Guangqian and Yao Youzhi, eds., *Science of Strategy* (Beijing: Military Science Press, 2001), p. 361. Military Science Press published an English translation of this book in 2005. Cited in Watts, *Nuclear-Conventional Firebreaks*, p. 64.

<sup>83</sup> Eric Heginbotham et. al, *China's Evolving Nuclear Deterrent* (Santa Monica, CA: RAND, 2017), p. 25.

<sup>84</sup> Ben Lowson, "Is China Abandoning Its 'No First Use' Policy?," *Diplomat*, March 21, 2018, <https://thediplomat.com/2018/03/is-china-abandoning-its-no-first-use-nuclear-policy/>.

<sup>85</sup> Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 2010*, p. 35.

ambiguity remains over the conditions under which China's NFU policy would no longer apply."<sup>86</sup>

Chinese military writings link deterrence to creating "more uncertainty" in the adversary's mind. Yet ironically, the growing uncertainty about the effectiveness of asymmetric military postures and capabilities, as well as new military doctrines, may enhance deterrence of those who are least likely to need it, the risk-averse leaders who follow "Chamberlain's Law": When faced with a difficult decision, dither if you possibly can. Correspondingly, the most risk-tolerant leaders—the Hitlers, Husseins, Khrushchevs, Maos, and Stalins of this world—are more disposed to assume that these differences and uncertainties will be resolved in their favor.

For example, it was Mao Zedong who, barely a year after defeating the Chinese Nationalist forces in a long and bloody civil war, went to war with the United States in Korea at a time when the Americans enjoyed a de facto monopoly on nuclear weapons. And it was Mao who later observed, "If Imperialism imposes a war on us, we have 600 million people, and if we lose 300 million of them, what of it?"<sup>87</sup> While this might be dismissed as public posturing, in one of his private correspondences with Khrushchev, Mao declared that China was prepared to fight a nuclear war with the United States, stating, "For our ultimate victory, for the total eradication of the imperialists, we are willing to endure the first [U.S. nuclear] strike. All it is a big pile of people dying."<sup>88</sup> One searches in vain for a similar statement by a Western great-power leader. Clearly Mao's risk tolerance with regard to nuclear war was considerably, if not radically, different from that of Cold War-era U.S. presidents.

It was Stalin who, only a few years after his country had survived a war with Germany at a loss of some 20–30 million people and the destruction of much of European Soviet Russia, blockaded U.S. land access to the American occupation zone in Berlin, despite the nuclear monopoly still enjoyed by the Americans (whose homeland was unscathed by war and whose losses in the war were roughly 1 percent those of the Russians). Stalin's risk tolerance, like Mao's, appears to have been quite high.

As for Hitler, his appetite for running high risks seemed boundless. It began when he successfully occupied the Rhineland in violation of the Versailles Treaty, although his

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<sup>86</sup> *Ibid.*, pp. 75–76.

<sup>87</sup> Jung Chang and Jon Halliday, *Mao* (New York: Alfred A. Knopf, 2005), p. 414. As Mao was directly responsible for the deaths of millions of his fellow Chinese, his cavalier attitude toward human life (other than his own, of course) appears both genuine and appalling.

<sup>88</sup> Nikita Sergeevich Khrushchev, ed., *Memoirs of Nikita Khrushchev* (University Park, PA: Penn State University Press, 2013), vol. 3, p. 436.

military was then greatly inferior to that of the Western allies, Great Britain and France. Eventually he went to war with the world's greatest empire (Great Britain), its greatest economic power (the United States), and its largest country (Soviet Russia), among others.

Saddam Hussein presents yet another case of a highly risk-tolerant authoritarian leader. During the months leading up to the 1991 Gulf War, the U.S.-led coalition of states gave the Iraqi dictator numerous opportunities to back down in the face of overwhelming force.<sup>89</sup> Yet he refused to do so. Once the war began, Saddam intentionally attacked a nuclear power, Israel, in the hope that Israel would actually retaliate against Iraq so as to fracture the U.S.-led coalition against him.

As we shall see presently, advances in the cognitive sciences suggest that leaders such as these—that is to say, tyrants—are often prone to assume that uncertainties will work in their favor. To the extent this is true, increasing the uncertainty they confront may *reduce* the risk they see in pursuing a proscribed course of action and, in so doing, weaken efforts at deterrence.

The efficacy of deterrence strategies is further compromised by senior decision-makers' lack of experience with new doctrines and new capabilities that are untested in combat against formidable adversaries. Uncertainty concerning the true effectiveness of military capabilities can easily lead to very different interpretations of the military balance. Again, risk-tolerant decision-makers are prone to believe these uncertainties will be resolved in their favor, and in so doing they discount the true risks they confront.

## **Summary**

Conventional weapons have become increasingly precise, capable of effectively striking some targets once reserved solely for nuclear weapons. Advances in nuclear weapon design have enabled the fielding of increasingly discriminate weapons. Thus the clear distinction that existed for most of the Cold War between conventional and nuclear weapons has become progressively blurred. Yet a significant number of political leaders believe that nuclear weapons' only use is to deter others from employing nuclear weapons. This decoupling could lower the perceived risks of waging conventional war. On the other hand, some civilian and military leaders in countries like China and Russia assert that certain types of nuclear weapons are, in some cases, available for use in a major conventional war. To the extent that these Chinese and Russian assertions are genuine, those Western leaders

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<sup>89</sup> This is technically a question of compellence rather than deterrence. That being said, at its core it addresses the same point: the willingness of certain types of authoritarian leaders to run risks that might be viewed as "irrational."

who discount the risk undermining efforts to deter general conventional war and the use of nuclear weapons.

The introduction of cyberweapons, with their enormous but untested potential, has only further muddied the deterrence waters. Insofar as cyberweapons reduce senior decision-makers' confidence in their early warning and C2 systems, they may be compelled to delegate nuclear (or strategic) force release authority to subordinate commanders, increasing substantially the number of individuals who can authorize a strategic attack. If even one of these individuals is more risk tolerant than the senior decision-maker(s), deterrence will be weakened.

If the prospective attacker's decision-makers believe the effectiveness of a rival's early warning and C2 systems is significantly compromised, this would logically reduce the anticipated costs (and risks) of executing a surprise attack during a crisis, all other factors being equal. If so, the efficacy of deterrence would be diminished.

Uncertainty over the relative value and effectiveness of these military capabilities is further complicated by the long absence of war between major military powers, which provides the ultimate test of military systems, force structures, and the doctrines governing their employment. As time passes, uncertainty increases with respect to the true nuclear, conventional, and cyber military balances and their interrelationships. The introduction of new capabilities exploiting advances in artificial intelligence, "big data," the bio sciences, directed energy, hypersonics, quantum computing, and robotics will complicate matters even further. This heightens the chances that prospective belligerents will reach significantly different conclusions about the risks associated with pursuing a particular course of action. Ironically, the growth in uncertainty surrounding many existing and emerging military capabilities is likely to enhance deterrence where it is least needed—in deterring risk-averse decision-makers. Those decision-makers who are highly risk tolerant, particularly tyrants, would seem more likely to assume that uncertainties with respect to the military balance will work out in their favor, thereby undermining deterrence.

## ***Geographic Factors, Early Warning, and Command and Control***

*The warning message we sent the Russians was a calculated ambiguity that would be clearly understood.*<sup>90</sup>

—Alexander Haig

**T**he decline in the efficacy of deterrence as a pillar of defense strategy is also a consequence of geography. The proliferation of nuclear and other strategic weapons to states in relatively close proximity to one another has significantly reduced attack warning times compared to those that existed between the United States and Soviet Russia during most of the Cold War. The problem is complicated further when these nuclear-armed states possess highly accurate ballistic missiles that can hold their neighbor's strategic forces at high risk of destruction. Moreover, cyber payloads can be delivered at the speed of light, while advances in directed energy and hypersonics promise to compress timelines associated with more traditional forms of attack.

In the Cold War era, the heartlands of the two principal rivals, the United States and Soviet Russia, were separated from one another by thousands of miles.<sup>91</sup> This separation provided each side with twenty to thirty minutes' warning of a nuclear ballistic missile attack launched from the other's territory. On several occasions, however, Moscow or Washington positioned land-based nuclear missiles in close proximity to its rival's border, greatly reducing attack warning time. In 1961, the United States deployed Jupiter medium-range ballistic missiles (MRBMs) in Italy and Turkey, which were capable of striking Moscow and Leningrad (today St. Petersburg). Previously, in 1958, U.S. Thor intermediate-range ballistic missiles (IRBMs) were installed in Great Britain. When the Soviet Union sought to give Washington a taste of its own medicine by transporting nuclear-armed ballistic missiles to Cuba in 1962, this led to a major confrontation between the two powers. And when the United States deployed Pershing II ballistic missiles to

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<sup>90</sup> "Alexander Haig," *Telegraph*, February 21, 2010, <http://www.telegraph.co.uk/news/obituaries/7279657/Alexander-Haig.html>.

<sup>91</sup> This refers to the distance between the two countries when transiting over the North Pole, as both sides' land-based missiles were programmed to do. That being said, Alaska is separated from Russian Siberia by the Bering Strait, which is roughly 50 miles wide at its narrowest point. Yet Alaska did not contain a substantial number of American citizens, nor did Siberia have a substantial number of Russian citizens, and there were no major industrial centers or critical military bases located in these regions. Of greater relevance, the distance between Seattle, Washington (the "continental" United States) and Russia (the Kamchatka Peninsula) is over 3,300 miles, or roughly the distance between Boston and London.

Western Europe in 1983, it stoked Russian fears that the United States was preparing for an attack.<sup>92</sup>

In these cases, the positioning of nuclear forces near a rival's homeland undermined crisis stability. In the Cuban Missile Crisis, the United States abandoned deterrence in favor of compellence, demanding the Russians remove their missiles from Cuba or risk war.<sup>93</sup>

Two decades later the U.S. installed Pershing II missiles in Western Europe. The deployment was driven by Reagan administration efforts to reassure America's European NATO allies following Russia's deployment of SS-20 missiles whose range limited them to targets in Western Europe.<sup>94</sup> The Russian response was quite different from what Washington expected. The Kremlin viewed the Pershings, with their high accuracy and compressed flight times, as designed to enable a U.S. pre-emptive strike.<sup>95</sup> This led the Russians to establish a semi-automated nuclear launch-on-warning posture known as Perimeter,<sup>96</sup> an implicit admission by the Kremlin that the risks of a U.S. nuclear attack had grown—and that their ability to deter such an attack was increasingly in doubt.<sup>97</sup>

Fortunately, in each instance the geographic buffer between the two superpowers' land-based nuclear missile forces was restored. The Russians withdrew their missiles from Cuba in exchange for a U.S. commitment to withdraw the Jupiters from service.<sup>98</sup> The 1987 Intermediate-Range Nuclear Forces (INF) Treaty led to the scrapping of both the Pershing II and SS-20 missiles.

Unfortunately, the geographic proximity of most current and prospective nuclear powers precludes a spatial buffer of the kind that existed between the United States and Soviet Russia. As the military competition has become progressively multipolar and multidimensional, there are an increasing number of situations in which attack-warning

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<sup>92</sup> For most of the Cold War, only land-based ballistic missiles possessed the speed and accuracy believed necessary to execute a successful surprise counterforce attack against a rival's land-based missile forces and aircraft.

<sup>93</sup> Whereas deterrence seeks to have its target refrain from taking a proscribed course of action, compellence demands the target undertake a course of action that the target wants to avoid.

<sup>94</sup> John Newhouse, *War and Peace in the Nuclear Age* (New York: Vintage Books, 1990), pp. 324–25.

<sup>95</sup> David E. Hoffman, *The Dead Hand* (New York: Anchor Books, 2009), pp. 23, 60–61; Newhouse, *Nuclear Age*, p. 353; and Gordon S. Barrass, *The Great Cold War* (Stanford, CA: Stanford Security Studies, 2009), p. 277.

<sup>96</sup> Hoffman, *Dead Hand*, pp. 150–54.

<sup>97</sup> If the Russians had announced they were fielding Perimeter, and if the U.S. political leadership had believed in Perimeter's effectiveness and believed that the Russian leadership had truly turned over its retaliatory decision to a reliable automated system, this might have enhanced deterrence. But the Russians never revealed Perimeter's existence until after the Cold War.

<sup>98</sup> The Americans withdrew the Jupiter and Thor missiles in 1963.

time is reduced to levels that threaten to erode crisis stability and, by extension, deterrence. In Asia, nuclear powers such as China, India, Pakistan, and Russia lie in close proximity to each other. All have well over a hundred nuclear weapons. All possess ballistic missile delivery systems with short flight times. All are modernizing their missile forces to enhance their accuracy and reliability, as well as their nuclear weapons inventories. Should we be surprised if China's ballistic missile force enhancements produce fears in the Kremlin similar to those that arose when the Pershing IIs arrived in Europe? Or that progressive enhancements to the accuracy of Pakistani missiles stimulate concerns among Indian leaders over the survivability of their nuclear arsenal, the overwhelming majority of which is land based? Should Iran acquire a nuclear capability, Israel will also face the problem of a close neighbor armed with nuclear-tipped ballistic missiles.

Consider that owing to the speed at which ballistic missiles travel, Iran and Israel confront prospective attack warning times compressed from the twenty to thirty minutes or so that existed between the two superpowers during the Cold War, to perhaps as little as five to six minutes. Given the short distances involved, the attack response timelines may be so compressed that it is impossible for senior decision-makers to make an informed decision on an adequate response (let alone an optimal one). This would place enormous strain on early warning and C2 systems—assuming these countries have the technical, human, and material resources to field, man, and maintain them perpetually at high levels of readiness. Moreover, other advanced militaries may begin fielding significant conventional capabilities along the lines of the U.S. military's "air-space" precision-strike forces. Should this occur, for reasons elaborated upon above, the challenge of pursuing a defense strategy founded on deterrence could become even more formidable.

### **Early Warning and Command and Control**

The compressed attack warning times stemming from geographic proximity, combined with advances in the speed and accuracy of strategic weapons delivery systems, places a premium on responding quickly to an attack. Yet the need to act within increasingly compressed timelines conflicts with the demands to exercise tight command authority over nuclear weapons and, increasingly, a wider spectrum of *strategic* weapons. Both requirements work to the detriment of deterrence. On one hand, a country that exercises tight control over the use of strategic forces may find an adversary concluding that the risks of executing a surprise attack have diminished. On the other hand, devolving release authority to local commanders may increase an adversary's belief in the need to strike first. This stems from the increased risk in having to deter a relatively large number of individuals capable of initiating an attack.

During the Cold War, U.S. civilian policymakers and military leaders understood the risk of a major war starting between the two superpowers and their allies with neither side

intending it, as well as the possibility of a catalytic war, one initiated between two states by a third party.<sup>99</sup> As the history of that time has borne out, these fears were not unfounded. Unfortunately, current trends strongly suggest that the risk of accidental or catalytic war between major military powers, as well as nuclear powers, is increasing.

## **Unintended/Accidental War**

During the Cold War, U.S. and Soviet leaders faced a major dilemma. On the one hand, they needed to avoid an unintentional war by maintaining tight control over their military forces in general and their nuclear weapons in particular. On the other hand, they needed to deter their adversary from starting a war by enabling these forces to be ready on short notice to avoid destruction in a surprise “Pearl Harbor” or “22 June”<sup>100</sup> attack, or in the wake of a decapitation strike on the state’s leadership. Fortunately, the two superpowers did not have to contend with the complications created by an increasingly multipolar international system and multidimensional strategic competition. Nevertheless, on at least several occasions, they came perilously close to nuclear war.

On the morning of November 9, 1979, displays at four U.S. command centers simultaneously indicated that a full-scale Russian missile attack was underway against the United States. Over the next six minutes, preparations were initiated to execute a U.S. retaliatory strike against Russia. Air force bombers were launched, including the president’s National Emergency Airborne Command Post.<sup>101</sup> A direct hotline had been installed between the White House and the Kremlin after the Cuban Missile Crisis to effect prompt communications in the event of an emergency. Yet the intense time constraints precluded its being used to contact Russian leaders, either to determine their intentions or to explain the sudden (and, from Moscow’s perspective, likely alarming) shift in U.S. military activities.

Fortunately, the U.S. North American Air Defense Command (NORAD) was able to access the radar data of the Ballistic Missile Early Warning System (BMEWS), as well as data from early warning satellites, and determine that no Russian missiles had actually been

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<sup>99</sup> These concerns also made their way into popular Western culture in the form of books like *Fail Safe* and *On the Beach*, both of which were made into motion pictures. Other movies highlighting the danger of accidental nuclear war include *Dr. Strangelove* and *The Bedford Incident*.

<sup>100</sup> Just as American leaders were powerfully affected by Japan’s surprise attack on Pearl Harbor in 1941, which initiated war between the two countries, Russian leaders were similarly affected by Germany’s unannounced attack some six months earlier, on June 22, 1941, which began what is known in Russia as the Great Patriotic War. In both cases, the lack of preparedness for the attack and the major military setback that resulted left a lasting impression on the country’s leaders and emphasized the need for vigilance to avoid being similarly victimized in the future.

<sup>101</sup> Time, however, precluded the president’s being aboard.

launched. The false alarm was traced to a computer exercise tape running on the system that had not been switched to “test” mode.<sup>102</sup> While it took only six minutes to detect the problem, six minutes is roughly all the time that an Israeli or Iranian leader would have before missiles launched by its rival would arrive at their targets. Similarly, Indian and Pakistani leaders would not have more than a few additional minutes’ warning of an attack, assuming they had effective early warning systems in place.

In some respects the Russians confronted a greater challenge than the United States. While Soviet Russia’s nuclear weapon deployments were overwhelmingly limited to its territory and the territory of its Warsaw Pact allies, the United States had nuclear weapons positioned along the USSR’s periphery in Western Europe, in South Korea and Turkey, and aboard aircraft carriers and ballistic missile submarines (SSBNs), among other places. Great Britain and France, close U.S. allies, also had significant numbers of missiles and aircraft equipped to carry nuclear weapons. Thus Moscow’s attack warning time could be—and in the Soviet leadership’s eyes, *was*—significantly less than Washington’s.<sup>103</sup> As the United States prepared to forward-base highly accurate Pershing II missiles in Europe in the early 1980s following Moscow’s deployment of SS-20 missiles, Soviet leaders faced the prospect of attack warning times compressed to less than ten minutes.<sup>104</sup>

As alluded to above, these conditions placed great stress on Russian early warning and nuclear command-and-control systems, which were not nearly as capable as their U.S. counterparts. In the early 1960s Moscow fielded Monolit, a primitive system whose transmissions were slow and cumbersome. Moreover, once Monolit transmitted orders through the system, they could not be countermanded.<sup>105</sup> This shortcoming was corrected with the deployment of a successor system, named Signal, in 1967. Nevertheless, Signal suffered from serious flaws of its own.<sup>106</sup> They manifested themselves on the night of September 26–27, 1983, when Lieutenant Colonel Stanislav Petrov, the duty officer at a missile attack early warning station south of Moscow, received warnings shortly after midnight from a Russian satellite monitoring U.S. missile fields indicating that an attack

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<sup>102</sup> Scott D. Sagan, *The Limits of Safety* (Princeton, NJ: Princeton University Press, 1993), pp. 228–42.

<sup>103</sup> While both the United States and the Soviet Union had ballistic missile submarines that could approach the other’s coast prior to launch, the U.S. lead in this area remained strong throughout the Cold War, especially in the accuracy of its SLBMs and its ability to detect and track Soviet submarines. Moreover, the Soviets had a far smaller percentage of their nuclear warheads aboard submarines relative to their land-based missile and bomber forces than did the United States.

<sup>104</sup> The KGB concluded that the launching of strategic missiles from the continental United States provided Soviet leaders with roughly twenty minutes’ reaction time, assuming the attack was promptly detected. Once the Pershing IIs were deployed, the reaction time would shrink to four to six minutes. Hoffman, *Dead Hand*, p. 61.

<sup>105</sup> *Ibid.*, pp. 146–48.

<sup>106</sup> Barrass, *The Great Cold War*, p. 279.

had been launched. The satellite system providing the information had been activated only the year before and had not been fully tested. A complete check of the satellite reporting the launch and of the center's computer system would take roughly ten minutes to complete—too much time to lose if an attack was really in progress. Petrov noted that only one missile launch had been detected. He considered the situation and informed his superiors that the indication was a false alarm. Shortly thereafter, however, the system began reporting more launches from the American missile fields. Fortunately for humanity, Petrov checked the data from the satellite's crude optical telescope. They showed no launches. Petrov again reported the "attacks" as a false alarm.<sup>107</sup>

Because of Russian concerns about progressively shorter reaction times, the growing accuracy and reliability of U.S. missiles (particularly the Pershing II and submarine-launched ballistic missiles), and the problematic Russian early warning system, Moscow took increasingly risky measures to guarantee its ability to execute a retaliatory strike even if the Russian leadership was incapacitated by a U.S. surprise attack.

One option the Russian leaders considered, known as the Dead Hand, was designed to enable a computer to order a nuclear retaliatory strike if all senior political decision-makers and the military command structure became incapacitated. It would rely on computers receiving nuclear attack warning data to ride out any attack and then, if they failed to receive instructions, to execute an automated nuclear retaliatory strike.<sup>108</sup> Russian leaders ultimately decided to deploy a modified version of the system, Perimeter, which was tested in November 1984 and became operational a few months later. Like Dead Hand, Perimeter was designed to function in the event the Russian leadership was incapacitated. If ground sensors detected a nuclear strike against Moscow and if communication links to Russian nuclear forces were severed, the system would send low-frequency radio signals to pre-designated missiles, which would automatically be launched. As they transited the atmosphere they would transmit launch orders to those Russian nuclear forces that had

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<sup>107</sup> Hoffman, *Dead Hand*, pp. 5–11.

<sup>108</sup> The concept shared much with the Doomsday Machine depicted in the motion picture *Dr. Strangelove*. Herman Kahn reportedly outlined the idea of a Doomsday Machine in the 1950s. The machine would have a computer linked to an arsenal of nuclear weapons. In the event of a nuclear attack, sensors would pass the information to the computer, which would be programmed to order all the doomsday weapons to detonate, irradiating the planet in a lethal radioactive nuclear fallout shroud that would extinguish all human life. The Doomsday Machine could be seen as the ultimate deterrent to an attack, since the computer would automatically issue the order to detonate without human intervention, effectively discouraging efforts by an enemy to launch a sneak attack to destroy the opposing country's nuclear forces before they could retaliate. Hoffman, *Dead Hand*, p. 152.

survived the U.S. attack.<sup>109</sup> Oddly enough, the Russians *never informed* the Americans about Perimeter, even though its ultimate purpose was to deter a U.S. nuclear attack.<sup>110</sup>

Given the combination of speed and precision accuracy in modern nuclear and strategic conventional weapon systems, it is hardly surprising that contemporary strategic powers would consider remedies similar to those adopted by the United States and Soviet Russia when confronted with the problem of compressed warning times during the Cold War.<sup>111</sup> Thus we could see their nuclear forces on “hair-trigger” alert in a crisis, with a significant portion of these forces always on heightened alert. Those countries lacking confidence in their early warning and C2 systems could feel compelled to devolve nuclear release authority to lower-level commanders, increasing the number of fingers on the nuclear trigger and widening the circle of personalities that constitute the objects of rival deterrence strategies. This could only weaken efforts at deterrence. More sophisticated nuclear powers might adopt their own version of Russia’s Perimeter system, or even Dead Hand. (If so, one hopes that unlike the Russians, they would inform those they are seeking to deter!) And as noted above, in this age of cyberwarfare, one can only speculate about how resistant such automated command systems would be to penetration and exploitation by adversaries and third parties.

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<sup>109</sup> According to some reports, versions of Perimeter have been tested extensively in exercises. However, the system is intended to be activated only in a crisis. William J. Broad, “Russia Has ‘Doomsday’ Machine, U.S. Expert Says,” *New York Times*, October 8, 1993, <http://www.nytimes.com/1993/10/08/world/russia-has-doomsday-machine-us-expert-says.html?pagewanted=all>.

<sup>110</sup> Hoffman, *Dead Hand*, pp. 124, 149, 153–54. Ironically, the Russians in *Dr. Strangelove* also failed to inform the Americans of their Doomsday Machine. There are two possible reasons for the secrecy surrounding Perimeter. One is that the Russians feared that sharing Perimeter’s existence with the Americans would encourage them to figure out how to compromise the system. A more interesting explanation is that Perimeter was intended to maintain the Russian leadership’s tight control over nuclear weapons. By this logic, the Russians “solved” the problem posed by compressed attack warning times, not by devolving nuclear release authority to lower-level commanders, but by switching on Perimeter. See Nicholas Thompson, “Inside the Apocalyptic Soviet Doomsday Machine,” *Wired*, September 21, 2009, <https://www.wired.com/2009/09/mf-deadhand/>. The United States had a somewhat similar system called the Emergency Rocket Communications System (ERCS). Also known as Project 279 and Project 494L, its purpose was to ensure communications to U.S. strategic forces during a nuclear attack. The system employed a UHF repeater on a Minuteman missile to transmit an Emergency Action Message (EAM) to units of the Strategic Air Command. Federation of American Scientists, “Emergency Rocket Communications System (ERCS),” <https://fas.org/nuke/guide/usa/c3i/ercs.htm> and Department of the Air Force, Headquarters Strategic Air Command, “Emergency Rocket Communications System: Emergency Action Procedures (U),” June 28, 1982, <https://www.scribd.com/document/95063585/SAC-Reg-55-45-ERCS-Emergency-Action-Procedures-Redacted>.

<sup>111</sup> Until the 1960s, both the United States and Soviet Russia relied primarily on bombers to deliver nuclear weapons to their targets. Depending on the target and the bombers’ base location, the bombers required at least several hours, and often quite a bit longer, to reach their targets. ICBMs, on the other hand, could reach these targets in roughly a half hour, greatly reducing attack warning.

For some countries, their size, or lack thereof, may also exert a strong influence. Israel, for example, is far smaller than China, India, Pakistan, or Russia—as well as Iran.<sup>112</sup> As Israel lacks strategic depth, it could be challenging for it to adopt some force postures that could reduce its vulnerability to surprise attack, such as land-based mobile missile basing.<sup>113</sup> On the other hand, large countries may enhance their ability to deter an attack by exploiting their strategic depth to base the bulk of their nuclear and prompt precision-strike forces far from their rivals' borders. Thus Russia, for example, in response to China's growing nuclear and ballistic missile forces, could leverage its strategic depth by basing most of its nuclear forces northwest of the Ural Mountains.<sup>114</sup>

## Summary

Geographic proximity, combined with a multipolar security competition and multidimensional military competition, together with technical advances in a variety of realms, further complicates strategies whose purpose is to deter rivals from pursuing proscribed activities in general, and major war in particular.

During the Cold War the two superpowers, even with their relatively generous early warning time windows and formidable material and technical resources, found themselves unintentionally staring into the nuclear abyss. It would appear the risk of unintended war between nuclear powers in close geographic proximity and with modest resources to devote to early warning and C2 systems is significantly greater. If so, the efficacy of deterrence would diminish.

Indeed, the combination of close proximity and high-speed delivery systems like ballistic missiles and cyber payloads, as well as emerging capabilities related to hypersonic and

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<sup>112</sup> Israel covers roughly 8,500 square miles, Iran about 636,000 square miles. This makes Israel a little more than 1 percent the size of Iran. The United States encompasses roughly 3.8 million square miles, while the USSR extended over 8.65 million square miles. Today, Russia comprises some 6.5 million square miles (not including Crimea), China 3.7 million square miles, India 3.3 million square miles, and Pakistan 800,000 square miles. For a discussion of the prospective characteristics of an Iranian-Israeli bipolar nuclear competition, see Krepinevich, *Critical Mass*, pp. 25–32.

<sup>113</sup> Israel, and perhaps Iran and Pakistan, might consider hiding solid-fuel missiles on transporter-erector-launchers (TELs) in underground shelters. But to employ them following a first strike they would presumably have to maintain their command-and-control system and be able to move the missiles above ground. The latter might prove difficult if an enemy targeted the entryways. A seaborne nuclear force might represent a better deterrent in terms of its survivability, but it might encounter even greater problems maintaining robust command and control with higher headquarters.

<sup>114</sup> One problem with such a nuclear basing posture, of course, is that Russian policymakers and military leaders also feel threatened by U.S. nuclear and “air-space” forces that could be forward based on the territory of America's European NATO allies.

directed energy weapons, threatens to compress attack warning times to the point where informed human reaction is impossible until after an attack has reached its targets.

Under such conditions, some senior policymakers may decide to place their strategic forces on hair-trigger alert in a crisis, with a significant portion of these forces perpetually on heightened alert. More sophisticated nuclear powers might adopt their own version of Perimeter. The incentive to devolve nuclear release authority to lower-level commanders would also likely increase. This could enhance deterrence, but it would also increase the risk of accidental or unauthorized use of strategic forces. Finally, reduced confidence in the effectiveness of early warning and C2 systems could lower the risk and enhance the potential benefits of striking first.

In brief, the net effect of these developments on strategies emphasizing deterrence would very likely be to reduce their effectiveness relative to both the Cold War and U.S. unipolar eras.

## ***New Domains and the Democratization of Destruction***

*The United States is fighting a cyber-war today, and we are losing.*<sup>115</sup>

—Mike McConnell

### **New Domains**

Over the past seventy years the military competition has gradually entered three new domains: the seabed, space, and cyberspace. With the passage of time, the seabed has become a major part of the world's economic infrastructure thanks to, among other things, offshore oil and gas exploration and the proliferation of undersea cables carrying the vast majority of global telecommunications data.<sup>116</sup> Since the launch of Sputnik in 1957, outer space has become increasingly populated with a wide variety of satellites, serving both civilian and military purposes, belonging to an ever-growing number of states. Thirty years ago the Internet was a novelty. Today cyberspace is teeming with activity that is crucial to the effective functioning of many states' economies, critical infrastructure, and military forces.

Pursuing effective deterrence strategies in each of these domains—and across them as well—is likely to prove difficult for three reasons. First, many state—and non-state—entities are capable of operating in these domains. The competition on the seabed, space, and cyberspace is multipolar. Moreover, we are also witnessing the “democratization of destruction,” as formidable destructive power is now within the grasp of small groups. The evidence is clear for all to see. South American drug cartels are using crude semi-submersibles and submarines to move their cargo, while unmanned underwater vehicles (UUVs), which only a few decades ago were the sole province of the world's most advanced militaries, are now common support capabilities for commercial offshore oil platforms.<sup>117</sup> These autonomous underwater vehicles can be fitted with many kinds of

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<sup>115</sup> Mike McConnell, “To Win the Cyber-War, Look to the Cold War,” *Washington Post*, February 28, 2010, p. B-1.

<sup>116</sup> In 1947, the first offshore discovery of oil out of sight of land occurred in the Gulf of Mexico. More finds followed. They were developed to the point where nearly 30 percent of America's oil production and 15 percent of its gas production came from wells on the Outer Continental Shelf. Globally, roughly 30 percent of the world's oil output comes from offshore production. Today, fiber optic undersea cables carry 99 percent of all transoceanic digital communications, and are quite accessible with current technology. Andrew F. Krepinevich, “The Terrorist Threat beneath the Waves,” *Wall Street Journal*, November 1, 2011, and Greg Miller, “Undersea Cables are Surprisingly Vulnerable,” *Wired*, October 29, 2015, <https://www.wired.com/2015/10/undersea-cable-maps/>.

<sup>117</sup> Although they are not remotely as sophisticated as the vessels operated by modern navies, these semi-submersibles (which sit very low in the water) and submarines (which are capable of running completely submerged) are used primarily to transport cocaine from the Pacific coast of Colombia and Ecuador. Semi-

payloads, including explosives. The space age long ago moved beyond the U.S.-Soviet duopoly to encompass not only many states, but also commercial firms like Space-X and Orbital ATK.<sup>118</sup> With the growth of the commercial space industry, it may be possible for non-state groups as well as major-power militaries to place small weaponized satellites in orbit.<sup>119</sup> Clearly the cyber world is populated by a large assortment of individuals and groups engaged in a wide range of criminal and terrorist activities that may also have the potential to inflict significant damage on elements of a state's critical infrastructure, much of which might be defined as "strategic" targets.

Second, in each domain the competition favors the offense, or is "offense-dominant."<sup>120</sup> This makes deterrence through denial a difficult proposition and, economically speaking, a losing one.

Third, prompt attack attribution is difficult. As noted above, with the proliferation of UUVs and enhanced mapping of the seabed, it is becoming increasingly possible for states and even non-state groups to execute attacks ("commerce raiding") against targets on the seabed. Similarly, with the proliferation of small satellites and commercial launch enterprises, the opportunity for states (and perhaps even radical political groups) to place "space grenades" in orbit with a modest maneuver capability is moving from the world of fantasy into practicality. Recent advances in the power and commercial availability of

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submersibles are typically limited in range to roughly 2,000 miles, but the fully submersible vehicles are assessed to have ranges that would enable them to reach the United States. Robert Mackey, "Advances in 'Narco-Submarine' Technology," *New York Times*, July 6, 2010; Michael S. Schmidt and Thom Shanker, "To Smuggle More Drugs, Trackers Go under the Sea," *New York Times*, September 9, 2012; Joint Interagency Task Force South, "Fact Sheet: Self-Propelled Semi-Submersible (SPSS)," 2008; and Lance J. Watkins, "Self-Propelled Semi-Submersibles: The Next Great Threat to Regional Security and Stability," unpublished paper, Naval Postgraduate School, June 2011. On the proliferation of commercial UUVs, see Defense Science Board, "Next-Generation Unmanned Undersea Systems," October 2016, pp. 7–13. [Note: The document contains only the report's executive summary, and as it has no numbered pages, the page numbers referenced here are based on the cover page being page 1.]

<sup>118</sup> The growth of the small satellite industry is seen as aiding the expansion of the U.S. commercial space launch industry. Gerald L. Dillingham, "Commercial Space: Industry Developments and FAA Challenges," Testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives, U.S. Government Accountability Office, June 22, 2016, p. 11, <https://www.gao.gov/assets/680/677943.pdf>.

<sup>119</sup> Several countries and commercial firms have already placed small satellites in low earth orbit (LEO). "Nanosats Are Go!," *Economist*, June 7, 2014, <https://www.economist.com/news/technology-quarterly/21603240-small-satellites-taking-advantage-smartphones-and-other-consumer-technologies>.

<sup>120</sup> The reader will recall that a competition is offense-dominant if, under conditions where both the attacker and defender have equal resources, the attacker will prevail. Put another way, to mount an effective defense, the defender would have to devote more resources to the competition than the attacker does. Moreover, even if the defender is willing to make the additional investment, the attacker can offset the defender's efforts at lower cost to himself.

lasers will almost certainly increase the number of states capable of anti-satellite (ASAT) operations.

Given the characteristics of the competition in these domains and the proliferation of actors, if several oil well heads located on the Gulf of Mexico seabed were blown up by undersea robots, would it be easy to identify the attacker quickly and reliably? What about confirming the source of attacks on satellites disabled by micro space grenades or sea-based lasers, or the identity of the state or group responsible for launching a debilitating cyberattack on SCADA (Supervisory Control and Data Acquisition)<sup>121</sup> systems controlling a large power grid? In each case, pinning the rose on the true attacker could be difficult and would almost certainly be more challenging than identifying the source of a nuclear or conventional attack during the Cold War. This suggests that deterrence strategies that rely on the threat of punishment, or retaliation, will be less effective: if the probability of identifying the actor responsible is reduced, the actor's risk in attacking is reduced as well.

### **The Democratization of Destruction**

The trend toward increased destructive power in the hands of small groups in these domains, and perhaps in the realm of biological warfare, also presents challenges for those depending on deterrence strategies. For example, millenarian groups, those whose members desire a radical change in the existing order, may prove exceedingly difficult to deter. This is particularly so if they see large-scale destruction as a way to further their aim of bringing down a corrupt and unjust order and replacing it with one more to their liking. For them, the cost of inaction far exceeds the cost of pursuing a proscribed action. Thus, such groups are likely to discount deterrence strategies based on punishment. They might be put off by strategies based on deterrence through denial. But as noted above, the competitions in the seabed, space, and cyberspace are offense-dominant.

If history is any guide, following such attacks, these groups would also trumpet their success. This would seem to remove the problem of attribution and enable strategies relying on deterrence through punishment. But again, there are problems. First, against what or whom would one retaliate? Threats made against state rivals typically involve the loss of economic assets or infliction of mass casualties (in the case of nuclear retaliation). Organizations like al Qaeda and ISIS have little in the way of such assets. For millenarian

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<sup>121</sup> SCADA systems drive and regulate the motors, valves, and switches in a wide range of industrial applications, including food factories, automobile assembly lines, gas pipelines, electric utilities, and water treatment plants. SCADA software collects information about the condition of and activities on a system and sends instructions to devices, often to perform physical movements. These instructions are sometimes sent over the Internet or broadcast via radio waves. Krepinevich, *Cyber Warfare*, pp. 134–35, 188.

groups, even their leaders' deaths may be viewed as a "benefit" if they die as martyrs to their cause.

## **Catalytic War**

As described above, a catalytic war is one initiated covertly between two states by a third party. In effect, a catalytic war occurs when one state incorrectly attributes an attack to another state or non-state entity. The combination of an expanding multipolar competition; the movement of the military competition into new domains; growing problems with attributing the source of attacks; and the combination of high-speed delivery systems belonging to rivals in close geographic proximity seems likely to increase substantially the odds of catalytic war. If so, this will add to the problems of policymakers pursuing strategies based on deterrence.

Consider, for example, a Middle East with an Iran armed with a dozen nuclear-tipped ballistic missiles. In a crisis, Iranian leaders would have to account for the possibility of an Israeli pre-emptive attack. In attempting to deter such an attack, the Iranians might place their small nuclear force on a launch-on-warning posture. That is to say, when Iran received warning that an Israeli missile attack was under way, it would launch its nuclear forces before they could be destroyed.

As noted earlier in this study, Israel and Iran are in such close proximity that ballistic missile flight times between the two countries are roughly five or six minutes. This provides the leaders of both countries with little time to react to a ballistic missile attack. Furthermore, Iran may lack an effective early warning system. In a crisis it is not beyond the realm of possibility that a cyber payload containing malware injected into the early warning systems of one or both countries by a third party (including a non-state entity) could be activated. The malware would corrupt the early warning system to show—falsely—that a ballistic missile attack was under way. Given the short missile flight times, there would be no time, particularly for the Iranian leadership, to confirm that an attack was, in fact, occurring.<sup>122</sup> Because of Iran's launch-on-warning posture, it would launch its

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<sup>122</sup> This assumes there would be a period after Iran acquires its nuclear capability when it would not yet have amassed a sizeable arsenal, one that would be at risk of elimination in a preventive Israeli attack. During this period the Iranian leadership would likely feel the need to adopt a launch-on-warning posture to ensure that Israel would pay a price for attacking Iran, and thus to deter such an attack. Israel, on the other hand, has a sufficiently large and well-distributed nuclear arsenal to withstand an Iranian nuclear missile attack and still retain an assured destruction capability against Iran. See Krepinevich, *Critical Mass*, pp. 27–32.

missiles before it could confirm that it was under attack.<sup>123</sup> Similar situations could arise elsewhere as, for example, in a crisis between India and Pakistan.

More broadly speaking, the difficulty in determining the source of a cyberattack could trigger war at levels below nuclear use. The chances that a regime would incorrectly attribute an attack cannot be easily dismissed. To date, even when substantial efforts are made to determine the source of a sophisticated cyberattack, there is difficulty producing a “smoking gun” level of evidence, and such efforts have taken considerable time and resources to pursue.<sup>124</sup> The problem of prompt, accurate attribution in the event of a cyberattack may encourage risk-tolerant leaders to believe they can inflict major damage on an adversary at little or no cost to themselves. At the same time, the fear of triggering a catalytic war could discourage risk-averse leaders from retaliating, further encouraging risk-tolerant leaders.

## Summary

The expansion of military competition in the relatively new domains of space, cyberspace, and the seabed finds a growing number of state and non-state rivals competing for advantage. In each domain, the competition favors the offense. This undermines deterrence through denial since, all other factors being equal, the costs of taking a proscribed action are less than the costs of blocking the action successfully.

In each domain, it is relatively difficult to identify the source of an attack—especially promptly—compared to large-scale attacks in more traditional warfighting domains, such as land, air, and sea. This lowers the risk of pursuing a proscribed action in these domains and, in so doing, incentivizes risk-tolerant actors, eroding the efficacy of deterrence through punishment.

Moreover, the reduced risk of being identified as the source of an attack also reduces the risk of attempting to initiate a catalytic war. To the extent the risk of inadvertent catalytic war is increasing, the value of deterrence in defense strategy is decreasing.

The rapidly increasing ability of non-state entities to inflict destruction also undermines deterrence. The objective of at least some groups, such as millenarian groups, is simply to

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<sup>123</sup> This situation is similar to that depicted in a catalytic war that occurs in the popular novel *On the Beach*. Nevil Shute, *On the Beach* (New York: William Morrow, 1957). In the novel, the attacks that triggered the war were conducted by Russian-built aircraft (not missiles) that were in the armed forces of other countries.

<sup>124</sup> Mike Lennon, “Massive Series of Cyber Attacks Targeting 70+ Global Organizations Uncovered,” *Security Week*, August 3, 2011, <http://www.securityweek.com/massive-series-cyber-attacks-targeting-70-global-organizations-uncovered>.

inflict destruction—to “watch the world burn.” If that is their purpose, deterrence through denial is the only possible strategy, as deterrence through the threat of punishment matters little to those who are willing—even eager—to give their lives to achieve their aims. Moreover, to the degree that such groups lack a sanctuary, they may believe they must use their destructive capability or risk losing it to those who seek to suppress them. Finally, non-state groups have little (in most cases nothing) in the way of economic infrastructure and population against which to retaliate—at least in traditional terms.<sup>125</sup>

With a relatively large number of competitors in these domains and the problems with prompt, effective attribution, risk-tolerant leaders will find the prospective costs and risks of undertaking proscribed actions lessened, all other factors being equal, which weakens deterrence through punishment strategies. The costs and risks may appear even lower, and the prospective benefits far greater, if would-be perpetrators believe their action would trigger a catalytic war between two rivals.

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<sup>125</sup> While it is beyond the scope of this paper, it is worth undertaking efforts to determine what such groups do fear. For example, they may not fear losing their own lives, but perhaps they do fear for the lives of their children. Thinking along these lines may seem beyond the limits of civilized behavior, but history shows that when states or groups are faced with a threat to their survival or well-being, they are often willing to take extreme measures to prevail—and protect their own children.

## *The Human Condition*

*It is remarkable how little concern men seem to have for logic, statistics, and even, indeed, survival: we live by emotion, prejudice, and pride.*<sup>126</sup>

—Dwight D. Eisenhower

Over the past forty years, advances by scholars in the cognitive and behavioral sciences have not only confirmed much of the pioneering work on human decision-making done in the mid-twentieth century, but substantially expanded on it. Their findings demonstrate that humans cannot be counted on to act rationally in making decisions where risk is involved, in the sense that they make decisions that maximize their prospective gains within the context of their utility functions. This contradicts in some important ways work done by intellectual giants like David Hume, John Locke, Adam Smith, and John Stuart Mill, which led behavioral psychologists and social scientists to view cognitive processes as though they were identical for all normal human adults.<sup>127</sup>

These findings have implications for deterrence strategies that assume the target is rational and conforms to the expectation principle (that is, that the decision-maker calculates the expected values of alternative outcomes using the laws of probability). Based solely on the work of these early pioneers, the prospects for those pursuing deterrence strategies seemed encouraging, in that all “normal” humans were believed to seek to maximize their prospective gains and minimize risk (and if possible, eliminate it). But the process of scientific discovery did not end here.

Work by the Swiss mathematician and physicist Daniel Bernoulli on the expected utility hypothesis was widely accepted by those in the mainstream. Bernoulli’s key insight was that most people dislike risk (and uncertainty).<sup>128</sup> If offered the choice between a gamble and a sure thing equal to the expected value of the gamble, people are highly likely to pick

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<sup>126</sup> Evan Thomas, *Ike’s Bluff* (New York: Little, Brown and Co., 2012), p. 105.

<sup>127</sup> Richard E. Nisbett et al., “Culture and Systems of Thought: Holistic Versus Analytic Cognition,” *Psychological Review* (April 2001): 291.

<sup>128</sup> Uncertainty exists when the decision-makers do not know the possible outcome of their decision in advance, nor the probabilities. On the other hand, risk exists when the decision-makers have some sense of the probabilities of potential outcomes in advance. For example, before rolling a pair of dice, an individual knows the odds of rolling “snake eyes” (two “ones”). (The odds are one in thirty-six.) In a game of poker, the players are less certain of the outcome of a particular hand, but expert players have a sense of the range of the odds in choosing a particular course of action. In this paper, we are focused on decision-making under conditions of risk, not uncertainty.

the sure thing.<sup>129</sup> Bernoulli realized that human decision-making is based not only on prospective material gains and losses, but also on psychological factors. Thus decision-making under conditions of risk and uncertainty is the average of a range of utilities, each weighted by its probability. Bernoulli's work led to a modification of the expectation principle<sup>130</sup> to incorporate the psychological aspects of decision-making under conditions of risk. As Daniel Kahneman notes:

The conclusion is straightforward: the decision weights that people assign to outcomes are not identical to the probabilities of these outcomes, contrary to the expectation principle. Improbable outcomes are overweighted—this is the possibility effect. Outcomes that are almost certain are underweighted relative to actual certainty. The *expectation principle*, by which values are weighted by their probability, is poor psychology” [emphasis in original].<sup>131</sup>

In the 1940s, John von Neumann and Oskar Morgenstern showed that any person who satisfies four axioms has a utility function, which is the foundation of the rational-agent or “rational-actor” model of human decision-making. Von Neumann and Morgenstern proved that “any weighting of uncertain outcomes *that is not strictly proportional to probability leads to inconsistencies and other disasters*” [my emphasis].<sup>132</sup> Still, as long as humans act as rational agents, it should be possible to avoid these “inconsistencies” and “disasters.” Over the next quarter century came still more pathbreaking work. The new findings, however, were not nearly so encouraging with respect to human behavior and assumptions regarding either “Rational Economic” or “Rational Strategic” Man.

In the 1950s, Herbert Simon began work on what became known as bounded (or limited) rationality in decision-making. Simon argued that people's ability to make rational decisions—those that optimize their utility function—is limited by the difficulty of the decision problem they confront, their own cognitive limitations, and the time available to make a decision. Consequently, rather than finding optimal solutions that maximize

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<sup>129</sup> This is the basis for insurance. A risk-averse person is willing to accept an expected value that is less than that of the gamble in order to obtain a sure thing; that is to say, the person is willing to pay a premium to avoid risk.

<sup>130</sup> The expectation principle fails to identify human behavior with respect to risk. It does not account for the possibility effect, which finds that changes in an individual's probable gains and losses are not linear. For example, a boost in the probability of a person winning a bet from 50 percent to 60 percent has a smaller psychological benefit than an increase from 95 percent to 100 percent. Amos Tversky and Daniel Kahneman, “The Framing of Decisions and the Psychology of Choice,” *Science* (1981): 453–58.

<sup>131</sup> Daniel Kahneman, *Thinking Fast and Slow* (New York: Farrar, Straus and Giroux, 2011), p. 312.

<sup>132</sup> *Ibid.*, pp. 270, 312. Kahneman notes that von Neumann and Morgenstern's work in deriving the expectation principle from axioms of rational choice was “immediately recognized as a monumental achievement, which placed expected utility theory at the core of the rational agent [or ‘rational actor’] model in economics and other social sciences.”

expected utility, decision-makers typically try to find acceptable solutions to acute problems. The very difficult problem of finding an optimum course of action is thus replaced by the simpler problem of satisfying a set of self-imposed constraints.<sup>133</sup> Simon called this “satisficing.”

Simon’s collaboration with James March in the late 1950s yielded a seminal work, *Organizations*. In it they showed how senior leader decision-making in organizations is shaped by the activities of the organization itself. They found the assumption that an organization’s decisions were made at the top and flowed down was flawed. In fact, the bureaucratic organizations that gathered, processed, and provided information to an organization’s senior leaders (or withheld it from them) could exert a significant influence on their decisions.<sup>134</sup> In the early 1960s, March collaborated with Richard Cyert to produce yet another seminal work, *A Behavioral Theory of the Firm*, which found that senior decision-makers often made decisions based on relatively simple rules, not a detailed assessment of costs, benefits, and risks.<sup>135</sup> These findings were enhanced by the work of Roberta Wohlstetter and Graham Allison.<sup>136</sup>

In brief, the pathbreaking work of Simon, March, Cyert, and others eroded the belief that human beings can be counted upon to maximize their utility functions and act like a rational agent (“rational actor”), as von Neumann and Morgenstern had found. The implications for defense strategies based on deterrence are clear.

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<sup>133</sup> Herbert A. Simon, “A Behavioral Model of Rational Choice,” RAND P-365, January 20, 1953, and Herbert A. Simon, “Rational Choice and the Structure of the Environment,” *Psychological Review* (March 1956), <http://digitalcollections.library.cmu.edu/awweb/awarchive?type=file&item=33544>. See also Daniel Kahneman, “Maps of Bounded Rationality: Psychology for Behavioral Economics,” *American Economic Review* (December 2003): 1449–75, <http://www.econ.tuwien.ac.at/Lotto/papers/Kahneman2.pdf>.

<sup>134</sup> James March and Herbert Simon, with the collaboration of Harold Guetzkow, *Organizations*, 2nd ed. (Cambridge, MA: Blackwell, 1993), pp. 3–4.

<sup>135</sup> Richard M. Cyert and James March, *A Behavioral Theory of the Firm*, 2nd ed. (Cambridge, MA: Blackwell, 1992), pp. 120–22, 214–15. The work was originally published in 1963.

<sup>136</sup> In Wohlstetter’s assessment of Japan’s surprise attack on the U.S. fleet at Pearl Harbor, she found that the ability to communicate information (in this case, intelligence warnings) clearly and accurately was limited. These limitations are inevitable owing to the difficulty in distinguishing accurate information from the background “noise” of other information—some accurate but irrelevant, some inaccurate but relevant—being provided to senior decision-makers. Roberta Wohlstetter, *Pearl Harbor: Warning and Decision* (Stanford, CA: Stanford University Press, 1962). Allison found that “government behavior relevant to any important problems reflects the independent output of several organizations, partially coordinated by government leaders.” Graham T. Allison, *Essence of Decision* (Boston, MA: Little, Brown and Company, 1971), p. 67.

## Prospect Theory

In the late 1970s, research by Amos Tversky and Daniel Kahneman produced another breakthrough in our understanding of human decision-making. They found that people systematically violate the laws of probability on which utility theory is based. They called their findings prospect theory, which addresses human decision-making under conditions of risk. Prospect theory's principal insight is that people's choices are influenced by their reference point, which means that an identical situation may be viewed differently in terms of its prospective gains and losses. Kahneman and Tversky call this the "framing effect."

Their theory rests on four principal propositions. First, individuals derive utility not from levels of wealth (or, for our purposes, various types of geopolitical gain), but from gains and losses (or benefits and costs) *relative to a reference point*. Second, *decision-makers are generally more sensitive to losses than to gains*. This sensitivity is linked to and informed by their reference point. Simply stated, people tend to be risk averse in choices among gains but risk seeking with respect to avoiding losses.<sup>137</sup> Third, individuals exhibit *diminishing sensitivity* to gains and losses (or anticipated benefits and costs). Thus a gain of \$100 from a reference point of \$200 (that is, a gain from \$200 to \$300) or a corresponding loss (from \$300 to \$200) has a larger utility effect than an equal gain of \$100 when moving from \$10,200 to \$10,300 or a corresponding loss, from \$10,300 to \$10,200. Fourth, decision-makers overweight low-probability outcomes and underweight high-probability outcomes.

Kahneman and Tversky showed that whether decision-makers frame their choices as gains or as losses influences their propensity to take risks. They also found that framing is influenced by the decision-maker's reference point. For our purposes, policymakers who frame an outcome as a loss will assume greater risk to avoid that outcome than if they had framed the same outcome as a gain. For example, suppose country X has a claim on province Y. If it sees getting Y as a gain, it will run only so much risk to seize it. But if it sees failing to acquire Y as a loss, it will be willing to run more risk to avoid not having it. Simply put, people tend to be more risk tolerant when they believe they are in a domain of loss.

The observation that the way people frame a decision affects their risk tolerance further challenges the notion that humans act to maximize their prospective gains when making decisions under conditions of risk. Wholly rational decision-makers should pay attention to their prospective absolute gains and losses with respect to their total welfare, not changes relative to a particular reference point. Second, people's attitude toward risk should not be

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<sup>137</sup> Kahneman, *Thinking Fast and Slow*, p. 334. See also Jack S. Levy, "Applications of Prospect Theory to Political Science," *Synthese* (May 2003): 217.

skewed by whether their reference point places them in a domain of gain or loss. Yet as Kahneman and Tversky show, it is. In brief, a policymaker is more likely to run risks to avoid—or *recover*—losses than to realize an equivalent gain.

Returning to our earlier example of the Cuban Missile Crisis, viewed through the lens of prospect theory, research by Mark Haas finds that “when Kennedy and Khrushchev operated in the domain of losses . . . these leaders tended to engage in excessively risky, non-value maximizing behavior.”<sup>138</sup> Haas’s conclusion is worthy of quoting at length:

Perhaps the most important policy implication generated by the tendency to engage in risk-acceptant behavior while suffering losses . . . results from the fact that this proclivity calls into question the key assumption that grounds most theories of deterrence—that people will behave “rationally” in terms of basing their decisions on expected value calculations. *If leaders have a tendency to adopt excessively risky policies after experiencing losses, actions that according to deterrence theory are most likely to inhibit challenges to the status quo (such as maintaining military superiority in relation to one’s adversary or issuing deterrent threats to one’s opponent) may end up making these challenges more likely.* This ironic outcome results from the fact that the same policies designed to have a deterrent effect on others’ policies also tend to create losses for these individuals, which, in turn, are likely to provoke risk-taking behavior. Thus an important implication . . . is that *because individuals may be inclined to engage in “irrational,” risk-acceptant behavior when in the domain of losses, leaders should not be nearly as confident in the likely success of deterrent and compellent threats as deterrence theory asserts simply because the balance of power or balance of interests is in their state’s favor [my emphasis].*<sup>139</sup>

This begs the question of how decision-makers determine their reference point. How do they decide whether they are in a domain of prospective gain or loss? Thankfully, a partial answer to this question is provided in Richard Thaler’s endowment effect, which I will address presently.

## **Optimism Bias**

There is evidence that people who are generally optimistic possess other desirable qualities that enable them to play a disproportionate role in shaping events. These people are more likely to achieve positions of authority in government and business, among other fields. As Kahneman notes, such individuals “got to where they are by seeking challenges and taking risks. They are talented and they have been lucky, almost certainly luckier than they acknowledge.” He goes on to say:

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<sup>138</sup> Mark L. Haas, “Prospect Theory and the Cuban Missile Crisis,” *International Studies Quarterly* (June 2001): 266.

<sup>139</sup> *Ibid.*, p. 267.

Their experiences of success have confirmed their faith in their judgment and in their ability to control events. Their self-confidence is reinforced by the admiration of others. This reasoning leads to a hypothesis: the people who have the greatest influence on the lives of others are likely to be optimistic and overconfident, and to take more risks than they realize.<sup>140</sup>

This research suggests that leaders are, indeed, *generally* optimistic, overly self-confident in their ability to control events, and prone to be risk tolerant. Given their native optimism, they are also prone to double down when faced with failure, suggesting a willingness to increase the level of risk-taking as opposed to cutting their losses. This leads to the conclusion that among political leaders, optimism is “widespread, stubborn, and costly.”<sup>141</sup>

Even more worrisome, the challenge of deterring a leader with optimistic bias may be particularly acute in the case of tyrants, such as Adolf Hitler, Josef Stalin, Mao Zedong, Saddam Hussein, and even lesser despots like Nikita Khrushchev. Given the cutthroat political environment in which they lived, each of these men must have been by nature extremely risk tolerant in deciding to engage in the high-risk, high-reward endeavor of competing for supreme power. Given the relatively long odds involved—and the fate of those who competed and failed to reach the top—they had to be optimistic that somehow they would prevail against long odds. And it would not be surprising if, having prevailed, they believed that they were particularly skilled at navigating perilous political and military situations. Furthermore, once they assumed positions of leadership, they were often surrounded by sycophants who reinforced their self-confidence. Thus they were prone to view their success as coming from their “genius,” while discounting the fact that it was also due to a fair amount of luck.<sup>142</sup> Moreover, their status as absolute ruler allowed them to make decisions with far fewer internal and external constraints than leaders of democratic states typically confront.

Optimism bias may partially explain Hitler’s willingness to reoccupy the Rhineland and absorb Austria and Czechoslovakia while in a weak military position relative to Great Britain, France, and Soviet Russia. It may also provide some rationale for Stalin’s provoking the United States in the late 1940s, including by cutting off U.S. access to West Berlin, while Russia was in ruins and the Americans enjoyed a nuclear monopoly. Saddam Hussein’s decision to take on the United States not once, but twice, suggests a willingness

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<sup>140</sup> Kahneman, *Thinking Fast and Slow*, pp. 250, 256.

<sup>141</sup> *Ibid.*, p. 257. Kahneman notes: “One of the benefits of an optimistic temperament is that it encourages persistence in the face of obstacles. But persistence can be costly.”

<sup>142</sup> The fact that one of those seeking power obtains it does not necessarily tell us anything about the winner’s skill. If ten contestants compete in a “winner-take-all” game, one of them will necessarily emerge as the ultimate winner, even if all ten are absolutely equal in skill.

to run great risks, as does Mao's decision to plunge China into the Korean War barely a year after seizing power. Of course, we also have Khrushchev's high-stakes gamble of deploying nuclear missiles to Cuba in the face of clear U.S. warnings that this would precipitate a major crisis.

From the perspective of a U.S. national security decision-maker in the business of dealing with despots like Vladimir Putin, Xi Jinping, and Kim Jong-un, research on optimism bias indicates that crafting effective deterrence strategies may prove more challenging than one might suspect.

### **The Endowment Effect and Reference Points**

Richard Thaler's discovery of the endowment effect made an important contribution to prospect theory. It states that individuals tend to value what they have more than comparable things that they do not have, independent of any emotional attachment to the good.<sup>143</sup> Thus, for example, a policymaker would be more likely to run higher risks to retain territory than to seize territory of equal value that is part of another country. The endowment effect supports prospect theory's findings that people are generally more willing to run risks to avoid losing what they have than to gain what they do not have. In general, this phenomenon would seem to strengthen deterrence. But the matter does not end here.

There can be asymmetries in the way in which decision-makers set their "reference point" that can cause trouble. Thus one might assume that decision-makers set their reference point on the basis of the situation as it exists at the point where the decision is being made—the status quo. This assumption, however, *turns out to be false*. The endowment effect shows that after a series of gains, decision-makers will normally *reset their reference point* around the new status quo. This will lead them to view any subsequent setback as a loss rather than a gain foregone. If so, decision-makers can be expected to be relatively risk tolerant in efforts to defend a recent gain, which is now seen as a prospective loss.

Importantly, after decision-makers suffer losses, there is typically *no comparable resetting* of their reference point. They will not adjust to the new, less-favorable situation, but instead will retain the pre-loss status quo as their reference point. Thus they will view actions to retake what has been lost not as the pursuit of gains within the context of the new status quo, but as the avoidance of losses within the framework of the old status quo. Consequently, they will be willing to run relatively greater risks to achieve this end. As Jack Levy notes, such "preference reversals induced by changes in frame rather than by

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<sup>143</sup> R. H. Thaler, "Toward a Positive Theory of Consumer Choice," *Journal of Economic Behavior and Organization* 1 (1980): 39–60.

changes in subjective utilities or probabilities are difficult to reconcile with expected-utility theory or indeed rational choice more generally.”<sup>144</sup>

History offers a number of cases supporting the endowment effect’s influence on the reference point. For example, the Arab states’ decisive defeat by Israel in the 1967 Six-Day War, combined with the Israel Defense Force’s clear advantage over the militaries of Israel’s Arab neighbors (including Israel’s nuclear capability), should have provided a strong deterrent to any act of overt Arab aggression. Yet only six years later, Egypt and Syria initiated a war against Israel to recover their lost territories (and, perhaps equally important, their honor). For the Arab leaders, the reference point was the status quo that existed *prior to* the 1967 war. They saw themselves as trying to recover land that was rightfully theirs. The Israelis, on the other hand, had renormalized their reference point around the post-war status quo and fought to defend what they viewed as their own.

In a somewhat similar vein, France and Great Britain, after their victory in World War I, renormalized their reference point around the new status quo that emerged from the Versailles Treaty. Germany, the defeated power, in a manner similar to Egypt and Syria following the Six-Day War, saw its leaders retain the pre-World War I status quo as their reference point. This, combined with Adolf Hitler’s high level of risk tolerance and optimism bias, saw Germany engaging in a series of risky actions leading up to the outbreak of war in Europe.

Japan’s decision to go to war with the United States in December 1941 can also be viewed within the lens of a state acting from a reference point of loss. In this case the United States retained a reference point based on the status quo that existed prior to Japan’s occupation of Manchuria in 1931, its invasion of China six years later, and its occupation of Indochina in 1940. Japan’s leaders, however, had renormalized their reference point around the situation as it existed at the time of their decision to go to war. Thus the U.S. embargo on Japan was seen in Washington as an attempt to recover losses, while in Tokyo it was viewed as an American attempt to take from the Japanese what was rightfully theirs.

Looking ahead, one can envision a crisis involving Taiwan. Here the current status quo is particularly ambiguous (Taiwan is *de facto* independent, but *de jure* part of “one China”). Thus if Beijing came to believe that a Taiwanese declaration of independence were imminent, it might act militarily to prevent the “loss” of Taiwan, an action that the United States, Japan, and others would see as Chinese aggression whose purpose is territorial expansion.<sup>145</sup>

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<sup>144</sup> Levy, “Applications of Prospect Theory,” p. 218.

<sup>145</sup> I am indebted to Abe Shulsky for this observation. A similar situation could occur over time as China continues to create “new facts on the ground” in the South China Sea.

## Culture, Fairness, and Decision-Making

We now examine relatively recent advances in the behavioral sciences as they pertain to people from different cultures making decisions under conditions of risk. This research suggests that members of markedly different cultures, raised in societies with different views and ways of thinking, exhibit significant and in some cases dramatic differences in their cognitive processes, including how they view the world in general as well as matters of equity, cost, benefit, and risk.<sup>146</sup>

In the 1990s Joseph Henrich, an anthropologist, undertook research expecting to confirm one of the assumptions underpinning economics and psychology: that humans all share “the same cognitive machinery—the same evolved rational and psychological hardwiring.”<sup>147</sup> Toward this end, Henrich tested people from various cultures using the Ultimatum Game. The game involves two players whose identities are hidden from each other. Player A is given an amount of money—say \$100—and is told to offer some of the cash, anywhere from \$1 to \$100, to Player B. Player B can either accept or reject Player A’s offer. Both players are informed that if B accepts A’s offer, each receives the agreed-upon payout. If, however, B refuses A’s offer, neither player receives any money and both end up empty-handed.

In principle, as long as Player A offers Player B any amount above nothing, both players stand to come out ahead in the game. Both realize gains relative to the status quo. It appears to be a classic “win-win” situation. In cases where Americans played the game, Player A typically offered Player B a 50-50 split or something close to it. Interestingly, American Player Bs exhibited a tendency to reject offers that were significantly less than a rough split of the money, even though acceptance would have improved B’s financial situation.

Henrich then began conducting the game with members of the Machiguenga, a people residing in the southeastern Peruvian Amazon. To his surprise, the results were very different. With the Machiguenga, Player A’s offers were typically much lower than those made by their American counterparts. Those Machiguengans in the role of Player B rarely refused even the lowest possible amount. According to Henrich, “it just seemed ridiculous to the Machiguenga that you would reject an offer of free money. They just didn’t understand why anyone would sacrifice money to punish someone who had the good luck of getting to play the other role in the game.”<sup>148</sup>

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<sup>146</sup> Nisbett et al., “Culture and Systems of Thought,” p. 291.

<sup>147</sup> Ethan Watters, “We Aren’t the World,” *Pacific Standard Magazine*, February 25, 2013, <https://psmag.com/social-justice/joe-henrich-weird-ultimatum-game-shaking-up-psychology-economics-53135>.

<sup>148</sup> *Ibid.*

Based on these results, Henrich and some colleagues tested people from fourteen additional small-scale societies in East Africa, South America, the Southwest Pacific, and Mongolia. They found that “the variability in Ultimatum Game behavior across the groups in our study is larger than that previously observed in large-scale, industrialized societies.”<sup>149</sup> Simply put, the average offers made by Player A varied widely from culture to culture. Another surprising result was that in some cultures, even when Player A made offers above \$60, Player B would often refuse them. Such outcomes were almost unheard of when Americans or Machiguengans were playing the game.

As in the research cited above, Henrich and his team found a “powerful empirical challenge to what we call the *selfishness axiom*—the assumption that individuals seek to maximize their own material gains in these interactions and expect others to do the same.” They discovered that humans are prepared to reject what they see as *unfairness* or slights to their *personal honor*, even at substantial cost to themselves. As it turns out, perceptions of fairness are highly subjective. In cases where Player B rejects Player A’s offer, we find the two players have mutually incompatible judgments of what constitutes fairness, with the result that both players are left worse off.<sup>150</sup>

This suggests that for strategies based on deterrence, “unfairness” can be viewed by the target as a cost—at times a very significant cost. This complicates strategies whose effectiveness is dependent on the ability to deter, as there appears to be considerable uncertainty regarding how the target of a deterrence strategy assesses fairness.<sup>151</sup> As the Ultimatum Game shows, if the cost associated with “unfairness” is high enough, even though both players can come out with a net gain—a “win-win” result—they both end up worse off.<sup>152</sup>

Donald Kagan notes that in matters of war and peace, there is a link between a sense of fairness and a nation’s honor. An honorable nation, among other things, is a nation committed to acting in a just manner, but also to being treated fairly and with respect. According to Kagan,

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<sup>149</sup> Joseph Henrich et al., “‘Economic Man’ in Cross-Cultural Perspective: Behavioral Experiments in 15 Small-Scale Societies,” *Behavioral and Brain Sciences* (2005): 7.

<sup>150</sup> It may also be that in cases where Player A is risk seeking, A may make an “unfair” offer to Player B, anticipating that B’s self-interest will lead B to accept the offer.

<sup>151</sup> Some effort has been made to address this issue on a general level. See, for example, Nicholas Wright and Karim Sadjadpour, “The Neuroscience Guide to Negotiations with Iran,” *Atlantic*, January 14, 2014, <https://www.theatlantic.com/international/archive/2014/01/the-neuroscience-guide-to-negotiations-with-iran/282963/>.

<sup>152</sup> In the geopolitical sphere, however, the state that ends up with the lesser value can be seen as suffering a relative loss in the competition with its rival. I am indebted to Lieutenant Colonel Peter McAleer for this observation.

that fear and interest moves states to war will not surprise the modern reader, but that concern for honor should do so may seem strange. If we take honor to mean fame, glory, renown or splendor, it may appear applicable only to an earlier time. If, however, we understand its significance as deference, esteem, *just due*, regard, respect, or prestige we will find it an important motive of nations in the modern world as well [my emphasis].<sup>153</sup>

Kagan argues that in the Peloponnesian War and in World War I, some belligerents were motivated in no small way to go to war by the costs to their honor in failing to act. In the former conflict, he notes, the Corinthians' "driving motive" in going to war with Corcyra "was neither fear nor interest, but honor, a determination to avenge the slights they had suffered from the Corcyraeans."<sup>154</sup> Simply put, the Corinthians believed they had been treated unfairly and were operating from a reference point of loss.

As for Britain's decision to declare war on Germany in August 1914, Kagan finds that among senior British decision-makers, "those who would not fight for the balance of power and British security could console themselves that they were fighting for international law, the sanctity of treaties, and the protection of helpless neutrals."<sup>155</sup>

In the context of World War II, with respect to Great Britain's about-face in the year following Munich, when it shifted from accommodating Hitler's demands to confronting him after Germany's invasion of Poland, Kagan notes:

It is likely that the swing in British opinion away from appeasement to resistance was moved far more by the proddings of honor than other means. . . . The tenor of the criticism [of the Munich Pact] strongly suggests that the new resolve came from a sense of shame and anger of honor betrayed more than from a need to protect British interests.<sup>156</sup>

In other words, any feelings of guilt the British may have had regarding the Versailles Treaty's harsh (unfair) provisions concerning Germany were more than offset by the sense of unfairness that resulted from Hitler's duplicity following the agreement at Munich.<sup>157</sup>

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<sup>153</sup> Donald Kagan, *On the Origins of War* (New York: Doubleday, 1995), p. 8.

<sup>154</sup> *Ibid.*, pp. 38–39.

<sup>155</sup> *Ibid.*, p. 204.

<sup>156</sup> *Ibid.*, pp. 407, 411.

<sup>157</sup> *Ibid.*, pp. 411–12. Kagan's assessment is strengthened by the fact that Britain and France (and possibly Russia as well) were, relatively speaking, far better positioned militarily to make good on their pledge (or threat) to come to the aid of the Czechs in 1938 than the British and French militaries were to support the Poles a year later. (In the months following Munich, the British, in addition to guaranteeing Poland's

It seems clear that “fairness” or “honor” are factors in human decision-making when it comes to calculating the prospective benefits and costs of pursuing a course of action. Returning to the Cuban Missile Crisis, we find that Khrushchev’s decision-making was influenced significantly by his belief that there was a lack of “fairness” with respect to U.S. and Russian overseas missile deployments. Given that the United States had deployed nuclear-armed missiles in Britain, Italy, and Turkey, Khrushchev expected Kennedy to accept the deployment of Russian missiles in Cuba “as the Turkish missiles were received in the Soviet Union.” When Khrushchev’s foreign policy aide, Oleg Troyanovsky, summoned the courage to raise doubts to him regarding the plan to deploy the missiles, Khrushchev responded that he was not doing anything the Americans had not done by placing their missiles along Soviet Russia’s periphery.<sup>158</sup>

The theme of “fairness” persisted even as the crisis was winding down. The United States had an enormous advantage over Soviet Russia in nuclear forces, to the point where American missiles in Europe were a minor factor in the overall military balance. Yet the disposition of the missiles in Turkey became a crucial sticking point in negotiations to resolve the crisis, primarily owing to Khrushchev’s need to demonstrate to his senior colleagues (and, one suspects, to himself) that he and his country had been treated fairly (or honorably).

Khrushchev was able to get Kennedy to commit to withdrawing U.S. missiles from Turkey, although not publicly. The Soviet leader was so keen to have Kennedy on the record—even secretly—that he sent a confidential message to the president in which he requested that Kennedy provide him with a private statement to the effect that “you had agreed to resolve the matter of your missile bases in Turkey, consistent with what I had said in my message of October 27 and what you stated through Robert Kennedy in his meeting with Ambassador Dobrynin on the same day.” Khrushchev felt it important to have written evidence that he had secured a fair deal from Kennedy so as to “rebut charges of caving in to the imperialists” and suffering a loss of his country’s honor.<sup>159</sup>

This raises the question of how well U.S. decision-makers understand the way rival leaders view the costs they feel they may incur in matters of fairness or honor. One can at least appreciate that Khrushchev viewed U.S. missile deployments as “unfair”—even though Kennedy certainly did not. Can U.S. decision-makers today feel confident they understand

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security, also provided similar guarantees to Greece and Romania. The British lacked serious plans or the forces to defend either of these states.)

<sup>158</sup> William Taubman, *Khrushchev* (New York: W. W. Norton, 2003), pp. 541, 546.

<sup>159</sup> *Ibid.*, pp. 574, 576. When Dobrynin presented the letter to Robert Kennedy he declined to accept it, although he did orally confirm the U.S. commitment to withdraw its missiles from Turkey.

how the Chinese leadership, or that of Russia, Iran, or North Korea, views the cost it is willing to pay to be treated in a way that is “fair” or “honorable”? It seems clear that factors relating to perceptions of fairness can exert a significant influence on how decision-makers determine their reference point when making choices under conditions of risk. Recall that the decision by Egypt and Syria to start the 1973 Yom Kippur War with Israel cannot be explained by a major shift in the military balance in their favor. Rather, it stemmed in part from an unwillingness to accept the cost or “unfairness” of a situation, based on the reference point of the status quo as it existed prior to the 1967 Six-Day War.

Finally, given the growing challenges posed to the United States by China and North Korea, it is worth noting that research in the cognitive sciences finds significant differences between the cognitive processes of people in Western cultures and those from East Asian cultures. Of particular importance are issues relating to “fairness.” For example, research finds that the views of people from Western and Asian cultures with respect to contracts are fundamentally different. In the eyes of Westerners, a contract (or treaty) is fixed and unalterable. Easterners, however, view contracts as continually renegotiable in the light of changed circumstances. Not surprisingly, the profound difference in how people from these two cultures view contracts “has often resulted in conflict and bitterness between Eastern and Western negotiators.”<sup>160</sup> Given the work of Henrich and other scholars in the cognitive sciences and the examples provided by history, it takes little imagination to identify the challenges their findings pose for policymakers in geopolitics who are pursuing deterrence strategies.

## Why Policymakers Ignore These Characteristics

Given the major advances in our understanding of human decision-making under conditions of risk, why have senior national security policymakers generally failed to incorporate these findings into their efforts at crafting deterrence strategies? One explanation offered by Robert Jervis posits that “the study of human nature, once central to much of social science, has been put aside as too difficult to study or lacking relevance to questions of interest.”<sup>161</sup> Yet while some of the research may seem counterintuitive, it is not beyond the mental capacity of well-educated decision-makers to comprehend. Nor can there be any doubt as to the relevance of these findings for those seeking to influence the behavior of their rivals. Yet, as Daniel Kahneman points out, “Theories can survive for a long time after conclusive evidence falsifies them, and the rational-agent model certainly survived the evidence we have seen, and much other evidence as well.”<sup>162</sup> He has a point.

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<sup>160</sup> Nisbett et al., “Culture and Systems of Thought,” pp. 291, 304. See also François Jullien, *The Propensity of Things: Toward a History of Efficacy in China*, trans. Janet Lloyd (New York: Zone Books, 1999).

<sup>161</sup> Robert Jervis, “The Implications of Prospect Theory for Human Nature and Values,” *Political Psychology* (April 2004): 175.

<sup>162</sup> Kahneman, *Thinking Fast and Slow*, p. 374.

The so-called unitary rational-agent model of decision-making has been under assault for over half a century, yet as shown in the examples presented earlier in this study, it seems to persist. The model also has the advantage of being relatively simple when compared to the range of factors—such as reference points, optimism bias, and the endowment effect—that must be accounted for in attempting to get a better grasp on human decision-making under conditions where risk is involved. Senior civilian and military leaders typically lack the time (and as Jervis suggests, likely the interest as well) to plumb the depths of these phenomena. Or perhaps defense policymakers are simply unaware of these advances in the behavior sciences or are engaged in an act of willful ignorance in an effort to keep the range of factors they must consider in making decisions at a manageable level.

Those senior decision-makers who do choose to dip their toe in the behavior science waters can also raise legitimate concerns over the practical utility of these recent findings. For example, how does one determine how the targets of a deterrence strategy locate themselves in a domain of gain or loss? This is critical to determining whether the target is more or less likely to be aggressive or risk tolerant. We cannot run tests on Mr. Putin, the way men like Kahneman and Henrich do with their subjects, to determine Putin's reference point and level of optimism bias. National security policymakers could rightly note that it is relatively easy to identify such frames of reference after the fact, but far less easy to do so when projecting forward.<sup>163</sup>

Nor can one necessarily be confident that adversaries actually believe what they say and that they are not just posturing for effect. For example, Chinese leaders harp incessantly on the “humiliations” their country has suffered and are adamant that Taiwan is indisputably a part of China. This would appear to place the CCP's reference point in the status quo that existed when China's “century of humiliation” began in the mid-nineteenth century, and China in a position of seeking to recover what it has lost. This appears to convey a message that Beijing is willing to run relatively high risks to prevent any Taiwanese move toward independence. But it may also be simple posturing, and it is left to the statesmen of other countries to figure out which it is.

Finally, many of the recent advances in the behavioral sciences focus on individual, rather than collective, decision-making. As the work of Simon, March, Marshall, Cyert, Roberta Wohlstetter, and Allison demonstrates, even in governments that operate under the thumb of a tyrant like Mao or Stalin, the decision-maker is typically influenced significantly by bureaucratic actors and organizational preferences.

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<sup>163</sup> See Jonathan Mercer, “Prospect Theory and Political Science,” *Annual Review of Political Science* (2005): 3–4, <http://www.annualreviews.org/toc/polisci/8/1> and Levy, “Applications of Prospect Theory,” p. 233.

That said, at a minimum these findings should see national security decision-makers exhibiting a strong aversion to making the kinds of proclamations cited earlier in this study with respect to the robustness of defense strategies based on deterrence.

## Summary

As Richard Thaler observed, “Perhaps the most important conclusion to be reached from this research is that making generalizations about risk-taking preferences is difficult. General tendencies can be reversed by a simple reframing of options. This result points out how difficult it is to predict behavior.”<sup>164</sup>

Work in the cognitive sciences has generally served to reduce our confidence in “Rational Economic Man,” “Rational Strategic Man,” and the ability of humans in general to make decisions in ways that maximize their expected utility. Research also finds that there are impediments to our ability to understand how rivals calculate cost, benefit, and risk. Some of these impediments, especially those separated by a cultural divide, may prove difficult, if not impossible, to bridge.

To be sure, there is some optimism to be derived from prospect theory for those creating deterrence strategies. After all, if people are generally less willing to take risks to acquire what they do not have than to preserve that which is theirs, then deterrence (again, all other factors remaining the same) should be enhanced.

But the matter is more complex, since depending on the choice of reference point, decision-makers may incorporate gains into a new status quo that makes any threat to those gains a prospective loss. In addition, decision-makers who have incurred losses may refuse to adjust to a new status quo and continue to view their situation within the framework of loss, while stubbornly clinging to the old status quo.

Then there is optimism bias, which appears to be prevalent among successful individuals (including political leaders), and which leads decision-makers to discount the risk in pursuing courses of action and to “double down” when things go badly, as opposed to cutting their losses. In any event, the finding that political leaders may be relatively prone to optimism bias is not good news for deterrence strategies that seek to raise the risks in the minds of their targets of pursuing a proscribed action.

Finally, there is the matter of “fairness” and being treated “honorably.” Here we find that these can cause political leaders to take actions which, far from maximizing their gains,

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<sup>164</sup> Richard H. Thaler and Eric J. Johnson, “Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice,” *Management Science* (June 1990): 660.

cause them to reject “win-win” deals in favor of “lose-lose” outcomes. When these kinds of factors are examined across cultures, we see behavior that can appear bizarre to one group observing the behavior of another. Advances in our understanding of human behavior here only heighten the challenge for those who seek to craft effective deterrence strategies.

## ***What Is to Be Done?***

**T**his study is titled “The Decline of Deterrence,” and not “The Decline *and Restoration* of Deterrence.” The above analysis suggests it is likely not possible to restore the kind of confidence U.S. policymakers placed in deterrence during America’s unipolar period or even during the Cold War.

After all, we cannot simply wish away the ongoing shift toward a multipolar security competition, let alone reverse it. Nor can the diffusion of military capabilities be undone or the development of new forms of weaponry be arrested. Those genies cannot be put back in the bottle. Geography will not change to accommodate us. The spread of the military competition into new domains of warfare appears to be a one-way phenomenon, and the march of science seems likely to continue providing even small groups with far greater destructive power than they could have dreamt of a generation or so ago.

Advances in the cognitive and behavioral sciences in recent decades regarding decision-making under conditions of uncertainty are both impressive and worrisome for the prospects of strategies relying on deterrence. The growing evidence suggests that, simply stated, it is risky to assume humans will always act to maximize their gains or minimize their losses.

In light of these trends, a senior defense policymaker could be forgiven for concluding that strategies relying on deterrence are difficult to craft at best, and a fool’s errand at worst. That being said, this study argues that the effectiveness of deterrence strategies is declining, *not that strategies based on deterrence should be abandoned*. This would be to throw the baby out with the bathwater. Strategies based on deterrence can and have been successful. Humans, when making decisions, *do* weigh the costs, benefits, and risks of their decisions, albeit often with imperfect information and internal biases that make them deviate from what those pursuing deterrence strategies would describe as “rational” (value-maximizing) behavior. And even highly risk-tolerant leaders, including tyrants, are not entirely reckless when it comes to making decisions under conditions of risk. Simply stated, all is not lost when it comes to deterrence. After all, there are formidable challenges involved in developing any effective strategy against a serious geopolitical rival.

Yet there is nothing “automatic” about deterrence. Strategies relying on it require hard work by talented individuals. A useful first step is to abandon the “whistling past the graveyard” approach of policymakers like Monsieur Védrine, who place unwarranted faith in the idea that rivals who acquire nuclear weapons “automatically” enter a “system of deterrence” and do not take “absurd risks.” Rather, senior defense decision-makers must approach efforts to develop deterrence strategies with a sober understanding of their limitations, along with the difficulties involved in crafting good ones. With this in mind,

what might be done to improve the odds of developing and implementing successful deterrence strategies? What follows are some modest suggestions. They are meant to be illustrative rather than exhaustive. Moreover, they offer only an overview of what might be done. Detailed prescriptions as to how they might best be pursued are worthy subjects for further research and analysis.

***Have Decision-Makers Become “Human-Decision-Making Literate”***

Senior defense decision-makers and those responsible for constructing defense strategy need to have an awareness of the limitations on human decision-making under conditions of risk. This does not mean they must immerse themselves in the remarkable advances made in the cognitive and behavioral sciences over the past three-quarters of a century, any more than the introduction of nuclear weapons required decision-makers to develop a deep understanding of quantum physics. It does, however, mean they must have a clear awareness of what these advances tell us regarding deterrence strategies’ prospects for success.

***Understand the Competition Better***

If you want to deter someone, particularly if that someone is a tyrant or has achieved absolute rule, it is a good idea to find out as much as possible about that individual. For example, during Henry Kissinger’s time as President Nixon’s national security advisor and later, as secretary of state, he gave high priority to studying the personality profiles developed by the intelligence community on those senior decision-makers with whom he would have to negotiate or against whom he would have to implement strategies. In his own way, Kissinger was seeking to reduce the uncertainty about how these individuals saw the world and, in accordance with prospect theory, how they developed the reference points within which they made decisions.

Given the shift from the Cold War bipolar competition to the multipolar competition of today, the challenge for contemporary U.S. decision-makers is even greater than it was in Kissinger’s time. The democratization of destruction further complicates matters, as negotiating with terrorist group leaders can prove difficult, if not impossible. To enhance efforts to develop deterrence strategies based on punishment, it might be best to give attention to identifying what these leaders most value and fear losing (such as family members, tribal leaders, or sites of symbolic value).

***Plan More Realistically***

Given that deterrence involves influencing the behavior of others, the Defense Department should abandon its reductionist approach to this aspect of the competition in favor of a comprehensive net assessment of the strategic military balance. This means moving away

from such current efforts as the Nuclear Posture Review and Missile Defense Review, which focus on a narrow part of the competition. It also means assessing the strategic competition in a manner more in line with the way the Chinese and Russians do this. Thus a strategic net assessment would include, among other elements, the competitors' nuclear forces and delivery systems; strategic precision-strike forces and cyber capabilities; air and missile defenses; and early warning and C2 systems. Net assessments might also be considered on other functional areas of the military competition, particularly the undersea economic domain; space constellations and offensive/defensive space warfare capabilities; and strategic bio warfare capabilities. Importantly, this would also devote attention to how the Chinese and Russian militaries view the strategic balance, including (if possible) the conditions under which they would wage various forms of strategic warfare and large-scale conventional war.

### ***Revise Escalation Ladders and Paths***

Planning to improve strategies relying on deterrence can also benefit from a fundamental rethinking of vertical and horizontal escalation ladders, as well as cross-cutting conventional and strategic warfare escalation paths. With the introduction of new means of promptly attacking strategic targets, such as precision and cyber munitions, along with nuclear weapons using advanced designs, the Cold War conventional/nuclear vertical escalation ladder is badly in need of revision. The same is true for horizontal, or geographic escalation.

Owing to the growing multidimensional character of the military competition and the blurring of the formerly clear distinction between nuclear/strategic warfare and conventional warfare, what emerges from such an effort may look less like “ladders” and more like cross-cutting paths in which escalation in one domain (such as cyber, the seabed, or space) and/or at one type of intensity (nuclear, precision munitions, cyber payloads) could trigger an escalatory response in an alternate domain and/or type of attack.<sup>165</sup>

Simply put, a great deal of thinking and analysis needs to be done with respect to escalation dynamics. The implications for deterrence are clear. Once the revised escalation paths/ladders are completed, work can be undertaken to identify those areas where the United States enjoys an advantage over its rivals, and those where it does not. Efforts can be pursued to establish positions of advantage where they are most needed. These efforts can be informed and enhanced if U.S. planners are able to identify competitor escalation ladders/paths.

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<sup>165</sup> I am indebted to General John E. Hyten for raising the concept of cross-cutting escalation paths.

### ***Enhance Early Warning and Command-and-Control Systems***

Given the compression of attack warning times owing to increased geographic proximity and high-speed means of weapons delivery, policymakers should consider efforts to “buy back” warning time at a cost that does not exceed what it would take for rivals to cancel out the gains.

For example, shifts in force posture and the hardening of command-and-control systems may enable a state to ride out an adversary’s surprise attack, rather than launch a counter-strike when it receives warning that an enemy attack is underway. This could be accomplished, for example, by dispersing nuclear-tipped cruise missiles to seaborne surface and submarine forces and hardening strategic force command-and-control systems. If strategic force release authority (for nuclear, cyber, or precision munitions) must be extended down the chain of command, individuals given this authority should be subjected to a thorough vetting. Still, these kinds of initiatives may be impractical for some nuclear powers and will perhaps be even less so for those facing adversaries with strategic cyber capabilities.

Should efforts along these lines prove successful, they could strengthen deterrence by reducing, if only at the margins, the temptation to strike first in a crisis or to respond quickly in the wake of an attack designed to trigger a catalytic war.

### ***Enhance Intelligence Efforts Associated with Attribution***

An inability to determine the source of an attack, and to do so promptly, risks undermining deterrence strategies based on the threat of inflicting prompt, unacceptable punishment on the target. Yet the rise of a multipolar strategic competition, combined with a multidimensional military competition and the movement of military operations into relatively new domains, is increasing significantly the attribution challenge.

While it may be difficult to trace the perpetrators of a cyberattack, an attack on satellites by space micro mines, or the cutting of an undersea cable by purely forensic means, it may be possible to do so through other methods. For example, human intelligence (HUMINT) and signals intelligence (SIGINT) could prove useful in identifying the attacker. Yet these methods may not provide the victim with the desired prompt “smoking gun” identification of the aggressor.

### ***Exercise Capabilities to Lower Uncertainty***

Prior to the First Gulf War, there was considerable uncertainty over how the U.S.-led Coalition would fare against an Iraqi military that had inflicted severe losses on Iranian forces during their protracted war in the 1980s. A major conventional war involving U.S.

forces had not occurred since the Korean War, some forty years earlier. Since then, a wide range of new military systems had been introduced, and it was not at all clear how effective they would be if employed in war. Consequently, some forecasts envisioned Coalition casualties running into the tens of thousands. When war did come, new capabilities—stealth aircraft and precision-guided munitions—combined with the use of advanced high-fidelity training ranges, produced one of the most lopsided victories in modern warfare for Coalition forces, to the surprise of many military and strategic studies professionals. An array of new advanced military capabilities has been introduced since the Second Gulf War, with more on the way. Other major powers are fielding their own advanced systems. As this continues, the uncertainty as to how military forces armed with these capabilities will fare in war is also growing. This increases the risk that rivals will draw very different conclusions regarding the military balance, with potentially negative consequences for deterrence.

One way to reduce U.S. and competitor uncertainty regarding the effectiveness of new capabilities is by conducting realistic exercises at the operational level of war—the level at which campaigns are conducted. While not a substitute for war, such exercises—especially when conducted on high-fidelity training ranges—can significantly enhance our understanding of the prospective effectiveness of various military doctrines, force structures, and capabilities. To the extent they can, this may help reduce divergent views of the military balance and enhance the effectiveness of strategies relying on deterrence.

### **Closing Thoughts**

Again, the preceding suggestions are meant to be illustrative—a modest “first cut” at what should be a comprehensive and persistent effort to understand, as best we can, the advantages and limitations of deterrence strategies in a new era of great-power competition and growing military potential to wage strategic and conventional war on a large scale and with new and novel means.

Since the end of World War II, the United States has placed great reliance on deterrence as the centerpiece of its defense strategy. This emphasis endures in the Trump administration’s National Security Strategy and National Defense Strategy. Yet, as this study shows, the strategic environment in which deterrence must function has changed dramatically and continues changing. Moreover, some lessons that we thought had emerged from our Cold War experience regarding the robustness of deterrence strategies have proven false. Similarly, some critical assumptions regarding how rationally humans behave when making decisions under conditions of risk have been overturned by remarkable advances in the cognitive and behavioral sciences.

An enduring U.S. national security objective is to preserve the country's vital interests without resorting to war. This study's findings strongly suggest that meeting this objective requires a better understanding of strategies based on deterrence—their strengths and weaknesses—relative to alternative strategies, so as to better inform U.S. defense policy and budget priorities.

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