

*Column*

## Two Schools of Thought on the Logic of Nuclear Strategy

In recent U.S. nuclear strategy discussions, a point of contention is whether the United States should accept mutual assured destruction (MAD) with China in the future.<sup>1</sup> Some argue that the United States should accept mutual vulnerability with China and focus on retaining countervalue capabilities, while others assert that it should maintain and enhance counterforce capabilities in order to limit damage from a Chinese nuclear strike. This dispute reflects the claims of two schools of thought on nuclear deterrence and nuclear strategy—the “nuclear deterrence school” that emphasizes countervalue strikes and the “nuclear superiority school” that emphasizes counterforce strikes.<sup>2</sup> Each of these schools has drawn conflicting policy suggestions based on different logics and has contested over the desirable nuclear posture for the United States. This paper first reviews the theoretical underpinnings and the policy implications of these two positions. It also reveals that recent technological innovations and moves toward compliance with international law are accelerating attention on counterforce strikes, which has garnered renewed interest amid a deteriorating security environment. Lastly, it demonstrates how the two schools are combined and reflected in mosaic form in the 2022 Nuclear Posture Review (NPR).

In previous research since around the end of the “first nuclear age,” the U.S. nuclear deterrence discourse has been characterized by contrasting the “punitive retaliation school” and the “damage-limitation school.”<sup>3</sup> The

term “nuclear deterrence school” in this paper refers to the same concept as “punitive retaliation school” in those previous studies, while the “nuclear superiority school” is an extension of the “damage-limitation school” in previous literature. The latter, the nuclear superiority school, incorporates discussions that emerged in the 2010s and differs from the damage-limitation school in the following two ways. First, proponents of the damage-limitation school, such as Colin Gray and Keith Payne, focus on damage-limitation capabilities to escape MAD, believing that the U.S.-Soviet stalemate under MAD posed credibility issues for extended deterrence.<sup>4</sup> Conversely, the nuclear superiority school in this paper does not necessarily seek to avert MAD. Instead, it questions the existence of MAD itself or argues that advantages in the balance of nuclear forces give rise to political power even under MAD. It focuses on damage-limitation capabilities as one of the elements that shift the balance of nuclear forces to a state’s favor. While the damage-limitation school attempts to alter the strategic environment to achieve deterrence, the nuclear superiority school asserts that superiority in the balance of nuclear forces is broadly beneficial for achieving diplomatic objectives irrespective of the strategic environment. Second, the two schools have clearly distinct configurations. The damage-limitation school is strongly oriented toward policy issues, such as the credibility of extended deterrence, whereas the logic of the nuclear superiority school is constructed around the theoretical underpinnings of the nuclear deterrence school utilizing formal models.<sup>5</sup> Nonetheless, these differences do not suggest that the focus on counterforce capabilities in current policy discussions relies entirely on nuclear superiority thinking, nor that it has replaced the idea of the damage limitation school. For example, on the debate over whether the United States should accept MAD with China, both schools imply that the United States should enhance damage-limitation capabilities. This paper compares nuclear deterrence school and nuclear superiority school to present ideal types drawing on recent scholarly debates.

### The Nuclear Deterrence School and Countervalue Strikes

The nuclear deterrence school that emphasizes countervalue strikes, as examined in this paper, holds the mainstream view in the nuclear deterrence theory which developed during the Cold War. It accords weight to stalemate and strategic stability under MAD, which is premised on the nuclear revolution, and finds little political utility in the balance of nuclear forces or the first use of nuclear weapons. This section elaborates their ideas.

Nuclear revolution refers to the belief that the overwhelming destructive

power of nuclear weapons, coupled with mutual vulnerability supported by survivable second-strike capabilities, have fundamentally transformed the relationship between military force and political objectives.<sup>6</sup> States traditionally utilized their arms to achieve political objectives. Under the classical logic of war, states first contest in relative military strength, and once the struggle was decided, the winner was able to attain some political control over the loser.<sup>7</sup> Military victory was considered “the price of admission”<sup>8</sup> for achieving political objectives subsequently. However, in a war between nuclear-armed states with assured mutual vulnerability, even a preemptive strike by one side results in “unacceptable damage” for both the attacker and attacked. Accordingly, it was thought that winning a nuclear war would be impossible, necessitating a fundamental shift in the role of a state’s arms. Bernard Brodie foresaw the future in as early as 1946 when the United States had a monopoly on nuclear weapons: “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.”<sup>9</sup> The logic of the nuclear revolution posed significant challenges to deterrence theory. Namely, under mutual vulnerability, the actual use of nuclear weapons was viewed as irrational vis-à-vis any political objective. Therefore, even the threat of deterrence that suggested the use of nuclear weapons lacked credibility. Nuclear deterrence theory evolved primarily to address this credibility problem.<sup>10</sup> In short, it was believed that what mattered in the “nuclear age” was not the balance of military force but the balance of political interests, and that the level of resolve rather than capability would be contested.<sup>11</sup>

Relying on such logic of the nuclear revolution, the nuclear deterrence school since the Cold War takes the following academic and policy stances.<sup>12</sup> First, it considers that a stalemate ensuring strategic stability (particularly first-strike stability, under which no state has an incentive to strike first) between nuclear-armed states is desirable. Second, it attaches importance to MAD which ensures such strategic stability. It does not preclude countervalue strikes by nuclear weapons that target cities and civilian infrastructure to cause “unacceptable damage” to each other. Third, it believes that it is pivotal to possess sufficient survivable second-strike capabilities to inflict “unacceptable damage” on the adversary, and that any further nuclear forces will have little influence on crisis bargaining outcomes. These debates were reflected in U.S.-Soviet and U.S.-Russia arms control negotiations. For example, the Anti-Ballistic Missile (ABM) Treaty, which restricts the development and deployment of anti-ballistic missile defense systems, was an effort to maintain mutual vulnerability between the United States and the Soviet Union.

On the other hand, the long-standing U.S. nuclear posture has pursued

force buildup and nuclear doctrines that are not confined to merely securing second-strike capabilities, including stockpiling a large number of warheads, adopting counterforce targeting policies, and enhancing counterforce capabilities. Robert Jervis, a proponent of the nuclear deterrence school's thought, criticizes this posture in his book, *The Illogic of American Nuclear Strategy*.<sup>13</sup> He suggests that the counterforce aspiration of the countervailing strategy at the time shows that U.S. policymakers did not understand the meaning of the nuclear revolution and developed a posture that relies on the pre-nuclear age logic when military superiority could easily be converted into political gains.<sup>14</sup>

### The Nuclear Superiority School and Counterforce Strikes

In contrast to the above scholarly criticism, the nuclear superiority school that emphasizes counterforce strikes attempts to defend the U.S. nuclear strategy. Its argument challenges concepts such as the nuclear revolution and MAD, which have been the cornerstones of the nuclear deterrence theory since the Cold War era. In addition, the nuclear superiority school questions the validity of existing theories, which argue that superiority in the balance of nuclear forces does not translate into effective power in international politics and crisis bargaining. Furthermore, it argues that nuclear force superiority holds strategic value even when the adversary maintains secure second-strike capabilities and MAD is upheld.

In his book titled *The Logic of American Nuclear Strategy*, Matthew Kroenig refutes Jervis's critique of "illogic" policies and contends that superiority in nuclear forces can translate into political superiority. Kroenig's argument relies on the following two assumptions. First, there are meaningful differences in states' expected costs of nuclear war, contrary to the traditional argument that even the winner would suffer devastating damage under MAD. Second, these differences in expected costs are generated by states' balance of nuclear forces, which holds true even in environments where second-strike capabilities are secured. The basis on which this second assumption holds is further subdivided into two parts: the side with a superior nuclear balance (1) can impose relatively greater costs on the adversary in a nuclear war and (2) can seek to limit its own damage through the use of nuclear weapons in a counterforce operation. Kroenig defined such advantage in the balance of nuclear forces as nuclear superiority.<sup>15</sup> Specifically, nuclear superiority is operationalized as the expected cost of nuclear war perceived by a state. A state is considered to possess nuclear superiority if its expected cost of nuclear war is less than the cost perceived by the adversary. Moreover, even

if states compete in risk taking to demonstrate a high level of resolve as a brinkmanship under MAD, Kroenig argues that nuclear superiority will lead to its victory through enhancing a state's resolve to fight a nuclear war, so long as the aforementioned two assumptions are upheld.<sup>16</sup> This approach of comparing the damage incurred in a nuclear war between one state and the other differs from the idea of the nuclear revolution, the core concept of the nuclear deterrence theory that there can be no winners in a nuclear war.

Moreover, some supporters of the nuclear superiority logic question the very consensus underpinning nuclear deterrence, such as the stability of MAD and the high survivability of second-strike capabilities. Austin Long and Brendan Green note that ships submersible ballistic nuclear (SSBNs) and transporter erector launchers (TELs), which constitute the core of second-strike capabilities, were far more vulnerable than generally believed.<sup>17</sup> They highlight a number of U.S. investments made in intelligence capabilities to detect Soviet nuclear forces during the Cold War. They argue that there was a period when counterforce strikes against SSBNs were feasible using the sound surveillance system and ocean surveillance ship, and that the United States was moderately successful in tracking TELs using signals intelligence (SIGINT) satellites and aircraft. Additionally, they note that Soviet leaders had serious concerns about whether their second-strike capabilities would survive against improved U.S. counterforce capabilities.<sup>18</sup> The scholars argue that it calls into question the stability of MAD because it means the balance of nuclear forces was a concern even at a time when tens of thousands of nuclear warheads existed.

Relying on such logic, the nuclear superiority school has drawn scholarly and policy suggestions that contrast with the nuclear deterrence school's. The nuclear superiority school views that, even in a full-scale nuclear war, a state is able to prevail if it can minimize its own casualties while inflicting sufficient damage to the adversary. Therefore, it is considered important to destroy the adversary's nuclear forces through damage-limitation or disarming attacks. The school values policies that build counterforce capabilities, both through nuclear and non-nuclear means, and achieve superiority in the balance of nuclear forces. This contrasts with policies relying on MAD, which maximize one's vulnerability, and the school does not preclude the option of nuclear first use. This approach has led to the consistent U.S. posture of not denying the first use of nuclear weapons, as well as to the flexible response strategy that controls escalation by building readiness to fight through a nuclear war.<sup>19</sup> Damage-limitation capabilities are thought to facilitate resistance to the adversary's threat of nuclear use by lessening vulnerability, thereby contributing to the credibility of extended deterrence to allies and others.

***Technological Innovation: Accuracy Revolution and Low-yield Revolution***

Further encouraging this denial of MAD and the nuclear revolution is technological innovation.<sup>20</sup> In general, the measures of increasing the survivability of nuclear forces include hardening, concealment, and redundancy. Hardening involves placing fixed intercontinental ballistic missiles (ICBMs) in underground silos or reinforcing their lids. Concealment is performed on land by placing ICBMs on TELs and making them mobile, and at sea by deploying submarine-launched ballistic missiles on SSBNs.<sup>21</sup> Traditionally, a counterforce strike to disarm such delivery vehicles was considered to face intelligence issues. In other words, “A successful first strike would require near-perfect intelligence, surveillance, and reconnaissance,”<sup>22</sup> which was thought to be impossible against mobile targets. Furthermore, the use of high-yield nuclear warheads to increase the success rate of strikes against hardened or concealed warheads is fraught with two problems.<sup>23</sup> First, such attacks would cause collateral damage involving a lot of civilians and trigger retaliations beyond limited nuclear war. Second, it may generate a massive radioactive fallout that would harm neutral or allied states in the vicinity of the target country. While these issues had made a disarming or damage-limiting counterforce strike an unrealistic option, the idea emerged that technological innovation can increasingly overcome them.

Keir Lieber and Daryl Press note that the improvement of precision guidance capabilities and of remote sensing technology have dramatically increased the vulnerability of second-strike capabilities and eroded the foundation of nuclear deterrence.<sup>24</sup> Specifically, they argue that the former has made hardening almost meaningless, while the latter has made concealment more difficult. According to them, the improvement of precision guidance capabilities enables the destruction of hardened targets by low-yield nuclear or conventional weapons. It reduces collateral damage and radioactive fallout, which had been a concern, and increases the feasibility of counterforce strikes against hardened targets. Furthermore, the improvement of remote sensing technology increases the vulnerability of TELs and SSBNs. While it remains challenging to detect mobile targets, Lieber and Press suggest that the concealment method may be undermined in the future.

Lieber and Press simulated a situation in which a counterforce strike is conducted against North Korean TELs in 2017, and analyzed the U.S. and allies’ ability to collect target intelligence. According to their analysis, the United States and allies have synthetic aperture radar satellites that can take images every 24 minutes of the roads throughout North Korea along which

TEL can travel. Combined with unmanned aerial vehicles, the United States and allies are capable of conducting continuous detection and identification in 97% of the area.<sup>25</sup> While this analysis is merely a simple estimation and has limitations such as overlooking technical and institutional barriers to conduct attacks following the target’s detection, it is nevertheless valuable. The expansion of space capabilities, which has been highlighted in the Russo-Ukrainian War, and their integration with information processing technologies may further increase the feasibility of counterforce strikes against TELs based on such surveillance capabilities.

However, there are reservations about the utility of disarming or damage-limiting counterforce strikes. First, the feasibility of counterforce strikes is determined also by the size, location, topography, and defenses of the adversary.<sup>26</sup> Second, as Charles Glaser and Steve Fetter point out, there are often countermeasures to counter new threats arising from technological innovation, and additionally, the possibility of counterforce strikes may increase pressures for escalation in a crisis.<sup>27</sup>

***Nuclear Strategy and International Law***

The discourse for counterforce strikes includes a strand of discussion that denies countervalue options from an international law perspective, which is separate from the earlier discussion that denies the nuclear revolution and MAD in the context of technological innovation. The ethicality of nuclear deterrence based on the threat of assured destruction of the target country’s society has long been debated from a variety of angles, including international humanitarian law.<sup>28</sup> This paper examines the issues related to the law of armed conflict. Scott Sagan and Allen Weiner describe that the law of armed conflict and the recent U.S. position tolerate counterforce strikes to some extent but essentially prohibit countervalue options.<sup>29</sup> According to them, the principle of distinction in the law of armed conflict prohibits the intentional targeting of civilians, rendering untenable the deterrence school’s argument for countervalue strikes that relies on MAD.<sup>30</sup> On the other hand, collateral damage caused to the target country by counterforce strikes may be tolerable under the principle of proportionality, provided that expected harm to the United States and allies is reduced significantly. Additionally, they note that such counterforce strike is becoming a feasible option due to improvements in weapon accuracy and the development of low-yield nuclear weapons.

More importantly, these views are not merely confined to academic contemplation and are already reflected in the U.S. nuclear posture. Throughout the Cold War era, the United States maintained the position

that the Additional Protocol I to the 1949 Geneva Conventions, which establishes the principles of proportionality and distinction, does not apply to nuclear weapons.<sup>31</sup> However, the nuclear weapons employment strategy issued by the Obama administration indicated a clear change in course.

The new guidance requires the United States to maintain significant counterforce capabilities against potential adversaries. The new guidance does not rely on a “counter-value” or “minimum deterrence” strategy.

The new guidance makes clear that all plans must also be consistent with the fundamental principles of the Law of Armed Conflict. Accordingly, plans will, for example, apply the principles of distinction and proportionality and seek to minimize collateral damage to civilian populations and civilian objects. The United States will not intentionally target civilian populations or civilian objects.<sup>32</sup>

This guidance was immediately reflected in the posture of the U.S. Strategic Command. According to its commander at the time, the command reviewed nuclear plans based on this guidance to “expand non-nuclear strike alternatives” and apply “tactics and techniques to minimize collateral effects.”<sup>33</sup> This shift has been inherited by subsequent U.S. administrations. Both the 2018 NPR released during the Trump administration and the Biden administration’s nuclear employment strategy explicitly mention the use of nuclear weapons according to the law of armed conflict.<sup>34</sup> Additionally, the 2023 updated U.S. Department of Defense Law of War Manual states, “The law of war governs the use of nuclear weapons, just as it governs the use of conventional weapons. For example, nuclear weapons must be directed against military objectives.”<sup>35</sup> These statements suggest that the U.S. nuclear targeting policy is leaning toward counterforce strikes. In contrast, the nuclear deterrence school critiques that the significant impact on nuclear strategy by the law of armed conflict will undermine strategic stability and make the U.S. deterrence capability inadequate.<sup>36</sup>

### The Two Schools of Thought in the 2022 NPR

The two schools of thought—the nuclear deterrence school emphasizing countervalue strikes and the nuclear superiority school emphasizing counterforce strikes—are combined and reflected in mosaic form in the 2022 NPR. The two schools have been developed through the debate over U.S. nuclear strategy, as well as presenting a general theory of nuclear strategy. The analytical framework until now suggested that the

NPR has been influenced by a division in two intellectual orientations—proponents of nuclear deterrence and proponents of nuclear disarmament.<sup>37</sup> This paper compares the two schools to demonstrate that technological innovation and adherence to international law are driving the trend toward counterforce options in the U.S. nuclear posture. It should be made clear that “nuclear deterrence” school may imply a different policy stance from previous scholarship, and that the comparison does not eliminate aspects of “nuclear disarmament.” Furthermore, the analysis below was conducted to contrast these two schools as the ideal types and does not directly address factors such as the increased threat perception toward China and Russia at the basis of the 2022 NPR.<sup>38</sup>

The following sections or descriptions from the 2022 NPR appear to reflect nuclear deterrence school thinking. The first concerns the U.S. decision to “Eliminate ‘hedge against an uncertain future’ as a formal role of nuclear weapons.”<sup>39</sup> The role of nuclear weapons as a “hedge” was mentioned in the 2010 and 2018 NPRs.<sup>40</sup> According to a previous study, as great power relations became increasingly uncertain, the United States sought to maintain dismantled nuclear warhead stockpiles and modernize nuclear weapons infrastructure to prepare for technical and geopolitical surprises.<sup>41</sup> The nuclear superiority school argued that the United States needed to “hedge” to maintain U.S. nuclear superiority into the future. Furthermore, it claimed that hedging was necessary to maintain retaliatory capabilities, as recent trends in technological innovation could significantly improve adversaries’ counterforce capabilities and potentially weaken U.S. nuclear forces.<sup>42</sup> Second, the section on canceling the nuclear-armed sea-launched cruise missile (SLCM-N) development program, initiated during the Trump administration, can be understood as nuclear deterrence school thinking.<sup>43</sup> Cruise missiles are one of the leading weapons of the accuracy revolution that help make counterforce strikes feasible. SLCM-Ns began to be developed to address the “increasing need for flexible and low-yield options” for providing allies with extended deterrence and assurance.<sup>44</sup> Nonetheless, Deputy Assistant Secretary of Defense Richard Johnson, who was involved in the drafting of the 2022 NPR, explained that the Biden administration believes the United States already has “the capabilities we



A cruise missile, one of the leading weapons of the accuracy revolution, being launched from a U.S. nuclear submarine. All Tomahawks with nuclear warheads (TLAM-N) were decommissioned by 2013. (AFP-Jiji)



need to deter...nuclear use,” and the SLCM-N program only has “marginal capability.”<sup>45</sup> Third, the 2022 NPR states, “Any adversary use of nuclear weapons, regardless of location or yield, would fundamentally alter the nature of a conflict, create the potential for uncontrolled escalation, and have strategic effects.”<sup>46</sup> This description appears to be rooted in the nuclear revolution’s view that the logic of conflicts involving nuclear weapons differs fundamentally from the logic of conventional war. Fourth, the 2022 NPR articulates that the United States “does not rely on a launch-under-attack policy” as “a posture that contributes to strategic stability.”<sup>47</sup> This policy refers to preparing for ICBM retaliation launches if multiple sensors detect an attack. A previous study described it as being essentially a launch-on-warning posture.<sup>48</sup> Nuclear superiority advocates argue that such launch on warning or first use of nuclear weapons to disarm the nuclear forces of an adversary or to carry out damage-limitation attacks is indispensable for prevailing in nuclear war.<sup>49</sup> In contrast, the 2022 NPR emphasizes that U.S. nuclear forces can withstand an initial attack by an adversary. It maintains that reliance on launch-under-attack or launch-on-warning policies was unnecessary.

On the other hand, the following sections or descriptions from the 2022 NPR appear to reflect nuclear superiority school thinking. The first is in the context of nuclear weapons’ role in providing assurance to allies and partners: “Allies must be confident that the United States is willing and able to [...] mitigate the risks they will assume in a crisis or conflict.”<sup>50</sup> The second is the section mentioning that, if deterrence fails, the United States would use nuclear weapons “to end any conflict at the lowest level of damage possible.”<sup>51</sup> These statements reflect the logic of the nuclear superiority school, namely, that the U.S. advantage in the balance of nuclear forces, coupled with its ability to limit damage if deterrence fails, will support the credibility of extended deterrence. Third, the 2022 NPR explicitly states that the United States will use nuclear weapons in accordance with the law of armed conflict and “will not intentionally target civilian populations or objects.”<sup>52</sup> It can be construed to mean that the United States will, in principle, eliminate countervalue strikes on urban areas or on infrastructure in the target country, reflecting the logic of the nuclear superiority school that advocates for counterforce strikes. Fourth, on forgoing the adoption of no first use and the declaration of the sole purpose of nuclear weapons, the NPR states that the United States “concluded that those approaches would result in an unacceptable level of risk.”<sup>53</sup> It reflects the nuclear superiority school’s posture of not precluding the first use of nuclear weapons to disarm the adversary, thereby ensuring the credibility of one’s damage limitation and extended deterrence. Fifth, the NPR’s country-specific approaches for

China and Russia emphasize the flexibility provided by the W76-2 warhead, the B61-12 bomb, and other weapons.<sup>54</sup> These weapons correspond to the high-precision, low-yield weapons that the nuclear superiority school attaches importance to in discussing the feasibility of counterforce operations.

The two schools of thought—the nuclear deterrence school emphasizing countervalue strikes and the nuclear superiority school emphasizing counterforce strikes—have contrasting views on the desirable U.S. nuclear strategy. These differences are intricately reflected in the 2022 NPR. In a move challenging the Biden administration’s cancellation of the SLCM-N development program mentioned in the 2022 NPR, the U.S. Congress approved a small budget for the program in FY2023 and is likely to approve further funding in FY2024.<sup>55</sup> Even now, the nuclear deterrence school and the nuclear superiority school appear to be in a tug-of-war over the desirable U.S. nuclear posture.

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1. Charles L. Glaser and Steve Fetter, "Should the United States Reject MAD?: Damage Limitation and U.S. Nuclear Strategy toward China," *International Security* 41, no. 1 (Summer 2016): 49-98.
2. The terms are the author's creation. The comparison between the countervalue school and the counterforce school is based on Kurizaki Shuhei, "Two Schools on Nuclear Policy and Their Impact: The Counterforce-Countervalue Debate in North America" (presentation, NIDS Perspectives Workshop, Tokyo, August 31, 2023).
3. Charles L. Glaser, *Analyzing Strategic Nuclear Policy* (Princeton: Princeton University Press, 1990), 49-60; Takahashi Sugio and Akiyama Nobumasa, "'Kaku no fukken' no genjitsu" [The reality of "revival of nuclear weapons"], in *"Kaku no bokyaku" no owari: Kakuheiki fukken no jidai* [The end of nuclear forgetting: Revival of nuclear weapons], ed. Akiyama Nobumasa and Takahashi Sugio (Tokyo: Keiso Shobo, 2019), 1-16; Takahashi Sugio, "Beikoku: Kaku yokushi senryaku no saikochiku" [The U.S.: Rebuilding of nuclear deterrence strategy], in *"Kaku no bokyaku" no owari*, ed. Akiyama and Takahashi, 17-43.
4. Glaser, *Analyzing Strategic Nuclear Policy*, 50.
5. Matthew Kroenig, "Nuclear Superiority and the Balance of Resolve: Explaining Nuclear Crisis Outcomes," *International Organization* 67, no. 1 (Winter 2013): 146-150.
6. See Chapter 1 for the concepts of mutual vulnerability and second-strike capability. The concept of the nuclear revolution was first mentioned in Bernard Brodie, "Implications for Military Policy," in *The Absolute Weapon: Atomic Power and World Order*, ed. Frederick S. Dunn, Bernard Brodie, Arnold Wolfers, Percy E. Corbett, and William T.R. Fox (New York: Harcourt, Brace, 1946). The dual focus on nuclear destructiveness and second-strike capability is based on Robert Jervis, *The Illogic of American Nuclear Strategy* (Ithaca: Cornell University Press, 1984), 22. The focus on the relationship between military force and political objectives is based on Robert Powell, *Nuclear Deterrence Theory: The Search for Credibility* (Cambridge: Cambridge University Press, 1990), chap. 2.
7. For a detailed comparison of the classical logic of war and the post-nuclear revolution logic, see Powell, *Nuclear Deterrence Theory*, chap. 2.
8. Thomas C. Shelling, *Arms and Influence* (New Haven: Yale University Press, 1966), 13.
9. Brodie, "Implications for Military Policy," 62.
10. Powell, *Nuclear Deterrence Theory*, chap. 2.
11. See Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca: Cornell University Press, 1989); Schelling, *Arms and Influence*; Powell, *Nuclear Deterrence Theory*, chap. 3, 4.
12. See "Conceptual Development of Strategic Stability" in Chapter 1.
13. Jervis, *The Illogic of American Nuclear Strategy*.
14. For countervailing strategy, see Lawrence Freedman, *The Evolution of Nuclear Strategy* (New York: Palgrave Macmillan, 2003), chap. 9.
15. Matthew Kroenig, *The Logic of American Nuclear Strategy: Why Strategic Superiority Matters* (New York: Oxford University Press, 2018), 16.
16. Kroenig, "Nuclear Superiority and the Balance of Resolve," 141-171.
17. Austin Long and Brendan Rittenhouse Green, "Stalking the Secure Second Strike: Intelligence, Counterforce, and Nuclear Strategy," *Journal of Strategic Studies* 38, no. 1-2 (2015): 38-73.
18. Brendan R. Green and Austin Long, "The MAD Who Wasn't There: Soviet Reactions to the Late Cold War Nuclear Balance," *Security Studies* 26, no. 4 (2017): 606-641.
19. Takahashi, "Beikoku," 20. Furthermore, some note that even after Defense Secretary McNamara emphasized assured destruction capabilities during the Kennedy and Johnson administrations, actual operational policies were based on selecting counterforce targets. Matsuyama Kenji, "Beikoku no senryaku kakuunyo seisaku no hensen to genjo" [U.S. action policy of strategic nuclear force: Historical transition and present condition], *Reference*, no. 696 (January 2009): 55-77.
20. See also Chapter 3. The term "accuracy revolution" is taken from Keir A. Lieber and Daryl G. Press, *The Myth of the Nuclear Revolution: Power Politics in the Atomic Age* (Ithaca: Cornell University Press, 2020), chap. 3 and "low-yield revolution" from Scott D. Sagan and Allen S. Weiner, "The Rule of Law and the Role of Strategy in U.S. Nuclear Doctrine," *International Security* 45, no. 4 (Spring 2021): 126-166.
21. Kier A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence," *International Security* 41, no. 4 (Spring 2017): 18.
22. Michael S. Gerson, "No First Use: The Next Step for US Nuclear Policy," *International Security* 35, no. 2 (Fall 2010): 26-27.
23. Lieber and Press, "The New Era of Counterforce," 27-28.
24. Lieber and Press, "The New Era of Counterforce"; Lieber and Press, *The Myth of the Nuclear Revolution*, chap. 3.
25. Lieber and Press, "The New Era of Counterforce," 37-46, online appendix 7-9; Lieber and Press, *The Myth of the Nuclear Revolution*, 84-90.
26. Lieber and Press, *The Myth of the Nuclear Revolution*, 84.
27. Glaser and Fetter, "Should the United States Reject MAD?"
28. Kawai Kimiaki and Mayama Akira, "Kakuheiki mondai no omona ronten seiri: Kokusai jindoho hen" [Major issues of nuclear weapons: International humanitarian law], RECNA Policy Paper, no. 18 (May 2023); George H. Quester, "The Necessary Moral Hypocrisy of the Slide into Mutual Assured Destruction," in *Nuclear Deterrence and Moral Restraint*, ed. Henry Shue (Cambridge: Cambridge University Press, 1989), 227-269; Austin Long, "U.S. Strategic Nuclear Targeting Policy: Necessity and Damage Limitation," *H-Diplo/International Security Studies Forum*, Policy Roundtable 1-4 (2016): 15-18; Nina Tannenwald, "Renewing a Regime of Nuclear Restraint," *H-Diplo/International Security Studies Forum*, Policy Roundtable 1-4 (2016): 21-24.
29. Sagan and Weiner, "The Rule of Law and the Role of Strategy in U.S. Nuclear Doctrine."

30. The United States used to argue that prohibiting the intentional targeting of civilians as a belligerent reprisal had not achieved customary international law status. Sagan and Weiner contend that the legal circumstances are no longer as such. Sagan and Weiner, “The Rule of Law and the Role of Strategy in U.S. Nuclear Doctrine,” 153-160.
31. Sagan and Weiner, “The Rule of Law and the Role of Strategy in U.S. Nuclear Doctrine,” 127.
32. [U.S.] Department of Defense, “Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.,” June 12, 2013, 4-5.
33. C. Robert Kehler, “Nuclear Weapons and Nuclear Use,” *Daedalus* 145, no. 4 (Fall 2016): 57, 59. He did not indicate which nuclear plans were reviewed (e.g., Single Integrated Operational Plan, National Strategic Target List).
34. [U.S.] Department of Defense, “Nuclear Posture Review Report” (2010 NPR), April 2010, VI; [U.S.] Department of Defense, “Nuclear Posture Review” (2018 NPR), February 2018, 23; [U.S.] Department of Defense, “Report on Nuclear Employment Strategy of the United States - 2020 Specified in Section 491(a) of 10 U.S.C.,” November 30, 2020, 6.
35. U.S. Department of Defense Office of General Counsel, “Department of Defense Law of War Manual,” July 2023, 426.
36. Steve Fetter and Charles Glaser, “Legal, but Lethal: The Law of Armed Conflict and US Nuclear Strategy,” *The Washington Quarterly* 45, no. 1 (Spring 2022): 25-37.
37. Takahashi and Akiyama, “‘Kaku no fukken’ no genjitsu”; Takahashi Sugio, “JIIA webinaa kinkyu toron: Kaku yokushi no kyo to Higashiajia no senryaku kankyo” [JIIA webinar urgent discussion: Today’s nuclear deterrence and East Asia’s security environment], The Japan Institute of International Affairs, March 2022.
38. For more on great power competition and the relationship with the U.S. nuclear posture, see Arakaki Hiromu, “U.S. Military Strategy for Maintaining the International Order,” in *China Security Report 2024*, English edition, ed. National Institute for Defense Studies (NIDS) (Tokyo: NIDS, 2023).
39. [U.S.] Department of Defense, “2022 Nuclear Posture Review” (2022 NPR), October 2022, 3.
40. 2018 NPR, VII.
41. Tosaki Hirofumi, “Obama seiken no kakugunshuku fukakusan seisaku: Bijon to seika to gyappu” [Obama’s nuclear disarmament and non-proliferation policies], *Kokusai Anzenhosho* [The Journal of International Security] 41, no. 3 (December 2013): 46-62; 2010 NPR, 7.
42. Lieber and Press, “The New Era of Counterforce,” 11. While “hedge” has been deleted from the NPR, some note that its capabilities have been partially maintained. Murano Masashi, “Ukuraina senso go no Beikoku no anzenhosho senryaku [US security strategy after the war in Ukraine],” *Kokusai Mondai* [International Affairs], no. 715 (2023): 28.
43. 2022 NPR, 3, 20.
44. 2018 NPR, 55.
45. Katherine Walla, “Inside the US Nuclear Posture Review’s Approach to a New Era of Three-Power Nuclear Competition,” *New Atlanticist*, November 3, 2022.
46. 2022 NPR, 7.
47. 2022 NPR, 13.
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