

A Modern Theory of Nuclear Deterrence: Understanding 21st Century US Nuclear Posture Requirements

A Monograph

by

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Abstract

A Modern Theory of Nuclear Deterrence: Understanding 21st Century US Nuclear Posture Requirements, by Lt Col Frederick M. Haley III, US Air Force, 40 pages.

This monograph explores modern ideas on nuclear deterrence by reviewing, assessing, and synthesizing the history of nuclear strategic thought. A historical review of deterrence reveals nuclear deterrence theory to be obscure. By synthesizing mainstream strategic logic, the author offers a concise, general theory of nuclear deterrence. This theory highlights adaptability as a defining requisite for the nuclear force posture. Nuclear force characteristics that serve adaptability include survivability, suitable range, ability to forward deploy, prompt response capability, variable payloads, assorted weapon yields, and high delivery accuracy. These characteristics are then used as an assessment framework for the present and planned US nuclear posture.

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Acronyms

A2/AD	Anti-Access/Aerial Denial
ALCM	Air-Launched Cruise Missile
DoD	Department of Defense
DCA	Dual-Capable Aircraft
GBSD	Ground-Based Strategic Deterrent
ICBM	Intercontinental Ballistic Missile
IRBM	Intermediate Range Ballistic Missiles
LRSO	Long-Range Stand Off (Cruise Missile)
NPR	Nuclear Posture Review
RAND	Research and Development (company name)
SLBM	Submarine-Launched Ballistic Missiles
SSBN	Ballistic Missile Submarines
START	Strategic Arms Reduction Treaty

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Introduction

[T]here is no appropriate view of nuclear weapons that one could adopt which would not make unreasonable demands upon our polity, and yet there is no sensible alternative to having them... The fact that we are unable to make sensible strategic decisions about nuclear weapons is simply a persisting feature of human existence... We are victims of our own success in the attempt to manage security.

—Colin S. Gray, *The Future of Strategy*

Nuclear deterrence is an obscure concept with resurging relevance. From the end of the Cold War through the beginning of the 21st Century, Americans were infused with a sense of optimism making nuclear weapons appear unnecessary. Each presidential administration since 1994 published a Nuclear Posture Review (NPR) with a discernable trend of de-emphasis on the role of nuclear weapons in US defense strategy.¹ These aspirational policy goals assumed an increasingly benign threat environment than what has been realized. Since 2010, the destabilizing trend in the global security environment has reinvigorated interest in the nuclear force, making it the Department of Defense’s “highest priority mission.”² The Donald Trump Administration affirmed this priority in the 2018 National Security Strategy which declared that the nuclear arsenal will continue to serve as the “foundation of the [US] strategy” to deter aggression against the United States.³

If nuclear deterrence is not only relevant, but foundational to the US national security strategy, then a common understanding is essential for policy makers and members of the strategic planning community. Yet, there are numerous challenges to the concept of deterrence.

¹ This trend is encapsulated in the 2010 NPR. See Department of Defense, 2010 Nuclear Posture Review, accessed December 19, 2017, www.defense.gov/Portals/1/features/defenseReviews/NPR/2010_Nuclear_Posture_Review_Report.pdf.

² Ashton Carter, Remarks by Secretary Carter to troops at Minot Air Force Base, ND, September 26, 2016, accessed December 19, 2017, <https://www.defense.gov/News/Transcripts/Transcript-View/Article/956079/remarksby>.

³ The White House, *2018 National Security Strategy*, accessed December 20, 2017, <https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>.

First, nuclear deterrence theory lacks empiricism, making definitive theory elusive while inviting almost endless speculation.⁴ As Henry Kissinger observed,

“Since deterrence can only be tested negatively, by events that do not take place, and since it is never possible to demonstrate why something has not occurred, it became especially difficult to assess whether the existing policy was the best possible policy or a just barely effective one. Perhaps deterrence was even unnecessary because it was impossible to prove whether the adversary ever intended to attack in the first place.”⁵

Second, much of modern scholarship has shown that the ‘Golden Age’ of strategic thought on nuclear deterrence (circa 1952-1966) was more fragile than generations of thinkers realized.⁶

Deterrence was largely influenced by economic theories of strategic behavior, leading to dubious assumptions of homogenous rational actors employing rational choice.⁷ Third, aside from the problems of empiricism and questionable theoretical approaches, deterrence also suffers from a lack of modern theory.⁸ The lack of modern scholarly attention paired with the fact that deterrence theory is often celebrated as an intellectual achievement of the Cold War makes nuclear deterrence appear old-fashioned to some policy makers.⁹ Thus, understanding nuclear deterrence requires much effort, including overcoming faulty perceptions, finding continuities among decades of thought, searching for empirical evidence, and discerning applicable principles.

Therefore, despite decades of strategic thought and despite deterrence being foundational to US strategy, the relevant principles of nuclear deterrence theory are not easily accessible or generally understood in the defense community. Yet relevant knowledge exists that illuminates the resurging debate on the US nuclear arsenal. As the well-known military theorist Antoine

⁴ Lawrence Freedman, “The Rationale for Medium-Sized Deterrent Forces,” in *The Future of Strategic Deterrence*, ed. Christopher Bertram (Hamden: Archon, 1981). 52.

⁵ Henry Kissinger, *Diplomacy* (New York: Simon and Schuster, 1994), 608.

⁶ *Ibid.*, 63.

⁷ Keith B. Payne, *The Fallacies of Cold War Deterrence* (Lexington: University Press of Kentucky, 2001). 36.

⁸ Colin S. Gray, *National Security Dilemmas: Challenges and Opportunities* (Washington DC Potomac Books, 2009), 45.

⁹ *Ibid.*, 46.

Henri de Jomini wrote, “It is true that theories cannot teach men with mathematical precision what they should do in every possible case, but it is also certain that they will always point out the errors which should be avoided.”¹⁰ This monograph explores modern ideas on nuclear deterrence by reviewing, assessing, and synthesizing the history of strategic thought on nuclear deterrence. The goal is to generate a general, concise, and practical 21st century theory of nuclear deterrence and to present a theoretical framework for understanding nuclear modernization requirements in the 21st century.

History of Strategic Thought on Nuclear Deterrence

The Golden Age of Nuclear Deterrence

A brief, historical review of major themes of nuclear deterrence theory provides helpful context to discerning relevant principles.¹¹ One might have believed that a revolution in strategic thought would have coincided with the first use of the atomic bomb in 1945, but the most important work did not occur until the period from 1952-1966.¹² Concepts of strategic bombing from World War II initially provided the framework for thinking through how an atomic war might be fought. However, the incomprehensively destructive power of the hydrogen bomb, introduced in 1952, marked a need for a decisive break with past thinking.¹³ At that time, strategy was a new field, an intellectually barren “no-man’s land,” traditionally neglected by both military officers and students of international politics.¹⁴ An Air Force grant funded new research by a small group of pioneers from the RAND Corporation, including Bernard Brodie, Thomas

¹⁰ Antoine Henri de Jomini, *The Art of War* (Novato, CA: Presidio Press, 1992), 323.

¹¹ The history of strategic ideas after 1945 has been traced in: Colin S. Gray, *Strategic Studies and Public Policy: The American Experience* (Lexington: University Press of Kentucky, 1982) and Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd ed. (New York: Palgrave MacMillan, 2003), 184-185.

¹² Though the exact timing of this period is debatable, this rough timeframe is referenced by numerous authors. See Gray, *Strategic Studies and Public Policy*, 14.

¹³ Marc Trachtenberg, “Strategic Thought in America, 1952-1966,” *Political Science Quarterly* 104, no. 2 (Summer 1989): 303, accessed December 22, 2017, <http://www.jstor.org/stable/2151586>.

¹⁴ Bernard Brodie, *Strategy in the Missile Age* (Princeton: Princeton University Press, 1959), 7.

Schelling, Herman Kahn, and Albert Wohlstetter. Together, these men generated a body of strategic thought that was unique to the time.¹⁵ In the war of ideas, theirs were enormously influential. Yet, it was not only their ideas, but their sophisticated, analytical style which shaped the American strategic approach to nuclear deterrence.

Historian Bernard Brodie first addressed the question of what purposes the atomic bomb might serve. In response to news about the development of the hydrogen bomb, Brodie reportedly told his wife, “Everything that I have written is now obsolete.”¹⁶ He observed, “Everything about the atomic bomb is overshadowed by the twin facts that it exists and its destructive power is fantastically great. Thus far, the chief purpose of our military establishment has been to win wars. From now on, its chief purpose must be to avert them. It can have almost no other useful purpose.”¹⁷ Brodie’s proposed solution to the potential for ultimate catastrophe relied on economic theory. To Brodie, there was a parallel between how economists utilized resources to maximize wealth and how military strategists utilized resources to maximize effectiveness in war, such that a “substantial part of classical economic theory is directly applicable to problems of military strategy.”¹⁸ This approach supported the trend at the time for all decisions to be subjected to rationality and the application of science. Under this construct, strategic problems were best understood by intellect and analysis rather than character and intuition.¹⁹ The intellectual vacuum in the national security arena thus became filled by economists’ style of thinking and analytical approach to problems.²⁰ RAND researchers were soon equipped with the most advanced computers of the day and manned with top-talent economists and social scientists. With these

¹⁵ Trachtenberg, “Strategic Thought in America, 1952-1966,” 301

¹⁶ Barry Scott Zelen, *State of Doom: Bernard Brodie, the Bomb, and the Birth of the Bipolar World* (New York: Continuum, 2012), 27.

¹⁷ Bernard Brodie, ed. *The Absolute Weapon*, (New York: Harcourt, 1946), 52.

¹⁸ Bernard Brodie, “Strategy as a Science,” *World Politics* 1, no. 4 (July 1949): 476.

¹⁹ Lawrence Freedman, *Strategy* (New York: Oxford Press, 2013), chap. 36.

²⁰ Trachtenberg, “Strategic Thought in America,” 309.

resources, RAND gained an unmatched capacity to innovate and transform established patterns of thought.²¹

A significant line of strategic thought that initially emerged in the early 1950s was the idea that nuclear violence should be limited. Bernard Brodie derived this assertion through his attempt to reconcile the Prussian military philosopher Carl von Clausewitz's war theory linking political objectives with military means. Brodie understood that Clausewitz described war as *planned* violence. Since the political objective could never be national suicide, thermonuclear war did not logically link as a means of conducting war due to the risk of uncontrolled escalation.²² Brodie simultaneously developed another line of argument that considered the utility of exploiting the risk of nuclear escalation to achieve political objectives. These two arguments created a tension of ideas between manipulating the risk of escalation or avoiding it altogether.

The search for an acceptable strategic approach to nuclear weapons continued throughout the 1950s. During this period, doctrinal pronouncements and commitments to allies were urgent and intense, settling many of the issues that defined the political Cold War framework.²³ With this framework in place, the pace of technological change focused strategic efforts on the complexities introduced with each new development. President Dwight D. Eisenhower commissioned Operation SOLARIUM, which resulted in his administration's "New Look" National Security Policy, encompassed in NSC 162/2.²⁴ Eisenhower desired to emphasize economic development through decreased defense spending enabled by increased reliance on nuclear capabilities and an "emphasis on the capability of inflicting massive retaliatory damage

²¹ Colin S. Gray, *The Future of Strategy* (Malden, MA: Polity Press, 2015), chap. Conclusion, Kindle.

²² Trachtenberg, "Strategic Thought in America," 305.

²³ Freedman, *The Evolution of Nuclear Strategy*, 459.

²⁴ David Alan Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy, 1945-1960," *International Security* 7, no. 4 (Spring 1983): 28, accessed December 2, 2017. <http://www.jstor.org/stable/2626731>.

by offensive striking power.”²⁵ Military operational plans to achieve this strategy were initially based on Billy Mitchell’s early air power theory of strategic bombardment from World War II.²⁶ Stanford professor Anthony Sokol noted that the prevailing idea, even in the 1960s, was that ‘strategic bombardment’ of the enemies’ ‘vital centers’ would be central to any future war.²⁷ This prevailing theory that focused on targeting cities was challenged by Brodie’s observation that, if deterrence failed, restoring deterrence required an element of restraint to retain the threat value of unused weapons and untargeted cities.²⁸ Eisenhower’s nuclear strategy was thus heavily influenced by domestic politics, fiscal concerns, and prevailing airpower theories. These factors combined to drive strategic focus primarily on nuclear targeting rather than emerging deterrence theories.

The central issue for nuclear targeting was whether to prioritize Soviet cities or nuclear capabilities. By 1954, RAND strategists led by James Digby, several Air Staff Planners, and the future head of ballistic missile development, Brigadier General Bernard A. Schriever, began promoting a “no-cities” targeting strategy focused on Soviet nuclear capability and military forces. The pace at which the Soviets grew their nuclear capabilities made this strategy of counterforce massive retaliation questionable, as analysis demonstrated the overall ineffectiveness of a disarming offensive attack in preventing subsequent nuclear responses on the United States. In 1956, Eisenhower, despite growing pessimism, affirmed his commitment to the counterforce strategy by implementing supporting policy changes and force structure.²⁹

²⁵ The White House, NSC 162/2, accessed December 12, 2017, <https://fas.org/irp/offdocs/nsc-hst/nsc-162-2.pdf>.

²⁶ See compilation of “Billy” Mitchells writings, available on Air University website: Lt Col Johnny R. Jones, comp., “William ‘Billy’ Mitchell’s Airpower,” (Maxwell Air Force Base, AL: Airpower Research Institute, Air University Press, 1997), accessed December 1, 2017, <http://www.au.af.mil/au/awc/awcgate/mitchell/mitchellsairpower.pdf>.

²⁷ Heuser, *The Evolution of Strategy*, 369.

²⁸ Bernard Brodie, “Changing Capabilities and War Objectives” in *The Development of American Strategic Thought*, ed. Marc Trachtenberg (New York: Garland Publishing, 1988).

²⁹ David Alan Rosenberg, “The Origins of Overkill,” 63.

Eisenhower's policies and the underlying fear of nuclear exchange fueled a growing nuclear target list, which, in turn, demanded continued expansion of US nuclear capability. The engine that drove the cycle of identifying new targets and increasing capacity was the US Air Force Strategic Air Command, but soon began to involve the other services.

Rapid growth in nuclear capabilities across the services exacerbated the search for a coherent targeting strategy. By 1959, the addition of a submarine-launched Intermediate Range Ballistic Missiles (IRBM) capability and an Intercontinental Ballistic Missile (ICBM) capability led to increasingly complex operations that challenged targeting de-confliction and command and control. Because the services were unable to resolve targeting and coordination measures, Secretary of Defense Thomas Gates proposed the creation of Joint Strategic Target Planning Staff to produce a National Strategic Target List and Single Integrated Operational Plan (SIOP). President Eisenhower approved Secretary Gates' proposal on August 11, 1960. When Secretary of Defense Robert McNamara was briefed on SIOP in 1961, he was disturbed by the absence of a clear strategic rationale for the counterforce/urban-industrial target mix inherent in the SIOP.

The lack of clear strategic logic in targeting philosophy in the SIOP had at least two significant contributing factors. First, Eisenhower's decision to produce the SIOP was not based on concern for a coherent nuclear strategy, but rather focused on service parochialism. SIOP was an operational, capabilities-based plan, not a strategy for deterring nuclear war. Eisenhower's institutionalization of the SIOP elevated operational planning to the level of national policy, leading the defense community to focus more on operational details than coherent strategy.³⁰ Second, deterrence theory remained obscure and did not offer a path to elevate nuclear strategy beyond operational details. The Air Force commissioned RAND, and Bernard Brodie in particular, to provide a theoretical foundation for strategy. By 1959, when Brodie published *Strategy in the Missile Age*, he refrained from assuming a specific position on any of the issues.

³⁰ Ibid., 70.

His rational analysis offered a framework and vocabulary for understanding the issues, but the inherent dilemmas of nuclear strategy remained. Thus, organizational, operational, and theoretical factors created obstacles to producing a single, cogent nuclear strategy.

Other competing theories further obscured the path to clear, compelling strategic logic. While RAND analysts generally avoided dogmatism, some were more resolute than Brodie in advancing specific theories. After in-depth operational analysis, Albert Wohlstetter advocated that a “protected retaliatory capability has a stabilizing influence not only in deterring rational attack, but also in offering every inducement to both powers to reduce the chance of accidental war.”³¹ This ‘second strike ability’ was born out of ‘the logic of preemption.’ The logic of preemption was that vulnerability to attack, on either side, could conceivably lead to preemption, which created the problem of accidental war resulting from reciprocal fear of surprise attack. Wohlstetter’s answer to this dilemma was a survivable second-strike capability.³²

Thomas Schelling, though initially pulled in multiple directions, eventually advocated a strategy of controlled counter-population warfare.³³ Schelling derived his strategy of choice from his objection to a full counterforce capability. He reasoned that nuclear strategy was inherently about the management of risk. A limited counter-population strategy facilitated manipulation of risk by salvaging untargeted areas as leverage for a subsequent political bargaining strategy. This line of thinking nested with Brodie’s early thoughts about limited nuclear war.

In response to the lack of coherence of US nuclear strategy, Secretary of Defense Robert McNamara initiated an intensive reevaluation of US nuclear posture. By late 1961, McNamara had incorporated a second-strike counterforce strategy and inserted more flexible targeting options into the SIOP. While initially convinced of the efficacy of counterforce strategy, McNamara eventually strayed from counterforce back toward assured destruction or ‘cities’

³¹ Albert Wohlstetter, “The Delicate Balance of Terror,” *Foreign Affairs* 37 (January 1959): 230.

³² Thomas Schelling, *Arms and Influence* (New Haven: Yale University Press, 1966), chap. 3.

³³ *Ibid.*, 199.

strategy in 1966. The reason for his change in strategic orientation was primarily due to fiscal rather than theoretical factors. The counterforce strategy necessitated increased force levels beyond what the secretary was willing to invest. A shift in policy away from counterforce decreased acquisition requirements and created a secondary effect of diplomatic momentum towards Strategic Arms Limitation Talks.³⁴ Like Eisenhower, the administration of President John F. Kennedy was unquestionably influenced by deterrence theorists, but political and fiscal factors ultimately drove decision-making.

Reflecting on the body of theory during this timeframe, the publication of Schelling's *Arms and Influence* in 1966 seemed to mark a climax and an end to the 'Golden Era' of strategic thought on nuclear deterrence.³⁵ The early ideas of theorists in this field were clearly important, yet US nuclear deterrence strategy ultimately lacked coherence, being inescapably driven by internal and external political factors. The high level of abstraction and esoteric nature of nuclear theory combined with an inability to solve basic intellectual tensions led to a growing disinterest in continued nuclear debate, especially as the Vietnam War progressed. While nuclear theory did not solely drive policy and strategy, the body of thought from 1952-1966 did provide a depth of insight, a framework, and a vocabulary that continues to inform modern makers of nuclear strategy.

Stable Deterrence and the End of the “Rational Strategic Man”

As new nuclear theory encountered what Lawrence Freedman describes as a “dead end” circa 1966, existing ideas competed for primacy. Gradually, the ideas of Thomas Schelling became the most influential.³⁶ Schelling's central argument was that stability, in arms competition

³⁴ Stephen Cimbala, *Nuclear Strategizing* (New York: Praeger, 1988), 139.

³⁵ Trachtenberg, “Strategic Thought in America,” 332.

³⁶The White House. President's Commission on Strategic Forces, *Report* (Washington, DC: Government Printing Office, 1983), 3.

and in times of crisis, is maximized when both sides are unambiguously vulnerable.³⁷ The result of a reciprocal fear of surprise attack was a reliable, predictable condition of mutual deterrence derived from a “stable” balance of terror. Maintaining this balance required continued mutual vulnerability, leading to Schelling’s strong convictions against defensive societal measures.³⁸

Herman Kahn represented an opposing, yet still influential school of thought. Kahn believed that the deterrent value of nuclear weapons was derived from credibility gained by asymmetrical capabilities and an imbalance of terror favoring the United States. Contrary to Schelling, Kahn was in favor of developing defensive capabilities.³⁹ Neither Kahn’s nor Schelling’s school of thought was decisively embraced to the exclusion of the other. However, the basic orientation and language of US policies on strategic deterrence, force acquisition and arms control eventually came to reflect Schelling’s theoretical framework much more than Kahn’s.⁴⁰ In fact, Schelling’s beliefs on stable deterrence remain powerfully influential in contemporary policy and budget debates.⁴¹

One reason for Schelling’s influence was that his theory provided planners and policy makers a convenient system of beliefs that could answer “how much is enough?”⁴² A rather straight-forward, quantitative approach to the challenges of nuclear strategy led to the strategic inclination within the arms-control process to reduce strategy to an arithmetic formula matching potential targets to nuclear warheads. This operational orientation for nuclear strategy-making

³⁷ Colin S. Gray, *Nuclear Strategy and National Style* (Lanham, MD: Hamilton Press, 1986), 134.

³⁸ Thomas Schelling, “What Went Wrong with Arms Control?” *Foreign Affairs* 64, no. 2 (Winter 1985/1986): 219-233, accessed November 20, 2017, <https://www.jstor.org/stable/20042570>.

³⁹ Keith B. Payne, *The Great American Gamble: Deterrence Theory and Practice from Cold War to the Twenty-First Century* (Fairfax, VA: National Institute Press, 2008), chap. 1, Kindle.

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² Alain Enthoven and K. Wayne Smith, *How Much Is Enough? Shaping the Defense Program, 1961-1969* (New York: Harper and Row, 1971), chap. 1.

was rooted in the institutionalization of SIOP and Schelling's stable deterrence theory. The supporting system of beliefs that emerged included the following ideas:⁴³

1. Deterrence can work reliably and predictably to prevent deliberate attack.
2. Because deterrence is reliable, defensive measures are unnecessary.
3. Because nuclear weapons promise such horrific destruction, all sane leaderships will rationally be compelled to be prudent and cautious.
4. Rational equates to deterrable and only "suicidal" leaders could fail to be deterred.
5. Damage limitation and counterforce capabilities are incompatible with deterrence. They are for "war-fighting" purposes and will "destabilize" deterrence if deployed. Forces thus will reduce or eliminate opponents' motives to acquire nuclear weapons.

Though widely accepted, these beliefs did not escape scrutiny. As the Cold War focus transitioned from an arms race to arms control, the START treaties provided a political mechanism to enhance cooperation and promote stability. While Schelling's stable deterrence theories provided the intellectual foundation for negotiations, these ideas were based on a military and operational vision of crisis stability that did not sufficiently account for political context.⁴⁴ The relative deficiency of the arms controls theories motivated a growing group of scholars to question the entire intellectual framework upon which deterrence and arms control was constructed. In the late 1960s, the principal critique of classical deterrence theory was that the theory often assumed the adversary to be a rational actor with a clear set of ends and well-defined costs, benefits, and risks. Game theory-based approaches, derived from economic bargaining, were considered the mark of a serious strategist.⁴⁵ The human dimension of decision-making under the extreme tensions associated with nuclear attack was dismissed as neither scientific nor strategic.⁴⁶ These views were challenged by scholars like Andrew Marshall, Ernest May, Richard Neustadt, and others. Hedley Bull summarized their observations:

⁴³ The following argument is summarized from: Payne, *The Great American Gamble*, chap. 1.

⁴⁴ Colin S. Gray, "Arms Control Does Not Control Arms," *Orbis* 37, no. 3 (Summer 93): 333, accessed December 12, 2017, <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=9308119565&site=ehost-live&scope=site>>Arms control does not control.

⁴⁵ John von Neuman and Oskar Morgenstern, *Theory of Games and Economic Behavior* (Princeton, NJ: Princeton University Press, 1944), chap. 1.

⁴⁶ Therese Delpech, *Nuclear Deterrence in the 21st Century* (Santa Monica: RAND, 2012), 48.

“A great deal of argument about military strategy...postulates the “rational action” of a kind of “strategic man,” a man who on further acquaintance reveals himself as a university professor of unusual intellectual subtlety. In my view this kind of formal theorizing is of great value in the discussion on strategic matters when it represents not a prediction of what will happen in the real world but a deliberate and conscious abstraction from it, which must later be related back again to the world.”⁴⁷

A growing body of research found that personality, politics, and institutional priorities could produce different decisions from game theory predictions.⁴⁸ Schelling would later confess that war lacked rationality and that rationality did not necessarily lead to advantages in decision-making.⁴⁹

The Second Nuclear Age

The unexpectedly peaceful end to the Cold War encouraged an assumption that the risk of nuclear war was over. Security through cooperation replaced security through fear of mutually assured destruction, leading to an abrupt end of the rigorous debate over nuclear deterrence. Perhaps as a matter of political expediency, the issue of a nuclear-free world was on the agenda and disarmament took center stage.⁵⁰ Even if the elimination of nuclear weapons could not be achieved, the political goal was to build the logic for marginalization.⁵¹

The moment of relative peace following the collapse of the Soviet Union invited reflection and debate on the overall efficacy of deterrence during the Cold War. While it was an indisputable fact that the Soviet Union and the United States never engaged in major conventional or nuclear conflict, it was impossible to empirically prove causation for an event that did not occur. Yet, some argued that the circumstantial evidence logically led to overwhelming proof.

⁴⁷ Quoted in Freedman, *The Evolution of Nuclear Strategy*, 184-185.

⁴⁸ Andrew F. Krepinevich and Barry D. Watts, *The Last Warrior* (New York: Basic Books, 2015), chap. 3.

⁴⁹ Thomas Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1980), 18.

⁵⁰ Karp, Regina, *Security without Nuclear Weapons? Different Perspectives on Non-Nuclear Security* (Oxford: Oxford University Press, 1992), 45.

⁵¹ Freedman, *The Evolution of Nuclear Strategy*, 425.

Michael Howard concluded that it was “beyond doubt that we effectively deterred the Soviet Union from using military force to achieve its political objectives.”⁵² Others took quite the opposite position. Richard Lebow and Janice Stein argued that the superpowers “overdosed” on deterrence: “It poisoned their relationship, but their leaders remained blind to its consequences. Instead, they interpreted the tension and crises that followed as evidence of the need for even more deterrence...The strategy of deterrence was self-defeating; it provoked the kind of behavior it was designed to prevent.”⁵³ While it was certainly possible to demonstrate how the elaborate systems of nuclear deterrence induced, rather than prevented, crisis, it was also possible to demonstrate that the threat of nuclear war encouraged restraint by Cold War decision-makers.⁵⁴ Unquestionably, the existence of nuclear weapons was a defining reality and shaped the character of political decision-making.

Even with hindsight, as the twentieth century ended, it seemed difficult to fully make sense of the previous fifty years of nuclear strategic thought. While military history is revered for its ability to illuminate and guide the present, there was no definitive agreement on the efficacy of nuclear deterrence in the Cold War. Consequently, there was no historical agreement on the value of strategies or the sufficiency of the supporting theories.

⁵² Michael Howard, “Lessons of the Cold War,” *Survival* 36 (Winter 1994-1995): 164.

⁵³ Richard Ned Lebow and Janice Gross Stein, *We All Lost the Cold War* (Princeton, NJ: Princeton University Press, 1995), 368.

⁵⁴ See John Lewis Gaddis et al., *Cold War Statesmen Confront the Bomb: Nuclear Diplomacy Since 1945* (Oxford: Oxford University Press, 1999), chap. 1.

A 21st Century Theory of Deterrence

Developing a General Theory of Nuclear Deterrence

One dominant theme from this historical review of nuclear strategic thought is that a single, cogent theory of nuclear deterrence is seemingly inaccessible. The dilemmas presented by nuclear weapons led to volumes of literature with authors assuming a variety of positions, but the overall lessons were obscure. Clausewitz wrote that the purpose of theory is ultimately to disentangle confusing concepts and provide clarity for decision-makers.⁵⁵ At the core, theory is simply an explanation, and the driving motive behind theory-making is to find truth with practical application. The problem is deriving an approach that creates a single, coherent, and practical explanation of nuclear deterrence. Modern military theory is highly empirical, relying primarily on historical study compared to scientific empiricism, which relies primarily on experimentation. Historical examples explain and demonstrate otherwise abstract ideas while supporting certain theoretical claims.⁵⁶

Constructing nuclear deterrence theory requires a different approach than traditional military theory. Because the narrative of nuclear deterrence exists less in the realm of action and more in the realm of ideas, it is challenging to build an empirical theory of deterrence upon the historical record. Nuclear deterrence was a completely new concept in the mid-20th century and, without history as guide, initial theories relied more on a quantitative approach based on economic theories of behavior rather than the normative, qualitative approach grounded in history and logic.⁵⁷ While the quantitative approach was, arguably, necessary in the beginning, rational-actor assumptions stripped deterrence theory of the critical context that a traditional historical

⁵⁵ Carl Von Clausewitz, *On War*, ed. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 173.

⁵⁶ Clausewitz, *On War*, 171.

⁵⁷ Colin S. Gray, *Airpower for Strategic Effect* (Maxwell Air Force Base, AL: Air University Press, 2012), 269.

approach offers. Because of the complex nature of deterrence, qualitative approaches based on psychology, sociology, and culture greatly enhance understanding. Modern studies on complexity theory point to the need to synthesize both “hard” science and “soft” science to understand complex systems. Nuclear deterrence is inherently complex as it involves multiple polities, various cultures, and ever-changing conditions. As the history of strategic thought on deterrence includes both quantitative and qualitative approaches, a synthesis of the body of strategic thought on nuclear deterrence enhances overall understanding. While this approach has merits, it is important to acknowledge the shortcomings.

The first and foundational issue of any theory of deterrence is the lack of empiricism, which does not allow for sufficient objective criteria to evaluate propositions. While certain historical examples may support some truth claims, deterrence theory remains largely relegated to subjectivity and, consequently, speculation. Another issue is the conceptual overlap between nuclear deterrence theory and general deterrence concepts. While the overlap is not detrimental to generating an acceptable explanation, it is an important distinction. Finally, if deterrence is primarily psychological in nature and political in context, then the multipolar security environment requires multiple, adversary-specific theories to generate comprehensive understanding. This monograph does not tailor theory to specific threats, but rather aims for a broader explanation of the nature of nuclear deterrence. However, while limitations do exist, there is intrinsic value to a logically derived general theory of nuclear deterrence. After seventy years of speculation and academic rigor, it is plausible to ask, “What do we know about nuclear deterrence?” In the simplest terms, a general theory of nuclear deterrence attempts to answer this question.

In the interests of clarity and utility, a general theory of nuclear deterrence is presented in the form of several dicta. Each dictum is a “considered, seriously evidenced, and even claimed authoritative statement” and is derived from a study of well-respected secondary sources in

academia.⁵⁸ The theory does not advance new ideas or opinions but synthesizes strategic thought and concisely presents widely researched ideas. Though adversary-specific deterrence theories would be more comprehensive, a generic theory of nuclear deterrence drawn from discernable mainstream strategic logic best informs a nuclear posture intended to influence numerous polities. Since the goal of this monograph is ultimately to link theory and modernization requirements, a general theory serves this purpose well. While the proposed theory is principally generic, it is presented from a US perspective. With a subject that so easily invites speculation, the following explanation is offered with commensurate humility.

Deterrence is Contextual and Psychological

One of the more salient lessons from the history of nuclear deterrence theory emanated from the challenges to the ‘rational-actor’ assumptions of early nuclear deterrence theory. Recent advances in social psychology suggested that “decision-makers systematically violate the strict behavioral expectations of rationality.”⁵⁹ The 1973 Yom Kippur war provided a helpful historical example of poor strategic calculus based on rational assumptions. The United States failed to anticipate the genesis of the war because, as Henry Kissinger wrote, “our definition of rationality did not take seriously the notion of Egypt and Syria starting an unwinnable war to restore self-respect.”⁶⁰ The Israelis made a similar error as they reasoned that Anwar Sadat of Egypt would not consider going to war with such a comparably weak Air Force, yet Egyptian passion proved more powerful than such calculations.⁶¹ The Egyptian motivation for war is best understood not on the basis of rationality, but through the timeless lens of Thucydides’ themes of fear, honor and self-interest. The United States and Israel assumed that Egypt would rationally conclude that a

⁵⁸ The methodology and explanation for presenting theory in this fashion was inspired by Dr. Colin S. Gray. See Gray, *Airpower for Strategic Effect*, 269.

⁵⁹ Berekikian, “A Cognitive Theory of Deterrence,” 165.

⁶⁰ Henry Kissinger, *Years of Upheaval* (Boston: Little, Brown, and Company, 1982), 465.

⁶¹ Delpech, *Nuclear Deterrence in the 21st Century*, 88.

war was not in their self-interest, yet honor was predominantly the motivating factor for the Egyptians.

If deterrence is psychological in nature and political in context, then the most predictive theory of deterrence is adversary-centric, empirically constructed, culturally relevant, and psychologically considerate. In a multi-polar world, rational models of decision-making can provide generic understanding of available strategic options, but the ultimate choice of certain options by an actor cannot be reliably assumed based on rationality. Instead, predictive deterrence theories should have specific audiences in mind. The overall assertion of this dictum should not be interpreted as an invalidation of claims of classical theory. Deliberate abstractions can be useful in developing understanding, but the limits of rationality must be acknowledged and aptly applied.

Deterrence is Inherently Uncertain

Because deterrence is more a psychological art than a physical science and involves a continually changing mosaic of political leaders, one cannot make claims regarding deterrence strategies with complete confidence. As coercive strategy is intended to control adversarial behavior, deterrence ultimately relies on consent of the intended subject. Achieving consent requires the subject to: understand threats and communications; value the types of targets that can be threatened; link the threat to a specific act, which it must not undertake; believe, to some degree, that the threat would be executed if the subject does not comply and would not be executed if the subject does comply; fear the threat more than conciliation; deem conciliation to be tolerable; and have positive control over its own actions and forces.⁶² When parsing the concept of consent as detailed above, the inherent uncertainty based on the relational variables is implicit.

⁶² Keith B. Payne, "Maintaining Flexible and Resilient Capabilities for Nuclear Deterrence," *Strategic Studies Quarterly* 5, no. 2 (Summer 2011): 14.

Because deterrence is ultimately relational, there can be no certainty that potential adversaries will behave according to the “quality or quantity immanent in particular forces.”⁶³ While this argument about deterrence is not necessarily controversial, it is not well understood. American defense discourse regularly conflates the concept, classically referring to nuclear weapons as ‘the deterrent’. Additionally, decades of defense policy focused energies on achieving strategic balance by determining a configuration of nuclear capabilities that provided deterrent value. Confident claims concerning the absolute deterrent value of a specific number of nuclear weapons are ever present in the strategic discourse on nuclear weapons. For example, Jeff Richardson wrote, “A total stockpile on the order of 500 warheads would satisfy the principle objectives of strategic nuclear deterrence in ‘rational’ scenarios where strategic deterrence is a useful concept.”⁶⁴ *Arms Control Today* printed an article that read, “Having 100 nuclear warheads . . . will deter others from using nuclear, biological, or chemical weapons or from even engaging in conventional attacks.”⁶⁵ These kinds of formulaic assertions literally contradict the nature of deterrence. While a specific posture may change the strategic calculus of potential adversaries, the power of decision cannot be fully removed from the adversary, and no degree of certainty can be offered. Keith Payne was correct when he wrote that “humility-not hubris” should govern discussions related to deterrence.⁶⁶

There is No Pure Nuclear Strategy

In the introduction to his seminal work on the history of Nuclear Strategy, Lawrence Freedman raised the issue as to whether ‘nuclear strategy’ is a contradiction in terms.⁶⁷ The issue

⁶³ Gray, *National Security Dilemmas*, 63.

⁶⁴ Jeff Richardson, “Shifting from a Nuclear Triad to a Nuclear Dyad,” *Bulletin of the Atomic Scientist* (September/October 2009): 40.

⁶⁵ Morton Halperin et al., “Parsing the Nuclear Posture Review,” *Arms Control Today* 32, no. 2 (March 2002): 19-20.

⁶⁶ Payne, “Maintaining Flexible and Resilient Capabilities,” 15.

⁶⁷ Freedman, *The Evolution of Nuclear Strategy*, xix.

has been whether nuclear employment could be sufficiently controlled to ensure that political objectives could be met. After a thorough review of the evolution of nuclear strategy, Freedman concluded that there can be “no pure nuclear strategies, but there remains a continuing need for strategies that take nuclear weapons into account.”⁶⁸ Freedman reasoned that there could be no means of employment that could completely assure control to prevent a chain of events that would lead to national suicide. This reasoning was consistent with Clausewitz’s concept of friction in war and supported by the historical record of crises involving nuclear states.⁶⁹ Colin Gray echoed this sentiment, writing: “Seventy years into the nuclear age, it remains a strategically embarrassing fact that we cannot, perhaps dare not, place much faith in strategy involving nuclear weapons.”⁷⁰ Valid strategies link ends, ways, means, and risk. An acceptable balance among these characteristics cannot require means (nuclear) that exceed the ends (political goals) with unacceptable risk (nuclear response on the United States). This idea, again, is not new, as Clausewitz insists that “the degree of force that must be used against the enemy depends on the scale of the political demands of either side.”⁷¹ Thus, a “pure” nuclear strategy where nuclear weapons are the only available means to achieve political ends cannot be logically conceived, much less employed.

Additionally, the 21st Century security environment demands *integrated* strategies due to an increasingly broader array of security problems, including the newer domains of space and cyberspace. As an example, the 2007 cyberattack against Estonia disrupted government, banking, and media websites for 22 days, virtually paralyzing the nation. The United States is uniquely at risk among the nation states due to its national and extensive reliance on space-based systems and computer networks. A cyber-attack on the United States of comparable magnitude to that on

⁶⁸ Ibid., 464.

⁶⁹ See Delpech, *Nuclear Deterrence in the 21st Century*, 61-91.

⁷⁰ Gray, *The Future of Strategy*, chap. 6.

⁷¹ Clausewitz, *On War*, 585.

Estonia may well present an existential threat. As nuclear weapons have, until recent history, constituted the only existential threat to the United States, future deterrence strategies should be integrated to account for not only nuclear, but also emerging threats in space and cyberspace as well.

Political Relations Drive Stability More than the “Balance of Terror”

In the January 1959 issue of *Foreign Affairs*, RAND Corporation analyst Albert Wohlstetter’s article, “The Delicate Balance of Terror,” became an instant sensation. Expounding upon Schelling’s claims concerning the balance of terror, Wohlstetter argued against the predominant belief among nuclear strategists that the mere possession of atomic weapons was sufficient for deterrence.⁷² Wohlstetter’s deep understanding of operational requirements led to arguments for technical capabilities that would maintain a “delicate” thermonuclear balance between the Soviet Union and the United States. Wohlstetter’s ability to connect operational requirements to strategy planted the analytical seeds that led Cold War strategists to focus incessantly on details about potential vulnerabilities and nuclear targeting. Regarding this propensity, Colin Gray confessed that, “the details that so consumed our attention were of little or no significance...this is not to say that the details of nuclear posture do not matter...but that political leaders, who are the ones that must decide whether or not our efforts to deter shall succeed, are not likely to be moved by reports of the details of our military power.”⁷³ Lawrence Freedman reached a similar conclusion when he wrote, “What is often forgotten in strategic studies, preoccupied with military capabilities, is that the balance of terror rests upon a particular arrangement of political relations as much as the quantity and quality of the respective nuclear arsenals.” Deterrence relationships are primarily defined by politics and psychology, not necessarily detailed operational nuclear capabilities.

⁷² Wohlstetter, “The Delicate Balance of Terror,” 211-234.

⁷³ Gray, *National Security Dilemmas*, 82.

While nuclear posture doesn't drive deterrence, quantitative and qualitative nuclear capability is inextricably linked to political relationships. Of note, it has been presidential policy since President Franklin D. Roosevelt not to allow US nuclear forces to be inferior to another power.⁷⁴ The political motivation for comparative nuclear strength is three-fold. First, some administrations fear that opponents may perceive an unfavorable nuclear balance as weakness, decreasing both hard and soft US power. Second, the goals of nuclear assurance are threatened if allies become unsettled by perceived US inferiority. Finally, ceding capability advantage to an adversary could have adverse domestic political repercussions as well. Despite theoretical requirements for deterrence, these political factors drive contemporary status quo power relationships to maintain strategic stability. While Wohstetter makes some incredibly relevant points in his "balance of terror" argument, deterrence should be understood *primarily* in a political context rather than a capability context.

Effective Deterrence Strategies Demand Limited Nuclear Options

Theories of limited nuclear war matured with the development of the doctrine of flexible response during the administrations of President John F. Kennedy and President Lyndon B. Johnson. Flexible response, predicated on a damage-limiting approach, grew out of opposition to the Eisenhower emphasis on massive retaliation. Based on the earliest ideas of Bernard Brodie, proponents argued that flexible response provided a more logical method of fighting a nuclear war, should one occur, allowing for credible political options, not just assured destruction. However, supporters of massive retaliation questioned whether nuclear war could remain limited

⁷⁴ This argument is presented in depth by: Kurt Guthe, "Ten Continuities in US Nuclear Weapons Policy, Strategy, Plans, and Forces," (Washington, DC: National Institute for Public Policy, 2008), accessed December 12, 2017, http://www.nipp.org/wp-content/uploads/2014/11/N-Continuities-Draft_Rev-2.11.pdf.

and ultimately denounced the flexible response strategy because of the perceived loss of deterrent effect.⁷⁵

The rise of small nuclear powers in the 21st century has increased the possibility of limited nuclear war and culminated the theoretical debate on limited war. Henry Kissinger predicted these conditions over fifty years ago:

“As nuclear technology becomes more widely diffused, other and perhaps more irresponsible powers will enter the nuclear race. The fear of mutual destruction, today the chief deterrent to all-out war for the major powers, may prove less effective with nations who have less to lose and whose negotiating position might even be improved by a threat to commit suicide.”⁷⁶

In other words, what appears to be a war of limited objectives to a great power may appear to be total war to a weak state. For a weak state with a limited nuclear arsenal, the perspective of being in a total war increases motivation for using their limited number of nuclear weapons to defend vital interests. While this assertion requires a rational projection, the resulting abstraction reveals a crucial truth: multipolarity has fundamentally changed the landscape of nuclear conflict.

Though the conditions that would prompt nuclear use by weak states are debatable, the fact remains that limited arsenals constrain actors to fight limited nuclear wars. This makes limited nuclear war *possible*.

Not only is limited war conceivable, but trends in the security environment are also increasing the possibility of conflict. While nuclear arsenals are of somewhat waning interest in great power politics, these weapons are a growth industry among small states that have recently acquired nuclear capabilities. The confluence of these opposing trends sets conditions for instability as asymmetric global interests compete, especially during times of crisis.⁷⁷ Thus, with the emergence of new nuclear powers and nuclear power aspirants, the possibility exists that the

⁷⁵ Jeffrey A. Larsen and Kerry M. Kartchner, *On Limited Nuclear War in the 21st Century* (Stanford: Stanford University Press, 2014), 270.

⁷⁶ Henry Kissinger, *Nuclear Weapons and Foreign Policy*, abr. ed. (New York: W.W. Norton, 1969), 144.

⁷⁷ Larsen and Kartchner, *On Limited Nuclear War*, 270.

United States may face an adversary who leverages a small nuclear arsenal and the threat of limited nuclear attack. Additionally, Russian strategic doctrine has recently promulgated a first-use of low yield nuclear weapons to create favorable war termination conditions.⁷⁸

Not only does the security environment demand limited nuclear war planning, but a damage-limiting capability may also provide the only viable political response option that could restore deterrence in a large nuclear exchange. This was the underlying argument by those who favored flexible response under the Kennedy administration. While Ballistic Missile Defenses continue to improve in reliability, the United States possesses no military solution that *guarantees* defense against a nuclear attack. If deterrence fails, one of the only politically viable response options may be damage-limiting attacks that create opportunity for political settlement. This reality has driven a modern continuity of damage limitation as a US policy goal.⁷⁹ As Colin Gray wrote, the “theory on waging of limited nuclear war is not very convincing, but it is all we have to help us navigate the military reality of bilateral nuclear war.”⁸⁰ Opponents of damage-limiting capabilities argue that damage limitation lowers the threshold for nuclear use and is ultimately destabilizing. This argument clearly has its roots in Schelling’s stable deterrence theory, whose rational actor assumptions are inadequate for the realities of the 21st century security environment. Limited nuclear options are thus a necessary component of deterrence strategies.

Credibility is the Cornerstone of Deterrence

The DoD defines deterrence as: “The prevention of action by the existence of a *credible* [author’s emphasis] threat of unacceptable counteraction and/or belief that the cost of action

⁷⁸ Department of Defense, *2018 Nuclear Posture Review*, accessed February 19, 2018, <http://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>.

⁷⁹ Guthe, “Ten Continuities in US Nuclear Weapons Policy, Strategy, Plans, and Forces,” 36.

⁸⁰ Gray, *The Future of Strategy*, chap. Conclusion.

outweighs the perceived benefits.”⁸¹ Credibility is generally defined as having two dimensions: resolve and capability. In terms of resolve, this paper established in the first dictum that deterrence is contextual and psychological. The adversary’s perception of resolve is thus contextually variant by forces such as leadership personality, culture, and ideology. One aim of deterrence is to establish conditions where a threat of force is contextually perceived as plausible in order to communicate resolve.

One of the more difficult obstacles to a plausible threat of nuclear force is a condition known as self-deterrence. While context varies, posing a *credible* threat of force can be difficult when the opponent possesses retaliatory capabilities that can impose unacceptable costs. In the case of nuclear weapons, other nuclear capable opponents may perceive threats as lacking resolve because the risk of nuclear escalation quickly exceeds the political will. As Herman Kahn wrote, “[c]redibility depends on being willing to accept the other side’s retaliatory blow...it depends on the harm he can do, not on the harm we can do.”⁸² A condition of self-deterrence then undermines the ability to establish resolve with opponents who possess credible retaliatory capabilities.

There are two primary pathways to overcoming conditions of self-deterrence. One is to deny the opponent’s ability to do harm, conceivably through defensive measures. Historically, the United States has not been able to develop defensive capabilities against nuclear strikes that guarantee protection, though current BMD capabilities do increase deterrent value against limited nuclear powers. Also, as discussed earlier, Thomas Schelling’s highly influential stability theory created strong discourse opposing defensive capabilities because of the perceived destabilizing effects. Thus, overcoming self-deterrence by means of defensive capabilities poses both technical and perceptual challenges. The second option is to embolden credibility through strong rhetoric

⁸¹ Department of Defense, DoD Dictionary of Military and Associated Terms (Washington, DC: Government Printing Office, 2016): 69, accessed January 30, 2018, http://www.dtic.mil/doctrine/new_pubs/dictionary.pdf.

⁸² Herman Kahn, *On Thermonuclear War* (Princeton, NJ: Princeton University Press, 1960), 32.

and demonstrations of political resolve. In other words, where the coercive party has diminished credibility, achieving deterrence objectives requires a certain amount of brinksmanship.

From a US perspective, it is also worthy to note that resolve is important not only for deterrence, but also for assurance. The United States has a long tradition of creating conditions of security and maintaining strategic stability by extending nuclear deterrence commitments to more than thirty partners and allies around the world—including North Atlantic Treaty Organization (NATO) allies, Japan, South Korea, and Australia.⁸³ Hans Rühle, former head of the Policy Planning Staff in the German Ministry of Defense, recently observed:

“These states derive their security from a predictable international system—a system that is still upheld by the United States, including through the US nuclear umbrella. If the United States were to reduce or even end its role as a nuclear protector, the security perceptions of its allies would change radically—and in some cases could even lead them to re-consider their attitudes vis-à-vis nuclear possession. The result could well be the largest wave of proliferation since the dawn of the nuclear age. ...US extended deterrence is a most effective non-proliferation tool and must be sustained for the deterrence of aggression, the assurance of allies and non-proliferation purposes.”⁸⁴

Credible nuclear forces are not only useful for deterrence, but also for assuring allies. Assurance contributes to conditions that discourage proliferation and preserve overall strategic stability. Consequently, the search for credibility by demonstrating political resolve necessarily involves multiple audiences, including both allies and adversaries.

The second dimension of credibility concerns capability. A threat of counteraction cannot be believable without the *ability* to impose an unacceptable cost. This includes reliable weapons and survivable delivery platforms. Yet, to avoid a condition of self-deterrence, decision-makers also need flexible options tailorable to context and political objectives, especially in the event of a limited nuclear exchange. This was Robert Osgood’s main point when he said, “if there was to be

⁸³ Keith B. Payne et al., comp., “A New Nuclear Review for a New Age,” (Washington, DC: National Institute Press, 2017): 73, accessed January 30, 2018, <http://www.nipp.org/wp-content/uploads/2017/06/A-New-Nuclear-Review-final.pdf>.

⁸⁴ Hans Rühle and Michael Rühle, *German Nukes: The Phantom Menace* (Fairfax, VA: National Institute Press, n.d.), March 22, 2017, accessed January 30, 2018, <http://www.nipp.org/wp-content/uploads/2017/03/IS->.

a strategy of deterrence it had to be credible, and credibility, in turn, requires that the means of deterrence be proportional to the objectives at stake.”⁸⁵

A Secure, Second-Strike Response Capability is Foundational to Nuclear Deterrence

Perhaps one of the most enduring concepts from the Cold War is Albert Wohlstetter’s theory of second-strike. Secure second-strike forces create stabilizing political effects by denying the value of aggression and providing inducement for cooperation. Wohlstetter’s theory is supported by modern advances in cognitive sciences that provide increased insight into human decision-making through what is known as prospect theory. Research found that individual choices are driven more by heuristics and biases than calculated costs and benefits. Decision-makers will “act more aggressively to avoid a loss than to secure an equal gain and will pursue loss aversion beyond a rational expectation of benefits.”⁸⁶ When broadly considering strategic options, prospect theory suggests that the plausible threat of counteraction is likely to have a deterrent effect on an adversary.⁸⁷ Because most people fear loss more than they value gains, second-strike nuclear capabilities tend to limit the political objectives that aggressors are willing to pursue by force.⁸⁸

As previously cautioned, the theory of second-strike is based upon rational actor assumptions. But these assumptions have been proven valid by the wide acceptance of second-strike theory by nuclear powers from various polities, including the United States, China, UK, Russia, Pakistan, and India. These countries commonly define secure second-strike as the

⁸⁵ Robert Osgood, *Limited War: The Challenge to American Strategy* (Chicago: University of Chicago, 1957), 26, 242.

⁸⁶ Jeffrey D. Berekikian, “A Cognitive Theory of Deterrence,” *Journal of Peace Research* (March 2002): 172.

⁸⁷ Gary Schaub Jr., “Deterrence, Compellance, and Prospect Theory,” *Political Psychology* 25, no. 3 (June 2004): 406.

⁸⁸ Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca, NY: Cornell University Press, 1989), chap. 5.

‘minimum deterrent’ capability required of a nuclear force. For example, China’s nuclear strategy relies on a minimum/limited nuclear posture and a secure second-strike capability.⁸⁹ The United Kingdom also employs a ‘minimum deterrent’ through a continuous-at-sea-deterrence posture of one ballistic missile submarine to ensure second-strike retaliatory capabilities. While the United States has historically preferred the flexibility of the nuclear triad, US advocates of a minimum deterrent posture define that capability as a “second-strike, or retaliatory, capability sufficient to threaten the destruction of an opponent’s societal or urban/industrial assets.”⁹⁰ If a secure second-strike capability has been collectively determined to be the absolute minimum capability required for nuclear deterrence by multiple polities, then its foundational importance can’t be overstated.

⁸⁹ Yao Yunzhu, “China’s Perspective on Nuclear Deterrence,” *Air and Space Power Journal* 24, no. 1 (Spring 2010): 29, accessed November 29, 2017, <https://search.proquest.com/openview/3f50d01a393e6fd0ec5dff4f91b21a72/1?pq-origsite=gscholar&cbl=26498>

⁹⁰ Keith B. Payne, “Why US Nuclear Forces Numbers Matter,” *Strategic Studies Quarterly* 10, no. 2 (Summer 2016): 14.

Linking Theory to Reality: Implications for US Nuclear Posture

The US Force Posture Must be Adaptable

As the goal of theory is to provide explanation with practical application, it is useful to link the general theory of nuclear deterrence proposed in this monograph to the ongoing modernization efforts of the nuclear enterprise. The following list summarizes the preceding argument for a general theory of nuclear deterrence:

1. Deterrence is contextual and psychological
2. Deterrence is inherently uncertain
3. There is no pure nuclear strategy
4. Political relations drive stability more than the “balance of terror”
5. Effective deterrence strategies demand limited nuclear options
6. Credibility is the cornerstone of deterrence – and assurance
7. Secure, second-strike capability is foundational to nuclear deterrence

From this theory, the requirements of the US nuclear posture begin with a secure second-strike capability. A defining characteristic that also emerges is the necessity for the nuclear force to be sufficiently *adaptable*.⁹¹ Because deterrence is inherently uncertain and driven by political relations, all with ever-shifting contexts, the capabilities required for a credible deterrent posture are highly variable. There is also a time component that further exacerbates the variability of requirements. Near term investments in nuclear force posture will likely define the range of options available to decision makers for several decades. Thus, the multipolarity of nuclear powers and the volatility in the security environment over time demands that modernization efforts ensure sufficiently adaptable US nuclear forces for both current and future needs.

The idea that nuclear forces need to be adaptable and flexible is not new. The earliest ideas of flexibility were inherent in the Kennedy administration’s strategy of flexible response. Both the Schlesinger Doctrine of 1974 and the 1980 “Countervailing Strategy” of the Carter administration highlighted flexibility as foundational to deterrence, as did the 1994, 2001, and

⁹¹ Payne, “A New Nuclear Review for a New Age,” 63-64.

2018 NPRs.⁹² Specifically, the 2018 NPR stated: “[t]he challenges that each situation may present, such as time, place, and circumstance, are distinct. Therefore, flexibility and adaptiveness are essential in a defense planning process that can never be informed reliably about the future contexts for action and requirements.”⁹³ Flexibility as a foundational force characteristic is thus among the long-standing continuities of US strategic policy.⁹⁴

While the concept of an adaptable and flexible nuclear force is helpful, the idea is too broad to be wholly practical. Though the terms ‘flexibility’ and ‘adaptability’ are ubiquitous in strategic nuclear dialogue, the precise meaning of the terms is rarely well-defined. In 2017, the National Institute for Public Policy commissioned a report intended to support the development of the most recent NPR, published in February, 2018. This report not only identified the requirement for the nuclear force to be adaptable, but also helpfully identified corresponding nuclear force characteristics that serve adaptability: survivability; suitable range; ability to forward deploy; prompt response capability; variable payloads; assorted weapon yields; and high delivery accuracy. These characteristics are useful for building an assessment framework for the present and planned updates to US nuclear posture.

An Assessment of US Modernization Efforts

Table 1 depicts current nuclear capabilities, proposed modernization programs, and the corresponding adaptable characteristics.⁹⁵ In Table 2, the author assesses current and planned US nuclear capabilities by desired adaptability characteristic.

Table 1: Adaptability Characteristics of Current/Planned US Nuclear Capabilities

⁹² Payne, “Maintaining Flexible and Resilient Capabilities for Nuclear Deterrence,” 25.

⁹³ Dr. Colin S. Gray, quoted in: Department of Defense, 2018 Nuclear Posture Review, 25.

⁹⁴ Guthe, “Ten Continuities in US Nuclear Weapons Policy, Strategy, Plans, and Forces.” 31-36.

⁹⁵ This monograph evaluates modernization programs as presented in the 2018 NPR

Delivery System (Service Life) Associated Weapons (Service Life)	Planned Replacement (Planned Service Entry)	Adaptable Characteristics (in order of merit)
Ballistic Submarines (SSBN) 14 <i>Ohio</i> -class (starting 2027)	12 <i>Columbia</i> -class (initial ops in 2031)	Survivable, Prompt Response Capability, Suitable Range, Ability to Forward Deploy, High Delivery Accuracy, *Assorted Yield
Sea-Launched Ballistic Missiles (SLBM) Trident D5 (2040s)	No SLBM replacement plan *2018 NPR plans low yield option	
Heavy Bombers B-52H (2050), B-2 (2058)	B-21 (mid 2020's)	
Air-Launched Cruise Missiles (ALCM) ALCM-B (2030)	Long Range Stand-Off (LRSO) (2030)	Assorted Yield, Ability to Forward Deploy, **Variable Payload, , High Delivery Accuracy, Survivable
Gravity Bombs B61-7 (2024) B61-11 (2029) B83-1 (2029)	B-61-12 (2021) **2018 NPR plans to extend B83-1 and B61-11	
Dual-capable aircraft (DCA) F-15E/F-16 (mid 2030's)	F-35 (needs certification)	Ability to Forward Deploy, Assorted yield, High Delivery Accuracy, Survivable, Suitable Range
Gravity Bombs B61-3(2024) B61-4 (2024) B61-10 (2024)	B-61-12 (2020)	
Inter Continental Ballistic Missiles (ICBM) Minuteman III (mid 2030's)	Ground-Based Strategic Deterrent (2029)	Prompt Response, Suitable Range, Variable Payload, Survivable
Sea-Launched Cruise Missiles (SLCM) Removed from service in 2010 ***2018 NPR plans new SLCM capability	unknown delivery system	Assorted Yield, Suitable Range, High Delivery Accuracy

Source: Author-produced graphic. Information derived from Keith B. Payne et al., comp., “A New Nuclear Review for a New Age,” (Washington, DC: National Institute Press, 2017): 73, accessed January 30, 2018, <http://www.nipp.org/wp-content/uploads/2017/06/A-New-Nuclear-Review-final.pdf>. and Department of Defense, *2018 Nuclear Posture Review*, accessed February 19, 2018, <http://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>.

Table 2: Assessment of US Nuclear Posture Adaptability

Adaptable Force Characteristics	Current/Planned Assessment	Notes
Survivability		C2 gets needed upgrade; SSBN (when at sea) still most survivable leg of triad, F-35/B-21/LRSO improve air-launched survivability; basing/ports still soft targets, but world-wide deployment complicates targeting; ICBM pre-launch survivability still issue, but large numbers complicate targeting;
Ability to Forward Deploy		Acquisition of B-21 and F-35 provide continued ability to forward deploy, but security requirements may provide obstacles; SSBN fleet somewhat reduced from 14 to 12, which could slightly limit port call flexibility
Suitable Range		Ranges presumably maintained or improved with new GBSD and LRSO
Prompt Response		Prompt response maintained with GBSD; SSBN and B-21 give additional capability for quick response
Variable Payloads		GBSD maintain capability for multiple warheads; NPR maintains B83-1 and B61-11 for redundancy and penetrating capability; Bombers maintain cruise missile and gravity weapon capability
Assorted Weapon Yields		NPR adds SLBM low yield option and SLCM; B61-12 maintains variable yield gravity fall option; GBSD presumably maintains only high yield option
High Delivery Accuracy		B61-12 adds precision guidance; LRSO maintains cruise missile precision capability; planned SLCM likely precision guided; GBSD Rentry vehicle likely unguided, but maintains or increases ICBM accuracy

Source: Author-produced graphic. Information derived from Payne “A New Nuclear Review for a New Age,” and Department of Defense, *2018 Nuclear Posture Review*, accessed February 19, 2018, <http://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>

Table 2 illustrates that survivability and assorted weapon yields are the weakest adaptable characteristics in the current nuclear posture. Planned modernization efforts as outlined in the 2018 NPR address these deficiencies. The US nuclear submarine fleet (SSBN) is considered the most survivable leg of the nuclear triad. Replacing the *Ohio*-class SSBN fleet with *Columbia*-class submarines provides a long-term investment in US secure second-strike capability. The proliferation of Anti-Access/ Aerial Denial (A2/AD) capabilities over the last decade has decreased the survivability of bombers and Dual Capable Aircraft (DCA). The F-35 and B-21 along with Long-Range Stand-Off (LRSO) missile vastly improve US capability for survivable

penetration of contested airspace. While the Ground Based Strategic Deterrent (GBSD) will continue to have prelaunch vulnerability to adversaries with large arsenals, the GBSD complicates adversary targeting and increases the overall survivability of the triad.

In terms of assorted weapons yield, DCA and bombers currently offer the only low yield delivery capability in the arsenal. Considering the vulnerability of current delivery systems, the US lacks strategic options for limited nuclear response. The 2018 NPR specifically addresses this shortfall by adding a low yield Submarine-Launched Ballistic Missile (SLBM) capability and reintroducing a Sea-Launched Cruise Missile (SLCM) capability back into the inventory. Additionally, the LRSO and continued maintenance of the B83-1 and B-61-1 tactical nuclear weapons will ensure a robust capability to deliver assorted yields from multiple delivery systems. As discussed above, improved survivability of DCA and bombers will increase future strategic options for delivering a variety of weapon yields. With adequate funding, the modernization efforts outlined in the 2018 NPR will greatly increase the overall flexibility and adaptability of the nuclear force.

Conclusion

The end of the Cold War infused Americans with a sense of hope and corresponding expectations that, thirty years later, seem ever elusive. This optimism drove the United States to lead efforts to reduce the role of nuclear weapons in international relations. Initial disarmament efforts immediately following the Cold War were successful to that end, but the deteriorating security environment since 2010 led to a reversal in that momentum. Several potential adversaries have placed significant focus on expanding nuclear capabilities over the last decade while the United States has invested little in its aging nuclear force. Figure 1 compares these recent nuclear investments, illustrating that these potential adversaries do not share the American vision of a world where nuclear weapons have decreased relevance. The 2018 NPR recognizes this reality and articulates a vision for a sufficiently adaptable US nuclear posture that accounts for the

rapidly deteriorating security environment. Planned modernization efforts reflect a necessary shift from the aspirational US nuclear policies of the last three decades.

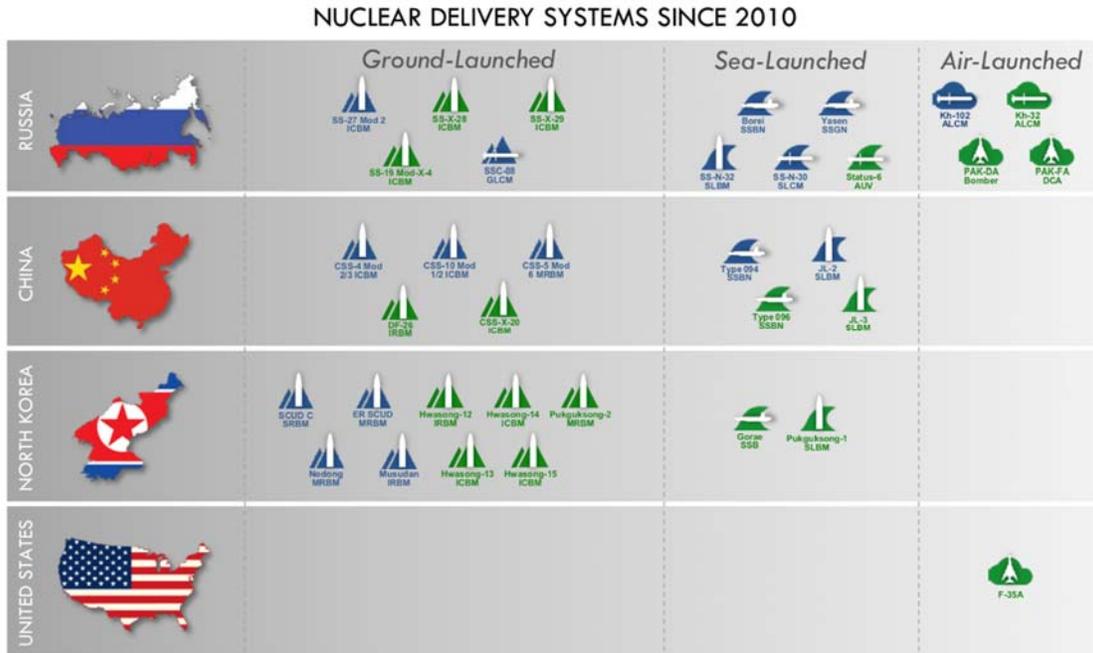


Figure 1. Nuclear Delivery Systems since 2010. Department of Defense, *2018 Nuclear Posture Review*, accessed February 19, 2018, <http://media.defense.gov/2018/Feb/02/2001872886/-1/-1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>

As long as nuclear weapons continue to exist, the United States must remain a nuclear nation with credible, flexible capabilities that preserve options for present and future decision makers. Recalling the earliest thoughts of Bernard Brodie, the chief purpose of these nuclear capabilities continues to be the prevention of war. Accomplishing this purpose demands a comprehensive understanding of deterrence in the 21st century and a political commitment to invest in necessary nuclear capabilities.

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