NIDS International Symposium on Security Affairs 2023

The New Horizon of the Nuclear Era

The National Institute for Defense Studies, Japan

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Chairperson's Summary

On December 6, 2023, the National Institute for Defense Studies held the International Symposium on Security Affairs on the theme of "The New Horizon of the Nuclear Era." This symposium had the objective of contributing to security dialogues, and also enhancing the quality of research, revitalizing human exchanges, encouraging mutual understanding internationally, and contributing to security policies.

The symposium was divided into two parts. Session 1 examined Nuclear Deterrence and Arms Control, and Session 2 examined Theories of Nuclear Deterrence and Compellence. Each session was implemented in the order of (i) presentations by panelists, and (ii) discussion (discussion with panelists and Q&As). Below is a summary of the symposium's Session 1 and Session 2, in that order.

In Session 1, Dr. Daryl G. Press (Director, Institute for Global Security, Dartmouth University), Dr. ARIE Koichi (Lieutenant Colonel, Government and Law Division, National Institute for Defense Studies), and Dr. James M. Acton (Co-Director, Nuclear Policy Program, Carnegie Endowment for International Peace) gave presentations on Nuclear Deterrence and Arms Control, and Dr. ICHIMASA Sukeyuki (Head, Cyber Security Division, National Institute for Defense Studies) conducted the discussion with the panelists.

At the beginning of the session, Dr. Press gave a presentation titled "Deterrence and Arms Control in an Era of Rapid Technological Change." He pointed out that currently we are in an era of unprecedented rapid technological change and that this uncertainty would have critical implications for deterrence today, and then he discussed his major suggestions with respect to arms control going forward.

Dr. Press began by listing hardening, concealment, and redundancy as three strategies related to enhancing the survivability of nuclear forces, explained that trends in accuracy had implications for hardening, trends in sensing had implications for concealment, and trends in arms cuts had implications for redundancy, and pointed out that the vulnerability of nuclear forces is increasing due to long-term technological trends, namely the leaps in the accuracy of weapons, remote sensing, data processing, and communication.

Next, he discussed the implications of technological change for nuclear deterrence,

using the examples of accuracy and remote sensing. He stated regarding accuracy that due to the enhanced accuracy of missiles and reduction in the number of warheads necessary to destroy targets, the targets will be destroyed reliably, and explained that due to the increased role of conventional weapons and reduction in the fallout due to low-yield weapons/airburst, collateral damage was declining and the threshold for the use of the weapons was falling. Furthermore, regarding remote sensing, he explained that due to the diversification of platforms, the broadening of communication, enhanced sustainability, enhanced analytical capabilities, and information integration through processing technologies, machine learning and artificial intelligence (AI), the detection and tracking of mobile ground missiles and submarines has become easier compared to the Cold War era.

Finally, taking into account the point that the vulnerability of the nuclear forces is increasing due to technological change, he presented his perception that stable nuclear deterrence is still possible, and then concluded his presentation by pointing out major suggestions for arms control going forward: firstly, discussions oriented toward nuclear arms cuts are not necessarily constructive in the context that the elements with implications for the stability of nuclear deterrence are diversifying; secondly, attempts at mutual deterrence/stability between the United States and the Soviet Union centered on submarines since the Cold War era are no longer the only option; and thirdly, forces should be designed based on the principles of (i) maintaining the diversity of delivery systems, (ii) destruction of hardened and concealed targets, and (iii) maintenance of flexibility (survivability, alert level, and swiftness).

Next, Dr. ARIE Koichi gave a presentation titled "Nuclear Deterrence and Arms Control: From the Perspective of New Combat Domains." He made the point that in recent years these new combat domains and emerging technologies are also beginning to impact the nuclear domain, and then he examined the implications of the new combat domains and emerging technologies for nuclear weapon systems, and discussed the implications in nuclear deterrence and arms control.

At the beginning of his presentation, he raised the question of whether the impact of new combat domains and emerging technologies on nuclear systems will have a stabilizing or destabilizing effect on nuclear deterrence. The thinking behind the view that it will stabilize nuclear deterrence is that, firstly, the nuclear command, control and communications (NC3) systems of nuclear powers are vulnerable to a variety of attacks in the new combat domains, but if the source of the attack is identified, there

is a high risk of severe retaliation, including with nuclear weapons, so there may be an incentive between nuclear powers to mutually refrain from attacks on NC3. Secondly, he argued that if emerging technologies such as AI are introduced into NC3, enhancing the intelligence, surveillance and reconnaissance (ISR) capabilities against the adversary's nuclear weapon systems and also enabling more appropriate decision-making concerning the use of nuclear weapons, there is a possibility that this could lead to the stabilization of nuclear deterrence. He added that in this case, there is a risk that nuclear deterrence may conversely be destabilized in the case that the (threat of) retaliation against attacks in new combat domains is judged to be lacking credibility or in the case that the adversary also introduces emerging technologies in NC3.

He pointed out that there is also an opposing view that nuclear deterrence will be destabilized. This view argues that, firstly, if an attack in new combat domains degrades the capabilities of NC3, it will become difficult to retaliate with nuclear weapons, making second-strike capabilities vulnerable and destabilizing nuclear deterrence. Secondly, in the case that emerging technologies are introduced into NC3 and ISR capabilities against an adversary's nuclear weapon systems are enhanced, the adversary will become increasingly concerned that its own nuclear weapon systems will be subject to a preemptive strike, increasing the risk of destabilizing nuclear deterrence. Thirdly, attacks in new combat domains increase the risk of unintended use of nuclear weapons based on misunderstandings or misperceptions.

Next, he discussed the policy issues for enhancing the stability of nuclear deterrence from the two perspectives of direct deterrence and extended deterrence. He pointed out that the major policy issues from the perspective of direct deterrence were (i) a shared understanding concerning escalation among the nuclear powers regarding deterrence in new combat domains, (ii) strengthening of surveillance systems for new combat domains, and (iii) enhancement of the resilience of NC3. Furthermore, he pointed out that the major policy issues from the perspective of extended deterrence were (i) responses to situations where attacks in new combat domains are directed at countries under the U.S. nuclear umbrella, (ii) a shared understanding about the introduction of emerging technologies to NC3, and (iii) proposing an agenda for extended nuclear deterrence in the context of new combat domains and emerging technologies from the perspective of nuclear umbrella states. Moreover, regarding arms control going forward, he proposed a normative approach regulating "behavior and actions," for example, an attack on NC3, rather than "weapons." He also added that among emerging technologies, it is the regulation of hypersonic weapons that presents the possibility of applying traditional

approaches to arms control.

In conclusion, Dr. ARIE predicted that in the near future activities in new combat domains will evolve further in line with the rapid development of emerging technologies, placing a heavy burden on the nuclear weapon systems of nuclear powers, and based on this prediction, he presented the summary that in order to increase the stability of nuclear deterrence in new combat domains going forward, the derivation of policy prescriptions, including arms control, will be required.

Finally, Dr. Acton gave a presentation titled "Deterrence and Arms Control." In this presentation, he firstly introduced the example of the Korean War, and took up the military intervention caused by the different understandings of the United States and China regarding the 38th parallel and the resulting intensification of the war as a typical example of "unintended escalation." He then stated that a useful and plausible role for arms control is to reinforce deterrence and reduce the likelihood of unintended escalations leading to a nuclear war.

He noted that the "reduction" of the likelihood of nuclear war he referred to above does not mean "eliminating" it as a possibility. Even if arms control could succeed perfectly and entirely prevent unintended escalation, deliberate escalation would still be possible. He concludes, however, that given the potential consequences of a nuclear war, reducing the likelihood of such a war seems like a useful endeavor.

In today's world, in which great power competition is beginning, the approach of Cold War-style arms control is being questioned. For that reason, Dr. Acton continues, we should return to the broader definition proposed by Thomas C. Schelling and Morton H. Halperin in *Strategy and Arms Control*: "all the forms of military cooperation between potential adversaries." In this view, arms control includes legally binding and politically binding measures to improve communication, enhance transparency, build confidence, and regulate behavior, as well as to limit force size.

Dr. Acton then argued that the United States needs to clarify and share "redlines" with China to prevent unintended escalation. For example, an attack on the NC3 equipment for nuclear weapons could be a redline. In this context, he particularly focused on command and control assets in space. In space activities in high-altitude orbits (geosynchronous orbits and Molniya orbits), there are cases in which attacks on satellites are similar to the maneuver of satellites used for normal space activities. In addition, many satellites, even satellites for NC3, have dual-use capabilities. For that reason, in a crisis situation, there is a possibility that unintended escalation will occur

due to space activities.

Therefore, he proposed two points: (i) China, Russia, and the United States could establish "safety zones" around one another's satellites in high-altitude orbits and (ii) that there could be a spacecraft launch notification agreement. In other words, each country could commit not to move any of its satellites to within an agreed distance of the satellites in high-altitude orbits of the other participants.

Arms control in this new era of great power competition is expected to be more difficult to negotiate than it would be effective, due to U.S. congressional politics and China's refusal to sit at the arms control table, among other factors. However, Dr. Acton stated that there is reason to hope that in the long term, Beijing and Washington may find a common interest in reducing the risk of unintended escalation. He said this is because after all, if a crisis goes badly, we will have bigger challenges afterwards than negotiating a risk-reduction agreement. Therefore, he concluded that Beijing and Washington can and should start preparing today for future arms control opportunities.

Session 1's discussion began with comments and questions from Dr. ICHIMASA regarding the three presentations.

A comment was made to Dr. Press that his presentation was very thought-provoking with regard to the major implications of the hardening, concealment, and redundancy of nuclear armaments, NC3, the diversity of strategies, and innovative technologies for deterrence strategies, force posture, and arms control. He was then asked whether the "accuracy revolution" and "sensing revolution" would further lower the threshold for using nuclear weapons if other nations such as China and Russia were to take similar measures, and asked regarding the implications of technological change whether there would be any difference in its impact on the two U.S. competitors with different nuclear use policies, namely Russia, which has discussed "escalate to de-escalate," and China, which has adopted a "No-First Use" policy.

In response to this, Dr. Press said that changes which can be seen in China today include attempts to build up its nuclear weapons and reduce its vulnerability; and noted that China aims to realize these goals by, for example, improving its sensing capabilities, and efforts in this area are not being made solely by the United States.

Furthermore, Dr. ARIE received the comment that the point he had made with regards to the destabilization of nuclear deterrence as a consequence of the rise of new domains — that the possession of new technologies by our side stabilizes nuclear deterrence while the possession of new technologies by the other side brings about

destabilization — was thought-provoking. Furthermore, he was given support for his point that it is valid to argue that the best way to deal with "unseen weapons" such as cyberweapons and AI is to regulate behavior and actions, rather than regulate quantity. Then he was asked the following questions: (i) Traditional normative code of conduct-based arms control, for example as seen in export control regimes, has often had the character of a "gentleman's agreement," but what kinds of implications do you think there are for actions in violation of an agreement under that kind of agreement? (ii) Going forward, how should arms control be implemented with respect to "innovative technologies" that are assumed to have already been widely adopted and introduced?

(i) Dr. ARIE stated regarding unseen weapons and arms control that regulating "actions suspected of being attacks" is conceivable, but that since the close-range maneuvers in orbit mentioned by Dr. Acton are also essentially used for satellite repair, it is conceivable that pre-launch notifications would be given regarding such easily-confused actions. (ii) He also responded regarding new technologies that have already been implemented that nuclear powers should confirm and establish with each other an understanding of which technologies undermine nuclear strategies and crisis stability, and reflect this in their policies.

Finally, in his presentation on what can be done in arms control in space Dr. Acton proposed presenting the points "on which agreement is possible" because we are not at a stage in which measures such as numerical reductions and verification can be taken as in the Cold War era, so it was indicated to Dr. Acton that we can conclude that it is acceptable to see this as the common theme of the discussions in this session. Dr. Acton was asked the questions: (i) Regarding verification measures typified by the provisions in the New START treaty, how should the relevant countries maintain this way of thinking (verification culture) going forward? (ii) As one of the arms control issues going forward, some research has been seen recently discussing arms control frameworks such as a mutual no-first-use agreement between the United States and China limited to a Taiwan Strait emergency. What is your opinion on this?

Dr. Acton (i) presented the viewpoint that he was optimistic about the future situation inside the United States because inspection technicians were being trained continuously at U.S. national research institutes and the inspection measures in the New START treaty use simple technologies. (ii) On the other hand, he presented the thought that the idea of turning the Taiwan Strait into what might be called a "nuclear safety zone" was difficult. He stated that the reason for this was that there is no guarantee that what happens in the Taiwan Strait will not spill over to other regions such as the Spratly

Islands, and vice versa. Then he concluded his response by asserting that it is important for the governments of both of the parties to make preparations in advance for risk and conflict management at a high level, deepen their understanding of the results of escalation, and make progress in discussions on rational methods for reducing the risk of escalation.

From the audience, questions were asked about the prevention of a new arms race brought about by technological change, the risk of unintended escalation brought about by an attack from a non-nuclear weapons power against a nuclear weapons power, and the implications of pre-launch notifications for the Japan-U.S.-South Korea framework of integrated deterrence, and a lively question and answer session was held with the three presenters.

In Session 2, Dr. Zafar Khan (Professor, Department of International Relations, Balochistan University of Information Technology, Engineering and Management Sciences), Dr. OHNISHI Ken (Senior Fellow, Global Security Division, National Institute for Defense Studies), and Dr. Charles L. Glaser (Senior Fellow in the Security Studies Program, Massachusetts Institute of Technology) gave presentations on Theories of Nuclear Deterrence and Compellence, and Dr. KURITA Masahiro (Senior Fellow, Policy Simulation Division, National Institute for Defense Studies) conducted the discussion with the panelists.

Dr. Khan gave a presentation titled "The Return of Cold War Nuclear Deterrence Theories in South Asia." Regarding the view which argues the applicability of the theories on nuclear deterrence developed during the Cold War era to South Asia, he pointed out that there are differences between the U.S.-Soviet rivalry and the Pakistan-India rivalry. One is the risk of crisis escalation. Unlike the U.S. and the Soviet Union, Pakistan and India had three military conflicts before acquiring nuclear weapons, and border skirmishes occurred even after acquiring them, and also they are geographically adjacent. The risk of escalation is therefore higher.

Another difference he pointed out was that the U.S. and the Soviet Union built a state of balance by maximizing the number of nuclear forces they had, but Pakistan and India have pursued "credible minimum deterrence." Furthermore, he touched on the fact that it is sometimes argued that the "minimum deterrence" concept is being changed and that Pakistan's "full spectrum deterrence" concept has been mentioned in that context. He said that such a view is based on the mistaken understanding that this concept means

a numerical augmentation of deterrence. Then he expressed the view that the purpose of the concept is to take effective countermeasures to eliminate the deterrence gap, thereby increasing the credibility of nuclear deterrence.

He also pointed out that India has begun to place more importance on a compellence strategy than on nuclear deterrence, and noted that there is a view within India that "the policy should be changed from 'no-first use' to 'first use'." He also touched on India's counterforce targeting strategy and the enhancement of its capabilities to achieve this, mentioning that India is developing various missiles and mentioning the possibility of advancing the development of technologies for enhancing precision and remote sensing technologies.

Then he pointed out that a very dangerous and complex situation has emerged in South Asia that could lead to the mutual assured destruction (MAD) scenario discussed during the Cold War. He went on to say that although there are differences between the U.S.-Soviet relationship and the current situation in South Asia, the broad outline of the Cold War era concept of nuclear deterrence also applies to South Asia. In other words, he said that there is no rationality in adopting compellence or a counterforce targeting strategy, and that the significance of the nuclear revolution is that the fear of mutual assured destruction will lead to mutual restraint and the realization of nuclear peace.

Moreover, he noted that contemporary challenges such as terrorism, chemical and biological weapons, cyber, and the development of advanced emerging technologies may undermine nuclear deterrence, and that nuclear-weapon states are required to take responsible initiatives, including addressing these challenges, to prevent problems from escalating into a nuclear exchange.

Next, Dr. OHNISHI gave a presentation titled "Compellence by Nuclear Threats: Features and Trends." He began by saying that compellence is the strategy of demanding that the other party take a certain action and trying to get them to accept one's demands by imposing costs or threatening to forcibly realize the demanded status if they do not comply. Compellence is a strategy for changing the status quo and can include the actual use of military force. In this respect, it differs from deterrence which is a strategy based solely on a threat that aims to maintain the status quo by demanding that the other party not do something. However, he said that even though it is a strategy for changing the status quo, compellence always aims to manipulate the other party's cost–benefit calculations and make them choose to take the action demanded by our own side, and that in the case that the objective ends up being achieved by force, it means that

compellence has failed.

He raised the fact that one of the key points for successful compellence is ensuring the credibility of the threat, and that this is particularly problematic in the case of nuclear threats, where the seriousness of the threat tends to be doubted. He went on to explain that two methods which have been discussed for giving credibility to threats of the use of nuclear weapons are the "madman theory," which makes the other party believe that the person making the threat is not making rational decisions, and "brinksmanship," which increases the risk of unintentionally provoking a nuclear war.

Moreover, regarding the effectiveness of the nuclear compellence strategy, he pointed out that existing research has shown both skeptical positions and optimistic positions regarding its effect. Then he introduced one study which cited 13 clear examples of nuclear compellence but in most of the examples the nuclear compellence was assessed as having failed. He noted that nuclear compellence has not been successful in the most recent examples of nuclear compellence, the Korean Peninsula Crisis which started in 2017 and the ongoing Russo-Ukrainian War, and that it is an extremely difficult strategy to execute. On the other hand, he said that the Cuban Missile Crisis and the Sino-Soviet Border Conflict can be considered examples of successful nuclear compellence, making them the exceptions to the rule, but there is room to deepen discussions regarding the factors behind their success.

He predicted that nuclear-armed states would continue to use nuclear weapons not only for deterrence but also for compellence, and raised the need for further research into and accumulation of knowledge regarding the factors behind the success of the nuclear compellence strategy and the effectiveness of such a strategy.

Next, Dr. Glaser gave a presentation titled "The Continuing Applicability of Nuclear Deterrence Theory." He began by emphasizing that the nuclear deterrence theories established during the Cold War era are still applicable today, when changes in the strategic environment have been indicated. In other words, according to him, the deterrence theories constructed during the Cold War era provide a general logic, not a logic only for special situations such as nuclear or bilateral rivalries. Therefore, he explained, they are also applicable to deterrence environments in which countries lacking assured destruction capabilities are involved, meaning that MAD has not been established, and to situations involving three or more countries.

Based on this premise, he mentioned the main nuclear strategic challenge facing the United States today. Namely, the expansion and modernization of China's nuclear forces

means that there is a possibility that the United States will face two major nuclear powers, China and Russia. He pointed out that the idea in the United States that it should increase its damage-limitation capability, with attacks on China's nuclear forces in mind, is based on concern about this issue. He also pointed out that that kind of argument has a logical flaw. Namely, if based on the logic of nuclear deterrence theory that is still applicable today (the logic of countervalue attacks under MAD), the United States has sufficient deterrence even without retaining its damage-limitation capability against the nuclear forces of China and Russia.

Based on this idea, he asserts that the United States should not pursue damage-limitation capability with China in mind. The maturation of China's nuclear forces is degrading the United States' damage-limitation capability, which reduces the United States' deterrence in the context of deterrence against attacks by conventional forces. However, even if damage-limitation capability is pursued to deal with this, it is possible that China will counter that capability, and the development of damage-limitation capability will entail considerable costs. Moreover, damage-limitation capability not only incurs those kinds of costs, but also entails the risk of increasing escalation pressure in serious international crises and conventional wars. Given the applicability of nuclear deterrence theory to the modern era, while acknowledging the existence of changes due to technological innovation, he argued that most of the logic of deterrence would remain unchanged, even in the modern situation where the United States faces two major nuclear powers, China and Russia.

Session 2's discussion began with questions from Dr. KURITA regarding the three presentations.

Dr. Khan was asked how we should understand the concept of strategic stability in South Asia and whether it differs from the definition and understanding during the Cold War era. Furthermore, he was asked whether Pakistan's full spectrum deterrence is an attempt to ensure deterrence by making it possible to wage and win a limited nuclear war, and how strongly Pakistan is concerned about a preemptive strike, given that Pakistan's development of forces does not seem to be driven by strong concerns about the survivability of second-strike capabilities, despite the indication of concerns about a first strike from India.

Dr. Khan's succinct response was to express the view that strategic stability is when two nuclear powers ultimately trust each other and do not use nuclear weapons or go to war. He also presented the thought that the theories of the Cold War era are applicable

to South Asia as well. He explained that although the term "full spectrum deterrence" is used, this does not mean a change to the strategy officially called minimum deterrence. Finally, he expressed the view that Pakistan is trying to secure a certain degree of second-strike capabilities by developing sea-launched cruise missiles and other weapons, but that they are not at an assured level.

Furthermore, Dr. OHNISHI was also asked whether Schelling is still an appropriate reference point today, and whether there have been any developments in compellence theories since Schelling. It was also pointed out that empirical research on nuclear compellence faces challenges, such as how to define nuclear compellence and how to determine whether nuclear threats have caused behavioral change. Moreover, he was asked whether there are any discussions about the impact of differences in nuclear postures on effectiveness in the context of nuclear compellence, given that deterrence research has in recent years been discussing how differences in the nuclear postures of the parties affect the effectiveness of deterrence.

Dr. OHNISHI responded that while Schelling's research remains an important reference point, a variety of advances in the theory of compellence have been seen in subsequent studies, such as the interest in the effects of reputation and audience costs, and the issue of whether the threat of punishment or threat of denial is more useful. He also acknowledged the difficulty of the challenges faced by empirical research on compellence, and stated that, given the reality that the number of nuclear compellence cases is extremely small, a realistic and flexible approach would be to conduct a provisional analysis using somewhat loose criteria for what is regarded as a nuclear threat and what is regarded as successful compellence, and to hope for research in later years based on newly available evidence. He then expressed the view that nuclear postures and strategies also affect the success or failure of compellence. In other words, he pointed out that the risk of losing control of the situation, which is the focus of brinkmanship in compellence, can be manipulated by the degree of delegation of authority to field commanders, etc.

Finally, in addition to a question about the definition of strategic stability during the Cold War era, Dr. Glaser was asked to what extent it can be argued that the behavioral pattern of pursuing damage-limitation capability can be applied to nuclear powers other than the major powers, and whether damage-limitation is the kind of strategy that any nuclear power would aspire to if their resources allowed. Moreover, he was asked whether, in the case that China continues to increase its number of warheads, the purpose of this increase could go beyond securing second-strike capabilities and even potentially be the pursuit of counterforce capabilities against the United States.

Dr. Glaser expressed the view that there is still debate today over the definition of the term "strategic stability," and that it would be wise to avoid using it. He said that it would be more constructive to use terms with more precise definitions, such as crisis stability or first-strike stability. Next, with regard to the problem of whether the argument regarding damage-limitation capability applies to small countries, he expressed the view that this is on a case-by-case basis. Finally, with regard to the purpose of China's buildup of its nuclear forces, he expressed the view that at present its damage-limitation capability with respect to the United States is not sufficient.

From the audience, a question was asked about the security implications of the imbalance in short- and medium-range missile forces between the United States and China. Dr. Glaser presented the thought that the circumstances under which such weapons would be used would be extremely limited. On the other hand, Dr. Khan, drawing on the South Asian context, stated the thought that there was a possibility that the enhancement of precision-guided capabilities could clarify the blurry line between counterforce attacks and countervalue attacks.

Part I
Nuclear Deterrence and Arms Control

Chapter 1
Deterrence and Arms Control in an Era of Rapid Technological Change

Daryl G. Press

Nuclear weapons have been in the news recently. Provocative nuclear threats from Russia, delivery system improvements by North Korea, and a major nuclear expansion by China have made deterrence and arms control more politically salient than at any time for decades. But as noteworthy as those events are, the more significant and longer-term changes in the nuclear landscape have attracted less attention. The unprecedented technological changes that are sweeping through all aspects of society, and through every corner of the global economy, are also having powerful effects on nuclear deterrence.

The sources of these changes are familiar: the computer revolution is unleashing waves of improvements in guidance systems, automation, data processing, and remote sensing. No one should be surprised to read that artificial intelligence (AI) is being used to search for mobile nuclear delivery systems, or that autonomous submersibles are hunting for submarines, or that modern guidance systems create pinpoint accuracy.

But what is not widely appreciated, even throughout the nuclear community, is how the cumulative impact of these technological changes is challenging the core assumptions of deterrence strategies, force posture, and arms control. In the new age of counterforce, many of the old assumptions about how to create stable nuclear deterrence need to be reevaluated.

In the first section of this paper, I summarize the core claims of nuclear deterrence theory, and I argue that significant increases in force vulnerability will complicate deterrence and arms control. The next section describes the implications of advanced accuracy for nuclear deterrence, including some non-intuitive implications. The third section summarizes some of the major changes in remote sensing, as they affect nuclear weapons and deterrence. The last section of the paper explores some of the implications of changing technology for deterrence and arms control.

The Logic of Nuclear Deterrence

At its core, deterrence theory claims that nuclear war will be deterred if countries believe that launching a nuclear attack on an enemy will trigger a devastating retaliatory blow in return. That condition will be met as long as nuclear-armed countries possess a sufficiently-survivable force so that they can (a) absorb a disarming strike, and (b) *subsequently* inflict unacceptable damage on those who attacked. Nuclear deterrence therefore rests, at its core, on the concept of survivable retaliatory forces.

To be clear, maintaining survivable retaliatory forces is not the only thing a country must do to deter its enemies: for example, a country must demonstrate the will to retaliate as well as the capability.[1] But maintaining forces that are sufficiently survivable to absorb an attack and subsequently inflict an unacceptable retaliatory strike on the attacker is the foundation of a robust deterrent.

The good news about nuclear weapons is that they are uniquely well-suited for deterrence for three reasons. First, nuclear weapons are small and therefore easy to hide. As a result, finding an enemy's nuclear weapons to destroy them is very difficult. Second, nuclear weapons are highly destructive per unit. The implication is that a country that wishes to disarm a nuclear-armed enemy must find and destroy nearly *all* of the enemy's weapons. Missing even a few of them could be catastrophic. And third, nuclear weapons are easy to deliver: in the missile age, defenses are leaky.[2]

Taken together, these three physical attributes explain why a successful disarming strike against a nuclear rival is very difficult: it is difficult to find his weapons, and yet you must find them all. And any weapons that survive a disarming attack will be deliverable against one's homeland. Love them or hate them, nuclear weapons are the ultimate tool of deterrence.

Experts on nuclear deterrence disagree about many things. For instance, they disagree about *how probable* nuclear retaliation must be to make nuclear deterrence sufficiently robust. Those on the "optimistic" side of the continuum often argue that even a vulnerable nuclear arsenal will have a large deterrent effect, because even a small

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1 Demonstrating that one has the will to retaliate is not always simple, especially if one is trying to use nuclear threats to deter attacks on an ally (i.e., extended deterrence), or to deter other attacks that do not in themselves raise existential risks. The issue of "will" is important and runs throughout the deterrence literature, but it rests on top of the core question of *capability*: can a force survive and retaliate?

2 Keir A. Lieber and Daryl G. Press, *The Myth of the Nuclear Revolution: Power Politics in the Nuclear Age* (Ithaca, NY: Cornell University Press, 2020), 15.

probability of suffering terrible retaliation will deter most rational actors from attacking.[3] Those on the more "pessimistic" side disagree; they point out that nuclear deterrence must succeed even against the most aggressive enemies, and even in dark times, for example during an intense crisis or a war, or even when an enemy is enraged and desperate. These scholars argue that for deterrence to be truly reliable, in even the most extreme circumstances, retaliation should be "assured."[4]

Similarly, optimists and pessimists disagree about how much destruction must be threatened in order to convince all potential attackers that the consequences are too horrendous to face. Optimists say that merely threatening a couple of enemy cities is plenty to deter; pessimists say that a threatened retaliatory strike must be far greater to ensure that deterrence holds in any conceivable situation.[5]

Where most nuclear experts agree, however, is that changes that make nuclear forces significantly more vulnerable to destruction are worrisome. Those changes are worrisome for two distinct reasons. First, they may tempt countries during crises or wars to attempt disarming strikes. Second, the *fear* that an enemy may launch a disarming strike will cause (a) arms races, (b) alerted nuclear postures, (c) mutual distrust, and (d) the conditions for escalation during periods of heightened tension (due to the heightened mistrust and the opportunity to weaken the enemy's nuclear arsenal).

Concerns about the consequences of nuclear force vulnerability are particularly important today because the world is undergoing a set of technological changes that are greatly reducing the survivability of nuclear forces. These technological changes are not being adopted evenly by all countries; the U.S. is a leader in many of them. But many of

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[3] The view that vulnerable nuclear arsenals will adequately deter is widely held among many deterrence theorists, including McGeorge Bundy, Kenneth Waltz, and Richard Ned Lebow. The view is nicely captured by Avery Goldstein, who writes, "Nuclear-armed states do not need to convince a potential aggressor that retaliation is certain, or even likely, only that it is possible…." Avery Goldstein, *Deterrence and Security in the 21st Century: China, Britain, France, and the Enduring Legacy of the Nuclear Revolution* (Stanford, CA: Stanford University Press, 2000), 44-46.

[4] Although many academic deterrence theorists subscribe to the "optimistic" view, nuclear armed countries have nearly-universally rejected that view for their own forces. The United States and the Soviet Union (now Russia) have always based their deterrent posture on the concept of assured destruction. Additionally, the United Kingdom, France, India, Pakistan, Israel, and North Korea seem to agree. For years the exception was China, which fielded a vulnerable arsenal and explained that, in its view, "assured retaliation" was unnecessary. Interestingly, that situation has changed; as China became more powerful and geopolitically active, it began to create a true "assured destruction" posture.

[5] See the discussion of the logic behind four competing views – existential deterrence, minimum deterrence, assured retaliation, and assured destruction – in Lieber and Press, *The Myth of the Nuclear Revolution*, 33-41.

the key technologies are diffusing around the globe. Taken together, these changes have critical implications for deterrence and arms control.

Changing Technology and Nuclear Weapons

In this section, I describe the major technological changes underway by focusing on two areas: improvements in accuracy and remote sensing.

The Age of Pinpoint Accuracy

The accuracy revolution has transformed conventional warfare *gradually*. The first "precision guided munitions" were employed more than 50 years ago by the United States during the Vietnam War, but it was not until the 21st century that guided weapons became the "normal" munition for U.S. air and naval forces. In other words, it took five decades from the first TV-guided missiles hitting a bridge in Vietnam until the moment we have reached today, in which virtually every munition fired by the U.S. Air Force or Navy is guided by digital links, laser designators, or GNSS systems.[6] And even today, most U.S. land-warfare munitions remain unguided.

The application of precision guidance to the nuclear domain has been even slower. In the United States, nuclear delivery systems generally do not depend on signals from external sources.[7] There are at least three reasons for this restriction. First, external navigation systems – like GPS and the other GNSS constellations – may not be available in a nuclear environment.[8] Second, signals – for example from data links or GNSS – may be vulnerable to manipulation. And lastly, making a nuclear weapon capable of receiving signals opens an "attack surface" on the weapon that enemies could use to corrupt the delivery system itself. As one expert in the nuclear enterprise commented, "I wish our enemies would allow their nuclear weapons to receive midcourse navigation updates; we'd be in there in a minute."[9]

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[6] GNSS stands for global navigation satellite system, such as GPS, Galileo, BeiDou, GLONASS, Michibiki, GINS, and others.

[7] An exception is that U.S. ballistic missiles use stellar navigation to update their position after boost phase.

[8] Key navigation systems may be intentionally targeted during a nuclear conflict, and therefore nuclear delivery systems are not permitted to depend upon them. In fact, nuclear detonations may disrupt the electromagnetic environment and degrade guidance systems even if the navigation infrastructure is not directly attacked.

[9] This is nearly an exact quote (I was not taking notes during the conversation).

Despite the (wise) reluctance to allow nuclear delivery systems to depend on guidance information from external sources, the accuracy revolution is coming to nuclear weapons. Improvements in gyroscopes, accelerometers, magnetometers, digital scene matching, and other techniques have greatly increased the accuracy of nuclear-armed ballistic missiles, cruise missiles, and bombs. In the mid-1980s, the most advanced U.S. ballistic missile had an accuracy of 183 meters. By 2010, the average "miss distance" for U.S. ballistic missiles was down to 90-120 meters.[10] And recent upgrades have reduced those distances again to approximately 60 meters.[11] U.S. nuclear bombs (as opposed to ballistic missiles) are even more accurate, with the upgraded B61-12 reportedly having "near GPS" accuracy (perhaps 30 meters) without relying on GPS.

But what is the impact of these accuracy improvements on deterrence? The revolution in accuracy is greatly increasing the ability of countries to conduct disarming strikes against enemy nuclear forces, weakening the foundation of deterrence.

Improved accuracy has at least five major effects on nuclear deterrence:

1. Pinpoint accuracy increases the effectiveness of strikes against hardened targets. In 1985, a 2-on-1 strike using warheads from a U.S. Minuteman III against a Russian missile silo had roughly a 79% chance of success. Against the same target today, two warheads would have (approximately) a 96% chance of success.[12]
2. Pinpoint accuracy allows countries to employ multiple weapons against a single target. Until recently, countries could employ at most two ballistic missile warheads against each target because of fratricide concerns. The accuracy revolution has greatly reduced fratricide risks, allowing for 3-on-1 (or more)

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[10] These figures reflect the "circular error probable" (CEP) of the missiles, which is the median miss distance. By definition, half the weapons fired at a target will fall within 1 CEP of that target, and half will fall further away. A smaller CEP means a more-accurate missile. For data on U.S. missile accuracy, see Keir A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence," *International Security*, Vol. 41, No. 4, Appendix Table A1 and footnote 3.

[11] The United States upgraded its Trident II and Minuteman III ballistic missiles with variable height of burst fuzes, which improve those missiles' effectiveness against hardened targets to a degree that is roughly equal to a 40% improvement of accuracy. On the fuzes, see Hans M. Kristensen, Matthew McKinzie, and Theodore A. Postol, "How US nuclear force modernization is undermining strategic stability: The burst-height compensating super-fuze," *Bulletin of Atomic Scientists*, March 1, 2017. See also, Lieber and Press, "New Era of Counterforce," pp. 23-24 and Appendix pp. 3-6.

[12] These calculations assume a silo hardness of 3,000 psi and a warhead yield of 335 kilotons. The 1985 missile is a Minuteman III with 183 meters CEP; the current version of the missile has an upgraded guidance package and approximately 120 meters CEP. The 96% figure *does not account for the benefits of variable height of burst fuzes*. For the calculations and underlying data, see Lieber and Press, "The New Era of Counterforce," pp. 19-21 and Appendix pp. 1-2.

targeting. This change has received little attention, but it has had a huge effect on force vulnerability, making complete disarming strikes against large target sets possible for the first time since the 1950s.[13]

3. Pinpoint accuracy allows attackers to destroy hard targets with small-yield nuclear weapons. Until recently, striking hardened targets required high-yield nuclear weapons. As accuracy improves, countries can destroy very hard targets with low-yield weapons, allowing attackers to significantly reduce collateral damage.[14]
4. Pinpoint accuracy allows attackers to destroy hard targets with airbursts. Throughout the Cold War, destroying hard targets required ground burst detonations, which create substantial nuclear fallout. Very high accuracy allows countries to destroy hard targets with airbursts, which would create little or no fallout, greatly reducing the civilian consequences of nuclear strikes.[15]
5. Pinpoint accuracy allows attackers to destroy hard targets with conventional weapons. As accuracy continues to improve, nuclear targets will increasingly be vulnerable to attacks with conventional (non-nuclear) weapons, reducing civilian casualties even further and possibly lowering inhibitions to disarming strikes. The implications of conventional counterforce for arms control are substantial and described below.

In sum, nuclear delivery systems are now far more accurate, and the implication for force survivability is significant. Hard targets can now be destroyed reliably by using multiple strikes, comprising of low-yield weapons, and in some cases they can be set to detonate as airbursts. In the near future, it will be possible to conduct counterforce strikes

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[13] For an excellent explanation of nuclear fratricide, see Bruce W. Bennett, "How to Assess the Survivability of U.S. ICBMs" (RAND Corporation, 1980). For an explanation of why the accuracy revolution greatly reduces the fratricide problem, see Lieber and Press, "The New Era of Counterforce," pp. 21-22 and Appendix p. 3.

[14] The destructive radius of a nuclear detonation depends on the warhead's yield *raised to the one-third power*. As a result, if accuracy improves by 50% (for example, from 180 meters CEP to 90 meters), targetters could have the same effectiveness against a hardened target using a warhead with 1/8th the yield as before the accuracy upgrade. Note that the accuracy of U.S. ballistic missiles has improved by approximately 50% twice since 1985. As a result, warheads with approximately *1/64th of the yield* would have the same effectiveness against hardened targets as their Cold War predecessors. This helps explain why the United States is now deploying very low yield warheads on its ballistic missile submarines. For the formulas to derive these calculations, see Lieber and Press, "The New Era of Counterforce," Appendix p. 1, which relies upon Lynn E. Davis and Warner R. Schilling, "All You Ever Wanted to Know about MIRV and ICBM Calculations but Were Not Cleared to Ask," *Journal of Conflict Resolution*, Vol. 17, No. 2 (June 1973): 207-42.

[15] See Lieber and Press, "New Era of Counterforce," pp. 27-32 and Appendix pp. 6-7.

with mostly conventional weapons. Strategies of deterrence and arms control need to account for the new age of accuracy.

Revolutions in Remote Sensing

While advances in accuracy are making hardened nuclear targets more vulnerable, leaps in remote sensing are undermining the survivability of concealed and mobile forces. In the ongoing game of "hide and seek" waged by mobile missile commanders and submariners against the forces seeking to track them, the job of the "hiders" is growing more difficult.

At least five mutually reinforcing trends are ushering in an age of unprecedented transparency.

1. New sensor platforms. Sensor platforms have become more diverse. The foundations of Cold War remote sensing – satellites, manned aircraft, submarines, and undersea hydrophones – are still crucial, but now they are aided by new platforms, among them unmanned aerial vehicles (UAVs), unmanned undersea vehicles (UUVs), unattended ground sensors, cyber spying, and more.
2. New types of intelligence. Cold War strategic intelligence relied heavily on photoreconnaissance, underwater acoustics, SIGINT, and ELINT, which all remain central to strategic reconnaissance operations. Now, however, sensors gather much broader ranges of data. Sensors have moved from relying mostly on the visible parts of the electromagnetic spectrum and infrared to exploiting the entire electromagnetic spectrum. Additionally, platforms now use spectroscopy to identify the vapors leaking from facilities; other satellites employ interferometry to discover underground facilities, and synthetic aperture radar (SAR) to track moving targets. And unattended ground sensors use seismic, acoustic, and radiological sensors to identify vehicles and in some cases their cargo near critical sites.
3. Sensors and the platforms that carry them perform better than they did in the past. Sensor resolution is steadily improving. Increasingly, U.S. sensors are carried on platforms that can provide persistent surveillance of critical adversary sites (e.g., through long-endurance UAVs circling outside enemy airspace, or through UUVs operating near or inside enemy waters). Persistent observation provides streams of data rather than snapshots, which is essential for characterizing enemy operational patterns in peacetime, and for tracking their forces during crises or wars.
4. Leaps in computer processing power. Perhaps most importantly, dramatic

increases in computer processing power are allowing better analysis of the large quantities of remote sensing data that is being gathered on nuclear forces. AI is helping to sort raw intelligence data and identify concealed and moving targets among the background noise. Sceptics caution that early AI algorithms were vulnerable to spoofing. But the *essence* of AI and machine learning is detecting subtle patterns amidst a sea of noise. As AI algorithms improve, and are trained using more and more data (e.g., of submarine or mobile missile signatures), and as processor speed continues to increase, the challenges for those whose job it is to hide submarines and missile launchers will continue to increase.[16]

5. The future of sensing? Lastly, countries are just now starting to explore the first generation of "quantum sensors," which hold the promise of greater sensing capabilities than is possible using traditional techniques. Some of the applications of quantum sensing are in the undersea domain. There is debate among experts about how difficult it will be to build robust, reliable quantum sensors, but even those on the skeptical side of that debate estimate that the deployment of relatively mature quantum sensing systems will occur in roughly a decade. Ongoing research in quantum computing will likely accelerate the development, deployment, and capabilities of quantum sensors.

Finally, missile defenses, which do not fit neatly into the "accuracy and sensing" framework, are witnessing major breakthroughs that, combined with accuracy and sensing, are stressing the "survivable retaliation" logic of deterrence.[17] Vast improvements in the sensitivity of missile defense radars (e.g., the new SPY-6) do not merely allow defense systems to track and engage smaller and more distant targets; they greatly increase the "footprint" of defense systems, meaning the area that a system can protect.

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[16] There is a debate about whether AI can be employed equally effectively for spoofing. See for example Edward Geist, *Deterrence Under Uncertainty* (Oxford, 2023), chapter 5. Even skeptics of AI, however, concede that the operators of nuclear forces will have less confidence in the survivability of their own nuclear systems.

[17] One missile defense breakthrough that has already occurred is the use of gallium nitride semiconductors in U.S. sea-based missile defenses (e.g., the SPY-6 and the EASR) to increase the radar sensitivity by *35 times*. One result of the increased sensitivity is the great expansion of the "footprint" that a missile defense system can protect, allowing a small number of sea-based platforms to protect continent-sized areas (like the United States). This breakthrough, in conjunction with possible progress in decoy differentiation (by observing frequency variations among objects of different mass) will not create impenetrable defenses, but they are undermining the retaliatory capability of nuclear forces (e.g., after absorbing a disarming strike). I thank Jaganath Sankaran for bringing this to my attention. See Kris Osborn, "Nothing Will Be Able to Hide from the Navy's New Spy-6 Radar," *The National Interest* (July 12, 2022).

Additionally, guided by longer-range radars, missile defenses are expanding their ability to conduct "shoot-look-shoot" engagements, which are key to improving the effectiveness of defenses against medium-sized (or bigger) attacks.

In short, missile defenses complement the capabilities described above. Accurate missiles (described above) are straining the ability of small- and medium-sized arsenals to survive disarming strikes. Advanced sensors are putting mobile nuclear systems at risk. And improved missile defenses are, for the first time, creating real possibilities that defenses can "mop up" those few weapons that survive an attack. Building a survivable nuclear deterrent in this environment is not impossible, but it takes more care than it did a few decades ago.

It is likely that none of these technological trends alone will be transformative. But taken together, they are creating a combination of accuracy, sensing, and defenses that were unimaginable even two decades ago. The accuracy revolution is already here; the sensing revolution is unfolding. Combine them with improvements in missile defense and we have a world in which the old assumptions about deterrence and arms control need to be carefully scrutinized.

Implications: Deterrence and Arms Control in the 21st Century

Even with these technological changes, it is possible to build force structures and deterrence postures that will create a robust deterrent, and to do so without dangerous policies like "launch on warning" or major force expansions that would trigger an arms race. But doing so will require care and a willingness to reconsider old approaches. I offer five tentative suggestions and observations about arms control and deterrence below.

1. Smaller is not always better. For decades, the arms control community was wedded to the idea that reducing the size of nuclear arsenals reduced the likelihood of nuclear war. There was good reason to hold that belief during the Cold War, when the superpowers had tens of thousands of weapons at high degrees of readiness. But arsenals around the world are much smaller today. In an era of pinpoint accuracy, revolutionary sensors, and improvements in missile defenses, reducing arsenal sizes may actually increase countries' vulnerability to disarming strikes, and hence elevate nuclear dangers, especially during conventional wars and nuclear crises.
2. Symmetry may not be safe. For decades, symmetry was an important tool that arms controllers used to create safe, stabilizing arms control agreements – but the

accuracy revolution makes symmetry a less effective tool in the future.

In the past, symmetrical nuclear reductions allowed countries to reduce arsenals while maintaining survivable retaliatory forces. Symmetrical arms cuts enhanced security because during the Cold War, only nuclear weapons could destroy hardened nuclear sites. As a result, reducing forces eliminated sites that would need to be destroyed in a disarming attack (which weakens deterrence), but also eliminated the weapons that were necessary to carry out an attack (which strengthens deterrence). In fact, because several weapons are typically required to destroy each hardened site, cutting forces symmetrically could make arsenals less vulnerable to attacks. Hence, arms control reduced the incentives for disarming strikes through symmetrical reductions.

The problem is that as conventional weapons become better for disarming strikes, agreements that leave two adversaries with small, symmetrical arsenals may leave them both vulnerable to disarming strikes – with conventional weapons leading the way. Symmetry is no longer a guarantee of survivability.[18] Stated differently, arms cuts now reduce the number of targets that must be destroyed but do not limit the weapons that can conduct those strikes (because many of them are conventional). A critical tool in the arms control tool kit is therefore now much weaker.

3. Do not fall in love with submarines. Throughout most of the Cold War, knowledgeable academics, think tank experts, and former government officials frequently asserted that the superpowers' submarine forces were essentially invulnerable, and therefore both superpowers possessed a secure retaliatory capability. We now know this was incorrect. In fact, there were periods of the Cold War in which the United States was tracking and trailing all Soviet submarines.[19] Equally importantly, the Soviet Union often did not know the state of the naval balance at any given time. Submarines have a "fail-deadly" quality: a set of technological and operational breakthroughs may transform the most survivable leg of a country's nuclear arsenal into the most vulnerable leg – without any signs that such a transformation has occurred.

   Are submarines survivable today? If the Cold War is a guide, the answer likely

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[18] This problem is even worse in an age of nuclear tripolarity.

[19] See, for example, Austin Long and Brendan Rittenhouse Green, "Stalking the Secure Second Strike: Intelligence, Counterforce, and Nuclear Strategy," *Journal of Strategic Studies*, Vol. 38, Nos. 1-2: 38-73. See also the various first-person accounts of U.S. anti-submarine warfare efforts during the Cold War.

depends on the specific submarine force, the training and skill of their crews, and the state of the back-and-forth technological arms race in undersea sensing.

Will submarines remain survivable in the future? Again, the answer undoubtedly depends on the countries involved: those doing the hiding, and those doing the hunting. But what seems clear is that in an era of unprecedented technological change, and in a time in which the leading military powers are investing great sums in sub-surface operations and sensing, basing one's nuclear deterrent on the assumption that large tubes of metal will forever remain invisible seems like an unwise gamble.

The answer, of course, is not to eliminate submarines but to build a balanced force structure in which submarines and other forces combine to create a difficult target set. Submarines are a key part of a secure nuclear deterrent, but not a solution by themselves.

4. Evaluate *systems* of sensors – not individual technologies. Well-meaning arms control advocates seem motivated to demonstrate that each new technology (developed, in many cases, precisely for the purpose of hunting mobile targets) cannot possibly work. They often reach this finding by highlighting limitations to first-generation technologies, and by modeling new sensors' capabilities *independently* rather than as part of a sensing / hunting system.

The Cold War provides useful information about how the United States hunts challenging, mobile targets. In both anti-submarine and anti-mobile missile operations, the U.S. approach had several key ingredients.

- Peacetime observation to learn adversary operating patterns, patrol areas, preferred routes, timing and means of communication, key waypoints, and more;
- Creation of systems of sensors, focused at strategic locations, to detect and if possible track adversary forces;
- Practice tracking and (if applicable) following deployed adversary forces.

The United States conducted operations like this against the Soviet submarine force for decades, and is probably doing similar things today in multiple regions. Hunting land-based mobile missiles requires different platforms and sensors, but the overall pattern is the same: peacetime surveillance using multiple platforms and sensors, monitoring chokepoints and waypoints, and using the adversary's own deterrent patrols (and alert behavior) to practice tracking.

The point is that the state of the balance – at any given moment – cannot be

precisely measured from outside the walls of a *few offices* inside the Pentagon (even the Russians and Chinese are probably not certain how survivable their deterrent forces are). But the direction of the balance seems clear: the revolution in sensing (and vast improvements in guidance systems and missile defenses) is giving much better tools to the hunters.

5. How to deter in the 21st century? How should a country approach deterrence in an era of unprecedented technological change? The answer is not new, but hopefully it is clarifying: An era of rapidly changing technology calls for a force structure that (1) includes diverse delivery systems, and (2) includes elements that are mobile and elements that present hardened targets.

   Diversity of delivery systems has always been valued in a nuclear force structure because it helps insure against unforeseen technological change. That consideration has never been more important than it is now. Additionally, a diverse nuclear posture means that potential attackers must solve several distinct problems: conducting highly-accurate strikes against the hardened targets, and also tracking and destroying mobile systems. Diverse target sets also create timing problems for an attacker: a successful attack on enemy mobile delivery systems may require time to unfold, giving warning that a broader attack is underway. And finally, having diverse forces can provide a sense of safety to those who field them, so they do not need to interpret ambiguous signs or warnings of attack in the most pessimistic way.

   There is one other attribute of a force that may be controversial – and is in tension with other things in this paper: it is valuable to have elements in a force that can be visibly alerted in ways that create additional force survivability. For the United States, having the ability to disperse its bomber force during a crisis permits Washington to signal (either quietly or openly) that it is concerned about the direction of a conflict – and thus taking steps to ensure the survivability of its arsenal. To be sure, alerting forces can be escalatory, but communication is valuable, especially during a crisis.

   What does a force with these attributes look like? For a country like the United States, which spends significant sums on national security, a modestly-sized diverse nuclear arsenal looks like the triad that the United States fields today, and which the United States is poised to modernize. Calls to eliminate the U.S. ICBM force are unwise, as they would rest the peacetime survivability of the U.S. arsenal entirely on the future of the submarine / ASW competition. One

could improve on the current U.S. triad by adding land-based mobile missiles to supplement the silo-based ICBM force (or replace some of the silos), but the political hurdles to that seem high.

For other countries, such as those with advanced technology but a limited defense budget, a pretty good, pretty survivable, and diverse nuclear arsenal could be built on either two or three legs, such as: (1) attack submarines with nuclear-armed cruise missiles, (2) air-delivered weapons stored in vaults under hardened aircraft shelters, and (3) mobile land-based missiles (which would have the advantage of adding ballistic missiles to the force, which would otherwise be only cruise missiles and bombs). To make a force like this more survivable, a country could build additional shelters and storage vaults to allow aircraft to disperse or move among a large number of hardened aircraft shelters to complicate enemy targeting.

In short, a survivable deterrent is feasible, but it is not simple and requires careful analysis and attention.

Trends in technology are complicating deterrence, and they raise real challenges for future arms control agreements. But deterrence is not hopeless – it simply requires greater care. The first step is to move beyond the slogans and assumptions from a different era, when arsenals were enormous, accuracy was poor, and sensors were primitive. None of those things is true anymore, so our policies and strategies must adapt.

The second step is committing ourselves to practice nuclear deterrence responsibly. Basing one's own security on the threat to use nuclear weapons is strategically and ethically defensible, but only if the strategy is executed with great care and seriousness. Simply assuming that nuclear arsenals will remain invulnerable, despite the lessons of history and the directions of technology, would be nuclear malpractice. A robust deterrent must be survivable, and survivability in an era of unprecedented technological change will require sufficient numbers, diversity, and care.

Chapter 2
Nuclear Deterrence and Arms Control: From the Perspective of Developments in New Combat Domains and Emerging Technologies

ARIE Koichi

Introduction

Today, the traditional combat domains of land, sea, and air are becoming increasingly strongly linked to newer combat domains such as space, cyberspace and the electromagnetic spectrum, and cognition. During Russia's invasion of Ukraine from February 2022, Ukraine's satellite communications have been subjected to cyber and electromagnetic attacks, disrupting Internet services and other telecommunications services.[1] Additionally, while not part of a military operation, it was reported that China engaged in large-scale cognitive warfare employing deep fakes, disinformation, and other means, to interfere with Taiwan's presidential election in January 2024.[2]

The impact of activities such as these in new combat domains is also beginning to impact the nuclear domain. In February 2024, there were reports concerning suspicions that Russia was developing a new nuclear weapon to use in attacks on space satellites.[3] While the space domain has been strongly linked to the nuclear domain since the days of the Cold War, technological advancements in recent years appear to be strengthening this linkage. Developments in the cyber domain are also now impacting the nuclear domain, as exemplified by the case of Stuxnet, which was uncovered in 2010. The Stuxnet malware was used to infiltrate centrifuge control systems at a uranium enrichment facility in Natanz, Iran, causing physical damage to over 1,000 centrifuges. The malware is believed to have been deployed, via a USB drive, to computers that were not connected

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1 Juliana Suess, "Jamming and Cyber Attacks: How Space is Being Targeted in Ukraine," RUSI, April 5, 2022; James Pearson, "Russia Downed Satellite Internet in Ukraine – Western Officials," *Reuters*, May 11, 2022.

2 Helen Davidson, "Cognitive Warfare and Weather Ballons: China Accused of Using 'All Means' to Influence Taiwan Vote," *Guardian*, January 9, 2024.

3 Johnny Franks, "Russia to Deploy Space-Based, Nuclear Anti-Satellite Weapon," *Warrior Maven*, February 18, 2024.

to the Internet.[4] In the electromagnetic domain as well, it has been suggested that directed-energy weapons could be used in the near future to disable the guidance and communications systems of theater-level nuclear weapons, rendering them ineffective.[5]

Advancements in emerging technologies such as artificial intelligence (AI), hypersonic weapons, and quantum technologies should also not be overlooked when considering the impact of developments in new combat domains. It has been pointed out that AI may be employed in space warfare in the future.[6] Emerging technologies can in this way act as enablers of conflict in new domains and they are expected to significantly influence developments in these areas. It is also expected that AI will come to be used in the cyber domain, and it is said that the use of advanced AI-based cyberattacks to hack nuclear-missile-armed strategic nuclear submarines (SSBNs) cannot be ruled out.[7]

In light of the fact that developments in these new combat domains and emerging technologies are now also having an impact on the nuclear domain, in this paper I would like to examine whether these developments will have a stabilizing or destabilizing effect on nuclear deterrence. Based on this, I will examine policy issues relating to the re-stabilization of nuclear deterrence should developments in new combat domains and emerging technologies lead to its destabilization, and conclude with additional remarks on arms control covering these domains and technologies.

Do Developments in New Combat Domains and Emerging Technologies Stabilize Nuclear Deterrence?

Of the systems used by nuclear powers to control their nuclear arsenals, it is NC3 (nuclear command, control, and communications) systems that are used for core functions such as early warning, command activity, and telecommunications, and many of the functions of these NC3 systems are dependent on satellites.[8] These satellites are vulnerable to physical attacks and electromagnetic or laser interference, and can also easily become the target of

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4 Bishr Tabbaa, "Zer0 Days: How Stuxnet Disrupted the Iran Nuclear Program and Transformed Computer Security," *Medium*, July 17, 2020.

5 Justin Anderson and James R. McCue, "Deterring, Countering, and Defeating Conventional-Nuclear Integration," *Strategic Studies Quarterly*, Spring 2021, p. 48.

6 Charles Beames, "AI in Space and Its Future Use in Warfare," *Forbes*, December 21, 2022.

7 James Johnson, "The AI-Cyber Nexus: Implications for Military Escalation, Deterrence and Strategic Stability," *Journal of Cyber Policy*, vol. 4, no. 3, 2019, p. 448.

8 Marie Villarreal Dean, "U.S. Space-Based Nuclear Command and Control: A Guide," Center for Strategic and International Studies, January 13, 2023, pp. 1-5.

cyberattacks. The various computer systems and telecommunications networks that form an NC3 system are themselves also vulnerable to attacks in new combat domains such as the cyber and electromagnetic domains.

To date, however, no significant attacks have been made on the NC3 systems of nuclear powers. One reason for this is perhaps the understanding among the countries concerned that any preemptive strike on an NC3 system in the space, cyber, or other new combat domain would inevitably provoke a severe retaliation. It has been posited, for instance, that, as both the United States and China have expanded their military capabilities in the space and cyber domains, they are becoming mutually vulnerable to attacks in these domains, and this may encourage both to refrain from carrying out such attacks.[9] In other words, the establishment of a certain level of mutual vulnerability in these new combat domains may encourage greater caution among the countries concerned and thereby contribute to increased crisis stability.[10]

The surprising level of difficulty involved in executing attacks in the new combat domains could also deter potential attackers. In the space domain, for example, one might deploy a satellite equipped with an electromagnetic wave generator on the same orbit as a target satellite and move it close enough to conduct an attack. In addition to the significant technical costs and limitations involved in an electromagnetic attack of this nature, however, it is also highly likely that any such unusually close-range maneuvers by an attacking satellite would be detected through SSA (space situational awareness) activities,[11] meaning the preparation and execution of the attack would entail a considerable degree of difficulty. With regard to cyberattacks against satellites, it would be difficult to accurately assess their effectiveness, and similarly to what has been seen with cyberattacks like Stuxnet in 2010 and NotPetya in 2017, there is a risk that malware could infect not only the target satellite but networks worldwide as well, including the networks of the attacking side.[12]

Integrating emerging technologies into NC3 systems could enhance ISR

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9 David C. Gompert and Phillip C. Saunders, *The Paradox of Power: Sino-American Strategic Restraint in an Age of Vulnerability* (Washington, D.C.: National Defense University Press, 2011), pp. 2-7.

10 Jacek Durkalec, Paige Gasser, and Oleksandr Shykov, "Multi-Domain Strategic Competition: Rewards and Risks," Workshop Summary, Center for Global Security Research, Lawrence Livermore National Laboratory, November 2018, p. 12.

11 Sitki Egeli, "Space-to-Space Warfare and Proximity Operations: The Impact on Nuclear Command, Control, and Communications and Strategic Stability," *Journal for Peace and Nuclear Disarmament*, vol. 4, no. 1, 2021, pp. 124-125.

12 James Timbie and James O. Ellis Jr., "Technology, Complexity, Uncertainty, and Deterrence," Kissinger Center Papers, May 2023, p. 18.

(intelligence, surveillance, and reconnaissance) capabilities targeting the nuclear weapon systems of adversaries, enhance the analysis of collected data, and also enable more appropriate decision-making concerning the use of nuclear weapons. If integrating AI into NC3 early warning systems could, for example, allow for a precise understanding of an adversary's nuclear posture, it would make it more difficult for the adversary to secretly prepare a nuclear strike. Since this would make it possible to correctly discern whether an adversary's nuclear threats were genuine, it would increase the reliability of deterrence and reduce the risk of accidental escalations during crises.[13] If high-sensitivity sensors based on quantum technologies could be used to measure variations in magnetic or gravity fields caused by SSBNs cruising underwater, it would likely become easier to detect and track them.[14] If quantum sensors can be used to detect the movements of an adversary's SSBNs, it would make calmer responses to nuclear threats possible and contribute to more appropriate decision-making concerning the use of nuclear weapons.

Do Developments in New Combat Domains and Emerging Technologies Destabilize Nuclear Deterrence?

Attacks in the new combat domains could conversely undermine the second-strike capabilities of nuclear powers, thereby destabilizing nuclear deterrence. As discussed above, NC3 systems are vulnerable to attacks in the new domains. If the various satellites that constitute these systems are destroyed or incapacitated, a nuclear power might lose the ability to execute a retaliatory nuclear strike. Cyberattacks that disrupt NC3 early warning systems, cut off communications so that nuclear attack orders cannot be received, or destroy the software of nuclear delivery systems rendering them unable to launch, could also weaken a nuclear power's second-strike retaliatory capabilities.[15]

The employment of emerging technologies could also lead to the destabilization of nuclear deterrence. It is conceivable that emerging technologies such as AI, hypersonic weapons, and quantum technology could be used to enhance the abilities of countries to detect, track, and precisely strike and destroy nuclear weapons, thereby weakening the second-strike retaliatory capabilities of adversaries and destabilizing nuclear deterrence.

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[13] Edward Geist and Andrew J. Lohn, "How Might Artificial Intelligence Affect the Risk of Nuclear War?" RAND Corporation, 2018, p. 21.

[14] Katarzyna Kubiak, "Quantum Technology and Submarine Near-Invulnerability," European Leadership Network, December 2020, pp. 3-9.

[15] Eva Nour Repussard, "Cyber-Nuclear Nexus: How Uncertainty Threatens Deterrence," Project on Nuclear Issues, CSIS, May 10, 2023.

According to one study, if the adoption of new technologies like AI, cloud computing, and data analytics makes it easier to detect and track the second-strike capabilities of nuclear powers, particularly mobile ground-launched nuclear missiles, nuclear deterrence could be destabilized. A specific concern is that, if a nuclear power moves or disperses its nuclear missiles to avoid detection and tracking by an adversary using an ISR system enhanced with AI and other technologies, the adversary might misinterpret these actions as a signal that the state is prepared to escalate to nuclear war, increasing their motivation to conduct a first-strike attack. There is also a risk that nuclear powers, fearing the weakening of their second-strike retaliatory capabilities due to the employment of AI, may seek to bolster their nuclear forces, triggering a nuclear arms race.[16]

Attacks in new combat domains could also potentially trigger unintended escalations or cause misinterpretations by the attacked party, developing into situations where nuclear weapons could be used. The United States, China, and Russia in particular are all enhancing counterspace and cyberattack capabilities that could be used to target each other's NC3 systems. All three nations understand that a surprise attack on their own NC3 systems using such capabilities would undermine strategic stability. During an international crisis, the military forces of these countries would likely intensify their monitoring activities to avoid missing any signs of impending attacks on their nuclear weapons systems. Under these circumstances, if a localized non-nuclear (conventional) conflict involving the United States, China, and Russia were to break out, it is conceivable that they might attempt to enhance the effectiveness of their own non-nuclear operations by employing counterspace or cyberattack methods to target the command and control systems supporting their adversary's conventional operations. In many cases, however, the command and control systems for conventional operations in these countries are also used to support their NC3 systems.[17] Thus, even if the intent is to avoid targeting an adversary's NC3 system and focus solely on non-nuclear command and control systems, the result could be an inadvertent attack on an NC3 system, increasing the risk of escalation to nuclear warfare.

There are concerns that, should emerging technologies be incorporated into nuclear weapons systems, the risk of unintended nuclear weapon use could increase due to

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16 Paul Bracken, "The Hunt for Mobile Missiles: Nuclear Weapons, AI, and the New Arms Race," Foreign Policy Research Institute, September 21, 2020.

17 Benjamin Bahney and Anna Peézeli, "The Role of Nuclear-Conventional Intermingling on State Decision-Making and the Risk of Inadvertent Escalation," NSI, November 2021, pp. 7-8.

misunderstandings, misperceptions, miscalculations, accidents, and so on.[18] In particular, the incorporation of AI into NC3 systems is seen as a particularly serious destabilizing factor for nuclear deterrence. AI is likely to be incorporated into four areas of NC3: communications, early warning systems, decision-making support, and automation of retaliatory strikes.[19] Of these, the use of AI in decision-making support and the automation of retaliatory strikes is particularly controversial. There are concerns that the decision-making algorithms of AI systems could lead to unintended actions, thereby increasing the risk of escalation into an accidental nuclear war.[20] An example of automation of retaliatory strikes is Russia's automated nuclear retaliation system, reportedly established during the Soviet era. The system is designed to respond automatically in the event that Russia's leadership is wiped out by a nuclear attack. It has been pointed out, however, that the system's sensors could misinterpret natural phenomena, such as a meteor strike, as a nuclear attack, potentially leading to unintended use of nuclear weapons.[21]

Policy Issues Relating to Re-Stabilization of Nuclear Deterrence

Given the potential destabilizing effects of developments in new combat domains and emerging technologies on nuclear deterrence, I would like to examine the policy issues relating to its re-stabilization. Let's first examine the stabilization of direct deterrence. First of all, work is required to foster shared understanding among the countries concerned regarding deterrence in new combat domains. It will be particularly crucial to work on developing an unspoken mutual understanding among countries about the activities in these new domains that can be tolerated and those that cannot. Until tacit mutual understanding on this is established to a sufficient degree, however, there is potential for some countries to attempt to justify extremely destructive attacks in the cyber domain, for example. There tends to be ambiguity and lack of clarity in the understanding among the countries concerned about the types of cyberattacks that are considered tolerable, and this could lead to unintended, accidental escalations. Prolonged competition in

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[18] Tosaki Hirofumi, "*Shinko Gijutsu to Kaku Yokushi Kankei*" (Emerging Technologies and Nuclear Deterrence Relationship), Japan Institute of International Affairs, March 30, 2021.

[19] Jill Hruby and M. Nina Miller, "Assessing and Managing the Benefits and Risks of Artificial Intelligence in Nuclear-Weapon Systems," NTI, August 2021, pp. 12-25.

[20] Amber Afreen Abid, "Artificial Intelligence in the Nuclear Age," Strategic Vision Institute, October 4, 2023.

[21] Anthony M. Barrett, "False Alarms, True Dangers? Current and Future Risks of Inadvertent U.S.-Russian Nuclear War," RAND Corporation, 2016, p. 11.

new combat domains between concerned countries could lead to relative power shifts, destabilizing the balance of power and potentially also resulting in armed conflict.[22] It would therefore be wise to establish a common framework to share with potential adversaries to help assess the types of attacks in new combat domains that could be considered proportional and the types that are more likely to provoke escalation.[23]

A second critical policy issue is the establishment of a system able to continuously monitor emerging threats in new combat domains and detect threats to NC3 systems at an early stage. The U.S. military has already established surveillance systems for the space and cyber domains, and conducts monitoring in the cyber domain and SSA activities on an ongoing basis. Not all threats to NC3 systems can be detected, however. While SSA capabilities relating to the monitoring of space debris and other objects to prevent collisions with satellites have improved, and the ability to detect physical attacks on satellites is presumably possible to some extent, detecting non-physical attacks could be difficult. Although the forensics techniques used in investigating cyberattacks have advanced, cyberattack techniques are also constantly evolving, which limits the effectiveness of forensic capabilities in the cyber domain.[24] Overcoming these challenges is likely to incur substantial costs, but investing in the early detection of a wide range of threats to NC3 systems in new combat domains, as well as in measures to prevent the destabilization of nuclear deterrence, should be regarded as essential.

Thirdly, measures must be taken to enhance the resilience of NC3 systems in order to counter the destabilization of nuclear deterrence. Strengthening the resilience of satellites and other space assets, is a particularly urgent issue, and it is also crucial for establishing a deterrence-by-denial posture. Specific measures include deploying decoy satellites and defensive escort assets in orbit and increasing the number of satellites.[25]

Next, with regard to the stabilization of extended deterrence, I will focus on countries under the U.S. nuclear umbrella that rely on the United States for extended nuclear deterrence. Firstly, it is necessary to consider responses to situations where attacks in new combat domains are directed not at the United States itself, but at countries

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[22] Michael P. Fischerkeller and Richard K. Harknett, "What Is Agreed Competition in Cyberspace?" *Lawfare*, February 19, 2019.

[23] Vincent Manzo, "Deterrence and Escalation in Cross-Domain Operations: Where Do Space and Cyberspace Fit?," *Strategic Forum*, no. 272, December 2011, pp. 3-7.

[24] Suzuki Kazuto, "*Anzenhosho no Kukanteki Henyo*" [Spatial Transformation of Security], Kokusai Mondai (International Affairs), no. 658 (January/February 2017): p10.

[25] Michael P. Gleason and Peter L. Hays, "Getting the Most Deterrent Value from U.S. Space Forces," Center for Space Policy and Strategy, October 2020, pp. 4-5.

under the U.S. nuclear umbrella. Possible scenarios include cases where the space assets of an "umbrella state" are subjected to non-physical attacks such as jamming or where its command and control systems are targeted by cyberattacks.[26] To avoid the destabilization of extended deterrence in such cases, the division of roles needs to be clarified as much as possible with regard to those cases that should be deterred or responded to as an alliance, and those that the umbrella state should handle independently.

Secondly, it is also important for umbrella states and the United States to maintain a shared understanding about the potential for emerging technologies to destabilize nuclear deterrence. When AI is incorporated into the NC3 system of the United States, for example, it would be preferable that there be consultations between umbrella states and the United States to discuss and align their perspectives on issues such as the NC3 functions that AI is to be used in and whether its introduction will destabilize nuclear deterrence. It would also be necessary to discuss issues relating to nuclear deterrence in cases where AI is incorporated into systems that support non-nuclear operations where these non-nuclear systems are also linked to NC3 systems. The United States is advancing the Joint All-Domain Command and Control (JADC2) concept, which is aimed at connecting all "sensors and shooters" in the U.S. military in real-time for combat purposes.[27] In the future, the JADC2 concept may be merged into a new command and control system that supports the U.S. military's non-nuclear operations, and the possibility that AI could be introduced into this system and then eventually linked to the NC3 system cannot be denied.[28] Given that, as mentioned above, the command and control systems supporting non-nuclear operations are also used to support NC3 systems, the incorporation of AI into the JADC2 system should be understood as an action that could also impact the U.S. NC3 system. Taking this into account, umbrella states ought to deepen discussions with the United States on the direction for extended nuclear deterrence in new combat domains.

Thirdly, from the perspective of umbrella states, it may be worth considering proposing an agenda for extended nuclear deterrence in the context of new combat domains and

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[26] Dean Cheng, "Prospects for Extended Deterrence in Space and Cyber: The Case of the PRC," Heritage Foundation, January 21, 2016.

[27] Kikuchi Shigeo, "*Chugoku no Gunjiteki Kyoi ni Kansuru Ninshiki Henka to Beigun Sakusen Konseputo no Tenkai: Togo Zen Domein Shiki Tosei* (JADC2) *o Chushin ni*" (China as the "Pacing Threat": Evolving U.S. Operational Concepts and Joint All-Domain Command and Control (JADC2)), Anzenhosho Senryaku Kenkyu (Security & Strategy) volume 2, No. 2 (March 2022).

[28] Michael Klare, "The Military Dangers of AI Are Not Hallucinations," *Foreign Policy in Focus*, July 14, 2023.

emerging technologies, and initiatives to incorporate this into their alliance's nuclear policy. NATO has, for this purpose, a framework for nuclear consultations based on the Nuclear Planning Group (NPG), in which nearly all NATO member states participate. While there are no multilateral frameworks like NATO's NPG in the Indo-Pacific region, umbrella states would likely be able to propose an agenda for extended nuclear deterrence in connection with new combat domains within the framework of their bilateral nuclear consultations with the United States.

Arms Control Relating to New Combat Domains and Emerging Technologies

In light of the potential for destabilization of nuclear deterrence due to developments in new combat domains and emerging technologies, what approach to arms control ought to be pursued? First, given that anti-satellite capabilities pose a threat to NC3 space assets, regulating such capabilities ought to be, from the perspective of preventing the destabilization of nuclear deterrence, a focal point of arms control in the space domain. China and Russia have maintained a posture of seeking an arms control treaty to regulate the deployment of weapons in space, while the United States and other Western countries consider the greatest threat to space security not to be specific weapons but *behavior and actions* in orbit, and are instead adopting an approach aimed at establishing norms for responsible behavior and actions in space.[29] This approach of the West in pursuing the establishment of a code of conduct is based on the recognition that defining what constitutes a "weapon" in space is difficult, and that a traditional arms control approach aimed at regulating and controlling specific weapons, as pursued by China and Russia, would therefore lack effectiveness and make verification practically impossible.

As is the case in the space domain, defining what constitutes a "weapon" in the cyber domain is also challenging, and a traditional arms control approach may fail to ensure effectiveness and transparency. Instead of a traditional approach aimed at banning or regulating cyberweapons, therefore, it would be more meaningful from an arms control perspective to focus on regulating specific behavior and actions that have a destabilizing effect on nuclear deterrence, such as cyberattacks targeting NC3 systems.

With regard to the electromagnetic domain as well, given the potential for directed

[29] Victoria Samson, "Breaking the Impasse over Security in Space," Arms Control Association, September 2022.

energy weapons to incapacitate theater-level and sub-theater-level nuclear weapons systems, it would be desirable to consider frameworks to restrict the use of directed energy weapons against such systems. U.S. B61-12 tactical nuclear bombs, which the United States is deploying to five other NATO member states, are equipped with inertial guidance systems to improve accuracy,[30] and if these guidance systems are vulnerable to directed energy weapons, then the abovementioned frameworks would likely also contribute to the stabilization of NATO's nuclear deterrence. Instead of a traditional approach of regulating the directed energy weapons themselves, however, it would be preferable to pursue a normative approach focused on regulating behavior and actions relating to the use of directed energy weapons that have the potential to destabilize nuclear deterrence.

Considering the risks associated with the integration of emerging technologies into NC3 systems, arms control to regulate their use is also necessary. With respect to AI in particular, as AI has not yet reached a sufficient level of technological maturity for nuclear powers to be confident in integrating it into their NC3 systems, there have been calls for nuclear powers to move quickly to reach an agreement on regulating against the use of AI in ways that could destabilize nuclear deterrence and increase the risk of nuclear weapons use.[31] Rather than a traditional arms control approach of regulating AI as a "weapon," a normative approach that seeks to prevent behavior and actions that could destabilize nuclear deterrence through the use of AI seems more meaningful. There is also a possibility that cyberattacks targeting nuclear weapons systems incorporating AI could rewrite AI training data sets and render the systems inoperative.[32] It may be necessary to consider whether such cyberattacks targeting the AI incorporated into nuclear weapon systems and other such specific actions should also be designated as behavior that ought to be prevented.

Among emerging technologies, it is hypersonic weapons that present the possibility of applying traditional approaches to weapon regulation. By proposing limitations on hypersonic weapons to Russia, the United States could advance strategic nuclear arms reduction negotiations advantageously with Russia, and reestablish upper limits on intermediate-range nuclear forces. This could open up a pathway towards a U.S.-Russia nuclear arms control agreement, and it has been pointed out that it would be desirable

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30 "B61-12 Nuclear Bomb," *Airforce Technology*, November 6, 2020.

31 Lauren Kahn, "Mending the 'Broken Arrow': Confidence Building Measures at the AI-Nuclear Nexus," *War on the Rocks*, November 4, 2022.

32 Zachary Kallenborn, "AI Risks to Nuclear Deterrence Are Real," *War on the Rocks*, October 10, 2019.

to also eventually involve China.[33] It should be noted, however, that during such negotiations, Russia and China would both likely demand the inclusion of U.S. missile defense systems as a target for regulation in such an agreement. China and Russia's development of hypersonic weapons was originally motivated by their desire to secure second-strike retaliation capabilities in response to the superiority of U.S. missile defense capabilities. Given this context, China and Russia may both view, on balance, limitations on U.S. missile defense as a beneficial trade-off for the restriction of hypersonic weapons. If, therefore, the regulation of hypersonic weapons comes to be included in future U.S.-Russia (or U.S.-Russia-China) arms control talks, it is likely to be discussed in connection with restrictions on U.S. missile defense systems.

Conclusion

Future developments in the new combat domains and emerging technologies will likely have a significant impact on nuclear deterrence and arms control. The United States, China, and Russia are competing fiercely to develop new technologies in the context of great power competition, and by enabling conflict in new domains, these technologies contribute to the destabilization of nuclear deterrence. In this paper, I have explored the potential for a normative code of conduct-based approach as a form of arms control to mitigate the destabilization of nuclear deterrence due to developments in new combat domains and emerging technologies. It goes without saying, however, that such an approach would involve many challenges, such as finding ways to verify compliance. Amid these developments, U.S. national security advisor Jake Sullivan stated in June 2023 that the United States would resume its efforts to bring China into arms control negotiations. He also stated the United States would maintain its nuclear deterrent while supplementing its current strategic nuclear forces with new technologies like non-nuclear precision strike weapons. He also indicated, however, that from an arms control perspective, the United States would seek to establish a global agreement ensuring that AI would not be used to authorize nuclear strikes without human involvement ("maintaining a human in the loop").[34] This stance of the United States is perhaps noteworthy, as it offers a glimpse into the future trajectory of arms control in relation to emerging technologies.

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[33] Spenser A. Warren, "Avangard and Transatlantic Security," Center for Strategic and International Studies, September 23, 2020.

[34] Julian E. Barnes and David E. Sanger, "U.S. Will Try to Bring China into Arms Control Talks," *New York Times*, June 2, 2023.

Chapter 3
Deterrence and Arms Control

James M. Acton

The Korean War began on June 25, 1950 with a North Korean surprise attack that almost succeeded in destroying South Korea. Under U.S. leadership, the United Nations intervened, with considerable effect. By late September, North Korean forces were in full retreat and UN forces were approaching the 38th parallel, the de facto border between North and South Korea.

Within Washington, there was little concern that crossing the parallel would induce China to enter the war. As the administration of President Harry Truman saw it, the crossing was not an escalation but a continuation of war on its existing terms—a necessary step to restore "international peace and security in the area," the mandate given by the United Nations. Moreover, the United States did not view the 38th parallel as a significant political boundary.[1] It was, in the words of the U.S. ambassador to the United Nations, an "imaginary line."[2] At his urging, the General Assembly supported its crossing, which South Korean troops did on October 1.

For China, the 38th parallel was anything but imaginary. The Chinese Communist Party was consolidating power and afraid that, without North Korea as a buffer zone, the United States might attack China. Accordingly, it viewed the crossing as a significant escalation of the conflict. Over the course of two weeks of agonized debate at the start of October, China decided to intervene. The war lasted another three years and saw millions of deaths.

In my view, the crossing of the 38th parallel is the paradigm example of unintended escalation. To be clear, I am not claiming that the crossing was unintended. The UN commander, General Douglas MacArthur, did not misread the map and send his forces across what he thought was the 37th parallel. Rather, what was unintended was the escalation. Washington honestly did not believe that crossing into North Korea

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* This is an edited transcript of an oral presentation at the International Symposium on Security Affairs, held at NIDS on December 6, 2023.

1 United Nations Security Council Resolution 83 (June 27, 1950), http://unscr.com/en/resolutions/83.

2 Warren R. Austin, "Peace and Security for the Future of Korea" in U.S. Department of State, *Bulletin* XXIII, no. 588 (October 9, 1950), 579.

represented an escalation. China disagreed, and its opinion was the one that determined whether it intervened.

Almost three quarters of a century later, the United States and Japan are again contemplating the possibility of a conflict against China. Only today, China has nuclear weapons. In consequence, the Korean War, as horrific as it was, could pale into insignificance next to a possible future conflict against China. In this context, a useful and plausible role for arms control is to reinforce deterrence and reduce the likelihood of unintended escalation's leading to a nuclear war.

Reducing the likelihood of a nuclear war does not mean eliminating it as a possibility. Even if arms control could succeed perfectly and entirely prevent unintended escalation—which it could not—deliberate escalation would still be possible. In particular, the state that was losing a potential U.S.-Chinese war might resort to the use of nuclear weapons in a desperate attempt to stave off a catastrophic conventional defeat. Even so, given the potential consequences of a nuclear war—which the Japanese people know better than anyone—reducing the likelihood of such a war seems like a useful endeavor.

Unfortunately, I am not optimistic. Given the prevailing politics, it is unlikely that the United States and China will succeed in negotiating any arms control agreements, at least in the short term. That said, I believe the effort to try and make progress on arms control is worthwhile—the costs are essentially zero and the potential benefits significant.

What is arms control?

The term "arms control with China" typically conjures up the image of legally binding numerical limits on China's nuclear forces. The administration of President Donald Trump endorsed this goal in supporting a trilateral (U.S.-Chinese-Russian) arms limitation agreement.[3] The attraction of this concept is clear enough; it would clearly serve the interests of the United States and its allies. Whether it would serve Chinese interests is more questionable. Certainly, Beijing does not believe it would, and China gets to determine its own interests. Few American officials and analysts have even tried to persuade it otherwise. To their credit, some in the Trump administration did try. However, their argument—that China would "be seen as a great power… [by] sitting down with the United States and Russia,…the first-tier forces, to negotiate"—did not

[3] "Trump Calls for Arms Control with Russia and China in Putin Call," Reuters, May 7, 2020, https://www.reuters.com/article/idUSKBN22J2JV/.

appear to gain any traction in Beijing.[4]

In identifying arms control proposals that both Washington *and* Beijing might judge to be beneficial, we should move back toward the broad, original definition, advanced by Thomas Schelling and Morton Halperin: "all the forms of military cooperation between potential adversaries."[5] In this view, arms control includes legally binding and politically binding measures to improve communications, enhance transparency, build confidence, and regulate behavior (as well as to limit force size).

What is unintended escalation?

Reducing unintended escalation risks is perhaps the most promising—or, rather, the least unpromising—goal for arms control. Having already provided one example of unintended escalation, here is a definition.

Successfully managing escalation requires the participants in a crisis or war to establish limits. These limits might be geographical features (like rivers), political boundaries (like borders), or the use of a particular type of weapon (like nuclear weapons). Sometimes a state decides that escalation serves its interests, even absent any expectation that its adversary is planning to escalate, and crosses an adversary's redline, fully aware that it is doing so. Such escalation is deliberate. Vladimir Putin's misbegotten invasion of Ukraine clearly falls into this category.

At other times, both belligerents can assess that a set of mutually observed limits would serve their interests, yet they can fail to establish such limits despite good-faith efforts to do so. Escalation in this case is unintended. The crossing of the 38th parallel fits this description. The United States did not understand that the parallel was a Chinese redline. Had it understood that crossing that redline would induce China to enter the war, it would not have done so—as key contemporary documents indicate.[6]

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[4] Transcript of "Special Presidential Envoy Marshall Billingslea on the Future of Nuclear Arms Control," Hudson Institute, Washington, DC, May 21, 2020, 10, https://s3.amazonaws.com/media.hudson.org/Transcript_Marshall%20Billingslea%20on%20the%20Future%20of%20Nuclear%20Arms%20Control.pdf.

[5] Thomas C. Schelling and Morton H. Halperin, *Strategy and Arms Control* (New York: Twentieth Century Fund, 1961), 2.

[6] "United States Courses of Action With Respect to Korea," Report by the National Security Council to the President, NSC 81/1, September 9, 1950 in *Foreign Relations of the United States, 1950*, vol. VII, *Korea*, Document 505, https://history.state.gov/historicaldocuments/frus1950v07/d505.

The importance of demarcating redlines

Efforts to prevent unintended escalation and to bolster deterrence are sometimes mutually reinforcing. Specifically, for an adversary to be deterred from crossing one of our redlines, it must know where that redline is. Demarcating our redlines (though not without costs) can prevent an adversary from stumbling across them unintentionally. In the process, we can threaten consequences for a deliberate crossing.

Let me give a practical example of where demarcating redlines could be useful. It might not be clear to China that, in a conventional war, it would cross a U.S. redline by launching nonnuclear attacks against dual-use command-and-control assets (that is, command-and-control assets that enable both nuclear and nonnuclear operations). It is partly for this reason that, in the 2018 U.S. Nuclear Posture Review, the United States threatened that it might use nuclear weapons in the event of nonnuclear attacks against its nuclear command-and-control assets.[7] While I believe it was a mistake to threaten nuclear use in this circumstance, the idea of emphasizing the importance of such assets was exactly right. I believe the administration of President Joe Biden erred by not doing so in its Nuclear Posture Review.[8]

Of course, states make declaratory policy unilaterally. However, cooperative measures can also be used to reinforce redlines and reduce the likelihood of unintended escalation.

Safety zones

I am particularly concerned about the possibility of unintended escalation's resulting from space activities in high-altitude orbits (geosynchronous and Molniya, to be technically precise). China, Russia, and the United States all use these orbits for nuclear command and control, among other purposes.

The biggest threat to satellites in high-altitude orbits comes from space-based co-orbital weapons, essentially other satellites. Such a weapon could approach an enemy satellite and then attack it (perhaps by ramming into it, perhaps by a more sophisticated method). In a conventional conflict, even nuclear command-and-control satellites might not be immune to attack because many, if not all, are dual-use.

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7 U.S. Department of Defense, "Nuclear Posture Review," February 2018, 21, https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF.

8 "2022 U.S. Nuclear Posture Review" in U.S. Department of Defense, "2022 National Defense Strategy of the United States of America," 2022, https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF.

It is also possible that one state might *wrongly* believe its satellites were under attack, or at least wrongly assess that they might be. Satellites are often repositioned for non-hostile reasons. During a repositioning operation, one satellite might approach another. In a crisis or conflict, this kind of maneuver could be misinterpreted as the prelude to an attack. Or, to put it in more theoretical terms, the owner of the satellite that was apparently being targeted might wrongly believe that its adversary was about to cross one of its redlines. In response, it might try to foil the attack—by, for example, attacking its adversary's capabilities for communicating with its satellites—potentially escalating the conflict unintentionally.

Arms control could help to reduce this danger. Specifically, China, Russia, and the United States could agree to establish "safety zones" around one another's satellites in high-altitude orbits.[9] In other words, each could commit not to maneuver any of its satellites to within an agreed distance of satellites in high-altitude orbits belonging to the other participants.

Two colleagues and I have developed this proposal in more detail. I will not belabor the details here, except to say that, in practice, sometimes one satellite must pass close to another during a non-hostile repositioning operation. We would, therefore, permit one state to move one of its satellites through the safety zone of another state's satellite so long as it provided 24 hours' advanced notice and conducted only one such maneuver at a time.

During a crisis or conflict, states would have every incentive to abide by a safety-zone agreement if they were not planning an attack. Of course, if a state believed its interests were best served by attacking an adversary's satellites, the existence of an agreement would probably not stop it from doing so. Nonetheless, the agreement would still be valuable for two reasons.

First, states—and here I really mean the United States—could use negotiations as an opportunity to impress upon China and Russia the serious potential consequences of attacking U.S. satellites. This kind of messaging could help deter such attacks. Second, it would take an attacker some time to move a co-orbital anti-satellite weapon from the edge of a safety zone to the satellites at its center. In fact, depending on the size of the safety zone, this process could take a few hours. The owner of the target satellite could

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[9] James M. Acton, Thomas D. MacDonald, and Pranay Vaddi, *Reimagining Nuclear Arms Control: A Comprehensive Approach* (Washington, DC: Carnegie Endowment for International Peace, 2021), 61–69, https://carnegie-production-assets.s3.amazonaws.com/static/files/Acton_et_al_ReImagining_Arms_Control_fnl_1.pdf.

use this time to try to defeat the attack, by ordering its satellite to undertake evasive maneuvers, for example. Thus, a safety zone agreement demonstrates how arms control designed to reduce the risk of unintended escalation could also bolster deterrence of deliberate escalation.

Launch notifications

A second measure to reduce the risk of unintended escalation would be a launch notification agreement.[10] Under such an agreement, participants would provide pre-launch notifications (and ideally also post-notifications) of space launches and test launches of ballistic missiles, boost-glide missiles, missile defense interceptors, and target missiles (subject to various defined criteria).

The goal here would be to prevent a space or test launch from being mistaken for an attack, or the preparations for such a launch being mistaken as the preparations for an attack. This danger is not hypothetical. In January 1995, Russian early-warning personnel mistook a sounding rocket launched from the Norwegian coast for a Trident D5 sea-launched ballistic missile. President Boris Yeltsin activated his cheget, or "nuclear briefcase," before it became clear that there was no danger. In peacetime, the likelihood that this kind of incident could spark escalation is very low. In a crisis or conflict, it could be a different story.

There are various launch notification agreements in operation today: U.S.-Russian, Russian-Chinese, and Indian-Pakistani arrangements as well as the Hague Code of Conduct. However, this patchwork of arrangements has many flaws and holes, including the absence of any U.S.-Chinese notifications.

In 2023, the U.S. National Security Advisor, Jake Sullivan, publicly endorsed a missile launch notification regime among the P5—an idea I wholeheartedly support.[11] In parallel, I believe the space-faring states of East Asia—including, of course, Japan and China—should negotiate a regional arrangement.

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[10] Acton, MacDonald, and Vaddi, *Reimagining Nuclear Arms Control*, 53–59.

[11] Jake Sullivan, remarks at Arms Control Association Annual Forum, Washington, DC, June 2, 2023, https://www.whitehouse.gov/briefing-room/speeches-remarks/2023/06/02/remarks-by-national-security-advisor-jake-sullivan-for-the-arms-control-association-aca-annual-forum/.

Is any of this feasible?

These two measures—safety zones and launch notifications—would be simultaneously modest in their effects and politically challenging to negotiate. They would not, by themselves, dramatically reduce the overall danger of escalation—though, if implemented successfully, they could provide a springboard for further, farther-reaching cooperation.

That said, the prospects for U.S.-Chinese arms control are unquestionably poor. The United States expresses interest in such arms control. However, there is no chance that the Senate would ratify any treaty that might plausibly be negotiated. Even nonbinding agreements would doubtless encounter significant domestic opposition, including from within the United States government and perhaps also from allies.

China, meanwhile, does not hide its lack of interest in arms control. Some of the resistance is surely internal, stemming from bureaucratic and regime politics. Additionally, China would doubtless have strategic concerns about any proposed agreement. But, for current purposes, the biggest question is whether China is actually interested in reducing the likelihood of unintended escalation.

There is reason for skepticism. Beijing is notorious for refusing to use its hotline with Washington. Meanwhile, the Biden administration has indicated a desire to negotiate bilateral "guardrails" with China to try to prevent a war. Chinese officials have reportedly likened such guardrails to "giving a speeding driver a seatbelt."[12] In other words, Beijing may want to use the risk of a crash to deter the United States from driving recklessly, that is, from taking actions, such as close-in surveillance flights, that China opposes. Indeed, on occasion, the United States has also adopted this strategy, often termed "the threat that leaves something to chance."[13]

Such thinking could stymie efforts to reduce the danger of unintended escalation, at least in the short term—though the only way to find out is to make specific proposals to Beijing and accompany them with an offer to negotiate. One reason for not being completely pessimistic is that, even if Beijing seeks to manipulate unintended escalation risks for deterrent or compellent purposes, it is unclear whether this strategy includes space operations or missile tests specifically.

Over the long term, though, there is some reason to expect that Beijing and Washington may find a common interest in mitigating unintended escalation risks. Assuming their current standoff is prolonged—as seems likely—there will probably be

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[12] Gideon Rachman, "How to Stop a War Between America and China," *Financial Times*, April 24, 2023, https://www.ft.com/content/44fb5a00-e7b8-48bf-be20-5f72b2d4a048.

[13] Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University, 1960), 187–203.

crises that underscore the dangers of war. Such crises can motivate cooperative actions to mitigate risks, just as the Cuban Missile Crisis did for the United States and the Soviet Union 61 years ago.

Of course, it would be better if China and the United States cooperated on risk reduction now, before any crisis. After all, if a crisis goes badly, we will have bigger challenges afterwards than negotiating a risk-reduction agreement. But even in the absence of cooperation in the short-term, Beijing and Washington can and should start preparing today for future arms control opportunities.

Part II
Theories of Nuclear Deterrence and Compellence

Chapter 4
The Return of Cold War Nuclear Deterrence Theories in South Asia

Zafar Khan

At the onset of the Cold War nuclear rivalry, different types of nuclear deterrence theories were adopted by the Soviet Union and the US. The essence of these nuclear deterrence theories was to create fear[1] in the minds of adversaries about the potential use of nuclear weapons. Following the Russian invasion of Ukraine and Vladimir Putin's consistent threat to use nuclear force, there has been escalating tension between the US-led NATO allies and Russia. Both the competing nuclear powers have already withdrawn from the ABM and the INF treaties, and New START has been suspended. The prospects for arms control and nuclear disarmament are growing ever dimmer as all nuclear-weapon states are modernizing and increasing their nuclear forces. Cold War deterrence theories are not only being revisited with regard to the US and Russia, but similar theories and compellence strategies are also being applied to nuclear-weapon states such as China and North Korea, as well as to the South Asian nuclear rivalry.

Critics argue that the return of Cold War nuclear strategies is accompanied by the increasing risk of escalation from conventional war to the nuclear level since potential adversaries often exploit gaps in nuclear deterrence to their advantage to maintain an edge against each other.[2] When the stronger side pushes the weaker side against the wall, reliance on and the use of nuclear weapons increases. It is empirically proven that conventional deterrence failed multiple times in the past and non-nuclear weapon states waged bigger and direct wars.[3] Despite the introduction of emerging technologies, nuclear deterrence continues to play an important role while preventing potential adversaries from waging conventional wars against each other because of the risk of escalation.

Most of these strategies were developed during the peak of the Cold War between the Soviet Union and the US, when each side had developed thousands of nuclear

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1 Lawrence Freedman and Jeffrey Michaels, *The Evolution of Nuclear Strategy* (London & New York: Palgrave McMillan, 2019).

2 Keir A. Lieber and Daryl G. Press, "The Return of Nuclear Escalation: How America's Adversaries Have Hijacked Its Old Deterrence Strategy" *Foreign Affairs*, November/ December 2023.

3 John J. Mearsheimer, *Conventional Deterrence* (Ithaca, Cornell University Press, 1985).

weapons and various combinations of delivery systems. Scholars closely assess whether some, if not all, of these concepts on nuclear deterrence are applicable to the South Asian nuclear rivalry. Before unpacking the layers of the South Asian nuclear rivalry, it is important to further conceptualize the applicability of the concepts of Cold War deterrence in South Asia. The South Asian nuclear rivalry is as unique and complex as the past Cold War nuclear rivalry between the US and the Soviet Union, but there are differences that should be noted.

Differences in Dangerous Escalation

The US and the Soviet Union never directly fought each other in a war, both before and after their acquisition of nuclear weapons. However, the South Asian nuclear rivals, India and Pakistan, fought each other in three wars before acquiring their nuclear weapons, and saw serious crises and border skirmishes after their nuclear weapon acquisition. Even following this acquisition, conventional low-intensity armed clashes have continued intermittently as rival troops confront each other in the disputed Kashmir area. During the 2019 Balakot incident, India crossed the Pakistan's border, and its fighter jets dropped bombs on Balakot well inside Pakistan. The next day, Pakistan retaliated in kind. Many perceive that this was the first time in nuclear history that two nuclear powers crossed each other's borders and attacked. Because of historic enmity and unsettled disputes between India and Pakistan, the acuteness of the security threat remains much higher in South Asia compared to that experienced by the US and the Soviet Union during the Cold War.

Both the Soviet Union and the US are geographically thousands of miles away from each other. By contrast, India and Pakistan are contiguous to each other, and any missile strikes could take only a few minutes to hit their targets without being intercepted due to a lack of time to respond. India's self-proclaimed "accidental" firing of its BrahMos supersonic missile from Sirsa, which crashed near the town of Mian Chanu in Pakistan, reflects how quickly such types of missiles on both sides of the border can penetrate the adversary's airspace and hit vital installations. If the Indian misfired missile had been armed, it could have caused domino effects and a dangerous escalation in no time at all. Therefore, the risk of escalation between India and Pakistan remains much higher than any of the nuclear rivals of other regions.

From Minimum to Full Spectrum Deterrence

The Cold War rivals pursued nuclear parity by maximizing their nuclear forces along with sophisticated delivery systems. On the other hand, the South Asian nuclear rivals have opted for credible minimum deterrence, although critics argue that they are gradually moving away from the minimum deterrence they initially conceptualized. Many still relate Pakistan's full spectrum deterrence with its increasing number of nuclear weapons. The concept of full spectrum deterrence may be somewhat akin to the Cold War nuclear history when the US Single Integrated Operational Plan (SIOP) at the operational level attempted to cover the full spectrum of targets in Europe and Asia.[4]

In South Asia, there is a misperception that full spectrum entails increasing deterrent forces. Arguably, the "spectrum" concept of full spectrum deterrence is more important than numbers. In other words, the concept is to plug any deterrence gaps in order to ensure the credibility of deterrence, which must be conducted by every nuclear weapon state because neglecting to do so could potentially make the state vulnerable to preemptive strikes that it might never have perceived. Theoretically, it may not be wrong to argue that full-spectrum deterrence falls within the ambit of credible nuclear deterrence readying a nuclear weapon state to produce effective countermeasures to fill any deterrence gaps.[5]

Many South Asian security analysts point out that "minimum" is an innocuous term that cannot fully be defined since it changes according to shifts in the strategic environment. It is argued that India has been increasing its strategic and conventional force modernization projects under the Defense Research and Development Organization (DRDO). What India considers to be "minimum" against Pakistan may be different for other countries. This is due to a few reasons. Firstly, India perceives China as a potential adversary since both countries fought a limited war in 1962 and have had a strategic border dispute in Laddakh during the last two years. Although the territorial dispute between India and China is still ongoing, it has been put on the back burner while both sides build up their own military infrastructure in preparation for a potential armed clash. Secondly, India has increasing economic potential and strategic partnerships with several countries. This has pushed India's rival Pakistan into an arms race in which it may not be able to fully compete, given that Pakistan is seven times smaller in terms of area,

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4 Desmond Ball and Robert C. Toth, "Revising the SIOP: Taking Warfighting to Dangerous Extremes," *International Security*, (1990) 14 (4): 65–92.

5 Zafar Khan and Rizwana Abbasi, "*Pakistan in the Global Nuclear Order*" Islamabad Papers, Institute of Strategic Studies Islamabad (ISSI), 16 February 2019, pp. 1-63.

population, and GDP compared to India. Thirdly, one wonders why India aspires to go for bigger missile ranges up to a reported 5,000 km to 10,000 km. Many consider that India increasing the range of its deterrent forces means it is going even beyond China to target others by showing its prestige, dominance, power projection, and perceived foresightedness against future adversaries in the European and American continents. Rather than nuclear deterrence, India appears to be adopting compellence strategies against its adversaries, which risks dangerous escalation. Compellence strategy under nuclear overhang is not a viable proven strategy. It is fraught with the risk of serious military crises in South Asia. On the other hand, Pakistan follows nuclear balance for deterrence purposes in South Asia. That said, nuclear balance remains one of the major elements for maintaining strategic stability in South Asia.

Pakistan vs. India: The Arms Race Continues

The rationale for Pakistan's acquisition of nuclear weapons cannot be understood unless its adversary India is discussed and understood. In terms of the essentials of Cold War nuclear history and their applicability to India and Pakistan's nuclear rivalry, India was the first to acquire nuclear capabilities in 1974, when it misled the world by calling its nuclear test, perhaps sarcastically, a Peaceful Nuclear Explosion." After India tested its nuclear weapons again in May 1998, Pakistan by then had become prepared to counter its adversary by ensuring its national security and deterrence.

While following the pattern of Cold War nuclear deterrence theory, it is commonly observed that India has brought changes from its 1999 draft nuclear doctrine to the draft it revised in 2003. Therefore, India has shifted from minimum deterrence to credible minimum deterrence. Instead of credible minimum deterrence, India often connotates credible deterrence with the omission of the term "minimum." From retaliation, India has apparently shifted to massive retaliation. And from its official declaration of No-First Use of nuclear weapons, India appears to be gradually shifting away from this doctrinal posturing to first use option. Many Indian analysts and India's security advisors are urging the Indian leadership to shift away from NFU to FU nuclear option. The changed draft doctrine says that India will use nuclear weapons if its military forces are killed anywhere. Although the draft appears to be exaggerated and ambitious, it reflects India's aspiration for FU nuclear option with security implications for the South Asian region.

India's advancement in developing counterforce capabilities such as *Prahaar* tactical nuclear weapons and Brahmos from supersonic to hypersonic missiles, multiple

independently targetable reentry vehicles (MIRVs), and submarine-launched ballistic missiles are some, if not all, the missile development that India can use for its counterforce targeting strategy against its adversaries.[6]

Speed, precision, and remote sensing are important for counterforce targeting strategy. To top this aggressive buildup of armaments, India also has its ballistic missile defense systems in addition to the S-400 bought from Russia. India's growing alliances with the US and Russia encourage her to be the first to use nuclear weapons against another nuclear power, preferably Pakistan. Therefore, the South Asian strategic stability is under stress. There have been reports from credible sources that India is preparing to test an H-Bomb, never mind the CTBT and other arms control global regimes. India's aspiration for counterforce targeting strategy, which may include its choices for both preemptive and limited strikes, appears to be potentially dangerous for the broader South Asian strategic stability. Critics often argue that there is complexity associated with counterforce targeting strategy, particularly when the targets are highly concentrated and mostly located within or adjacent to the congested urban areas.

To overcome this complexity, India might be developing precision-guided munitions, speed, and remote sensing as part of emerging technologies that may improve its confidence and capabilities to hit only its desired targets with pinpoint accuracy, without risking attacking counter-value targets. However, the acquisition of these technologies by one state against its rival will boost its confidence to opt for an aggressive counterforce targeting strategy, risking an escalation to a dangerous level (i.e., from conventional to a nuclear level), in a very short time. It is argued that those who lag behind in possessing emerging technologies could become vulnerable to preemptive strikes.[7] In this context, many may assume that emerging technologies could undermine the credibility of nuclear weapons. Whether or not such technologies make nuclear deterrence irrelevant, nuclear weapons will continue to proliferate in the foreseeable future and many more states may acquire these weapons for deterrence purposes. However, potential adversaries always develop countermeasures against every technology to maintain some balance between the defender and the offender. All nuclear-weapon states, with no exceptions, make all-out efforts against their potential adversaries to produce effective countermeasures to prevent deterrent force disparities and vulnerabilities.

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6 Christopher Clary and Vipin Narang, "India's Counterforce Temptations: Strategic Dilemmas, Doctrine, and Capabilities," *International Security* (2019) 43 (3): 7–52.

7 Keir A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence," *International Security* (2017) 41 (4): 9–49.

Revisiting MAD in South Asia

The aforementioned situation has created a very dangerous and complex operational environment in South Asia where both sides could quickly reach the level of a larger military conflict leading up to nuclear weapons use in a mutually assured destruction (MAD) scenario. This is especially true due to the fact that Pakistan has a relatively smaller conventional weapon system and does not subscribe to the NFU nuclear option. Temptation for military and nuclear victory under the nuclear overhang may turn out to be a highly risky strategy casting terrible consequences for the South Asian region.[8] It would not be wrong to argue that the Cold War MAD concept can be revisited in terms of the South Asian nuclear rivalry, where the risk of escalation from a serious military crisis to a nuclear exchange continues to exist. It is unwise for India to get tempted to conduct counterforce preemptive and limited nuclear strikes against nuclear Pakistan with the mindset to win some military objectives out of its hubris. This could bring mutual annihilation. Because of the fear of MAD, nuclear rivals are theoretically at least deterred from waging wars. This reflects the essence and meaning of the nuclear revolution in South Asia.

The nuclear revolution also transforms the behavior and belief of the state's leadership.[9] It is assumed, and for good reason, that there could be no nuclear victory between the two nuclear rivals. It conveys that there is no logic for adopting a compellence, aggressive military and counterforce targeting strategy. It urges the state's leadership to avoid going for nuclear superiority. It accentuates the meaning of credible minimum deterrence. It focuses on cooperation under the security dilemma and mutual restraint. And, more importantly, it extends nuclear peace between the nuclear rivals.

Some of these essentials applicable to the South Asian region may entail shaking up the delicate strategic stability between India and Pakistan. Despite some differences in the dynamics of the Cold War, regarding nuclear rivalry between the US and the Soviet Union, most if not all of the essentials of nuclear deterrence remain applicable to the South Asian region. In fact, the Cold War nuclear history conveys a lot more to other nuclear-weapon states for transforming their military and nuclear strategies in accordance with their threat perception and strategic environment. South Asian

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8 Zulfqar Khan and Zafar Khan *India's Evolving Deterrent Force Posturing in South Asia: Temptation for Pre-emptive Strikes, Power Projection, and Escalation Dominance* (London and New York: Palgrave MaCmillan, 2021).

9 Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca: Cornell, 1989).

nuclear rivals borrow variables from the classic Cold War nuclear history by filtering and adopting the essentials that best suit the South Asian strategic environment. In other words, the broader essentials of nuclear deterrence remain the same, but the application and contextualization both at the declaratory and operational level may change.

Challenges to Nuclear Deterrence: The Way Forward

The contemporary challenges to nuclear deterrence for all nuclear-weapon states, such as the safety and security of nuclear-related materials, terrorism, the threat of the use of chemical/biological weapons, cyber, and sophisticated emerging technologies, may undermine the very essence of nuclear deterrence if not totally make nuclear weapons irrelevant in terms of war prevention dynamics.[10] Managing and/or preventing these challenges may require different types of counter strategies without potentially risking entangled escalation. Along with the principles of nuclear deterrence, each of these emerging challenges may require specific countermeasures. In other words, rather than relying merely on the Cold War type strategies, nuclear-weapon states need to confront the contemporary challenges by exercising a different combination of deterrence strategies without getting into a "commitment trap" as part of broader nuclear responsibility.

Besides, there is an urgent need for non-traditional imperatives as well that may contribute towards crisis prevention and crisis management between the South Asian nuclear rivals when it comes to the notion of nuclear responsibility.[11] Such imperatives may include several measures to prevent developing war-fighting strategies, reducing reliance on nuclear weapons, practicing a nuclear moratorium, a mechanism for preventing accidental nuclear war, restricting to the essentials of credible minimum deterrence, and improved means of communication for risk reduction. South Asian rivals should continue to have hotlines, nuclear CBMs, effective utilization of the third-party role between the acute nuclear rivals, and measures for retaining nuclear balance rather than parity (nuclear superiority). Of course, they must also include an arms control regime, efforts for peaceful uses of nuclear technology, participation in the international discussion on non-proliferation, de-mating nuclear warheads from delivery systems, and undertaking stringent safety and security mechanisms. More importantly, South Asian

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[10] Zafar Khan, "Deterrence Value of Nuclear Weapons," *Strateheia: Margalla Policy Digest* 24 May 2024: https://stratheia.com/deterrence-value-of-nuclear-weapons/ (accessed on 12 August 2024).

[11] Rizwana Abbasi and Zafar Khan *Nuclear Deterrence in South Asia New Technologies and Challenges to Sustainable Peace* (London and New York: Routledge, 2020).

security leadership needs to provide advance notice before carrying out nuclear and missile tests, and immediately report any accidental firing of a missile toward each other to prevent retaliatory nuclear strikes. Most if not all these measures can be applicable and doable between the South Asian nuclear rivals to prevent the possibility of accidental war and promote strategic stability.

Chapter 5
Perspectives on Nuclear Threats: Two Purposes and Two Methods for Creating Credibility

OHNISHI Ken

Introduction

Russia's invasion of Ukraine, which began in February 2022, has been garnering attention due to Russia's repeated use of nuclear threats. Of course, these kinds of nuclear threats are nothing new. Since the advent of nuclear weapons at the end of World War II, there have been multiple attempts over the years to influence the behavior of others with the threat of using nuclear weapons. However, nuclear threats are not all uniform in nature and can be classified into several types. This paper introduces two perspectives on categorizing the purposes and forms of nuclear threats discussed in previous studies.

Deterrence and Compellence

The first is a distinction that focuses on what is being demanded alongside nuclear threats. When a certain party threatens the use of military force, the aim is to influence an adversary's behavior through the threat. In other words, the threatening party conveys to the adversary that it will use military force if the adversary does not comply with a demand, with the aim of making the adversary want to prevent the use of military force and forcing their hand in complying with the demand. While demands made on these occasions may vary in their content, they can be roughly classified into those that require an adversary not to do something, and those that require them to do something.

The strategy of demanding that an adversary refrain from doing something that it has not done yet, and threatening to use military force if it does, is called deterrence. A typical example would be a threat made to prevent an attack on the threatening party's own nation or an ally. This is specifically a case where, if there is another nation that seems likely to attack the threatening party's own nation or an ally, but an attack has not yet occurred, the latter will threaten to launch a counterattack and inflict grievous damage in the event the former were to attack, thereby making the adversary's attack end in failure. The purpose of this threat is to dissuade the adversary from taking an action

that it has not yet taken, but is likely to. Thus, deterrence is a strategy to maintain the status quo at the time a threat is made.[1]

In contrast, the strategy of demanding that an adversary take a certain action and threatening to use military force if it does not do so is called compellence. For example, during the confrontation between the U.S. and North Korea that occurred between 2017 and 2018, the U.S. putting pressure on North Korea by demanding that it destroy its nuclear weapons and dismantle its nuclear weapons program, and appearing ready to use military force should the latter refuse, is an example of compellence. The purpose of this threat was to force North Korea to take the action of denuclearization while it was already in possession of nuclear weapons and had an ongoing nuclear weapons program. Thus, compellence is a strategy to alter the status quo at the time a threat is made.[2]

Depending on the situation, however, it may be difficult to distinguish between instances of deterrence and compellence. For example, in the Russo-Ukrainian War, Russia has demanded that the United States and other Western nations stop providing military assistance to Ukraine, repeatedly warning that not doing so could bring about a direct conflict with the U.S. and the North Atlantic Treaty Organization (NATO) on one side and Russia on the other, along with potentially leading to nuclear war. Of these, threats attempting to dissuade the West from providing specific equipment that has not yet been delivered, or attempting to prevent the use of such equipment in certain ways, can be seen as simple deterrence. Specifically, this corresponds to the warning given by Chairman of the State Duma Vyacheslav Volodin in January 2023 that the provision of offensive weapons to Ukraine would bring about a global catastrophe, and that the only reason that nuclear-armed states have so far refrained from using nuclear weapons in localized warfare is simply that they have not directly faced threats to their own citizens or territorial integrity, along with the warning given by Deputy Chairman of the Security Council Dmitry Medvedev in February of the same year that if the Crimean Peninsula or inner Russia were attacked with weapons provided by the U.S., Russia would respond with any and all weapons in its arsenal, including nuclear weapons.[3]

Meanwhile, Russia has also repeatedly made threats demanding that the West stop

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1 E.g., David E. Johnson, Karl P. Mueller, and William H. Taft V, *Conventional Coercion across the Spectrum of Operations: The Utility of U.S. Military Forces in the Emerging Security Environment* (Santa Monica: RAND, 2002), 10-13.

2 E.g., Ibid., 13-15.

3 Lidia Kelly, "Putin Ally Says West's Deliveries of New Weapons to Kyiv Will Lead to Global Catastrophe," Reuters News, January 22, 2023; Kevin Liffey, "Russia's Medvedev Says More U.S. Weapons Supplies Mean 'All of Ukraine Will Burn,'" Reuters News, February 4, 2023.

providing all types of military assistance to Ukraine while such assistance is already being provided.[4] These threats can be seen as either deterrence or compellence, depending on how the situation is perceived. When viewing Western military assistance as intermittently repeated, separate actions, these threats can be understood as deterrents attempting to dissuade the next act of assistance being taken. On the other hand, if viewing Western military assistance as a continued campaign, these threats can be understood as threats of compellence demanding an alteration in behavior; namely, the cessation of ongoing actions.

Thus, for actual nuclear threats, there are those that involve a combination of aspects of both deterrence and compellence. This fact, however, does not negate the existence of purer examples of either deterrence or compellence, nor does it negate the merits of distinguishing between these two concepts. In actuality, the different purposes give each strategy different characteristics. As mentioned above, deterrence is a strategy used by a party wanting to maintain the status quo. The deterrent party may threaten an adversary, but what it wants is for the adversary not to disrupt the status quo, and if the adversary does not take any action, the situation will end with the deterrent party also taking no action. It is only when the adversary challenges the status quo that the deterrent party moves to put the threat into action; in that sense, therefore, deterrence is a passive strategy. In contrast, compellence is a strategy used by a party wanting to alter the status quo. The compeller wants the adversary to take a specific action, but one that the adversary does not want to take of its own volition. In order to compel the adversary to take an action that it would normally not want to take, compellence requires the compeller to take the initiative in moving the adversary, continuously building up pressure until the adversary complies with the demand. In this sense, therefore, compellence is a proactive strategy.[5]

Here, it is crucial to note that the status quo refers only to the situation at the time a threat is made. Consequently, there may be situations in which, when seen from a broader perspective, a party attempting to alter the status quo is actually using deterrence. This corresponds to cases in which, for example, following the alteration of the status quo by the successful creation of a fait accompli, a threat is then made to maintain the new status

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[4] E.g., Lidia Kelly and Ronald Popeski, "Russia's Lavrov: Do Not Underestimate Threat of Nuclear War," Reuters News, April 26, 2022; Guy Faulconbridge, "Russia Warns West over Risk of Conflict with NATO," Reuters News, May 12, 2022; David Ljunggren and Gabrielle Tétrault-Farber, "Russia's Medvedev Says Arms Supplies to Kyiv Threaten Global Nuclear Catastrophe," Reuters News, February 27, 2023; Guy Faulconbridge and Kevin Liffey, "Western Arms for Ukraine Make 'Nuclear Apocalypse' More Likely: Russia's Medvedev," Reuters News, May 24, 2023.

[5] Thomas C. Schelling, *Arms and Influence* (New Haven: Yale University Press, 1966), 71-72.

quo. Conversely, a status quo power may resort to compellence as a way of restoring the status quo ante after it has been altered by another party. It is also possible for the parties involved to have different perceptions on what constitutes the status quo; however, when compared to differences of opinion in respect of points of reference as to what constitutes a legitimate original state, the perceptions of involved parties in respect of the status quo at a given point in time tend to be in accordance with one another more often than not. Even if the parties' perceptions differ, a third-party analyst would be able to distinguish between deterrence and compellence and analyze the situation after having determined how to perceive the status quo.

The Madman Theory and Brinkmanship

The second distinction that can be made concerning nuclear threats is the difference in methods for creating the credibility of a nuclear threat. The issuance of a threat is the act of declaring that an action will be taken in future under certain conditions. Accordingly, there exists the possibility that the threat will not be carried out, contrary to what has been said. In other words, the threatening party may simply be bluffing in an attempt to make an adversary comply with its demand by showing an intention to follow through with a threat, even though it has no intention of doing so.[6] Once the adversary becomes aware of the possibility of a bluff, it will no longer be afraid of the threat and will lose motivation to comply with the demand. For this reason, a major challenge for the threatening party is to ensure the credibility of the threat by convincing the adversary that it is serious about the threat.

The credibility issue gets more serious in the case of threats where their carrying out would also incur significant costs for the threatening party; in particular, nuclear threats. If the adversary being threatened with nuclear weapons is also a nuclear-armed state, the threatening party must assume that there will be a retaliatory nuclear attack in response to its own nuclear attack. The characteristics that make nuclear weapons unique include the difficulty of blocking an attack and the scale of damage that is inflicted if even a single strike reaches its target. Prior to the advent of nuclear weapons, it was necessary to defeat enemy forces on the battlefield in order to expose an adversary's home and heartlands to danger. However, after nuclear weapons appeared and developments

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[6] James D. Fearon, "Domestic Political Audiences and the Escalation of International Disputes," *American Political Science Review* 88, no. 3 (1994): 578.

were made in their means of delivery, especially ballistic missiles, it became possible to inflict a major strike on an adversary's home and heartlands without going through the steps of defeating the opposing forces on the battlefield.[7] Even today, with advancements in missile defense technology, the interception of ballistic missiles remains a difficult endeavor. Consequently, if an adversary's nuclear forces are not expected to be completely disarmed by an attack (first strike), the threatening party must be prepared to expose itself to a retaliatory nuclear attack made by the adversary (second strike).

The costs to a party using nuclear weapons do not end at retaliatory attacks. Even when an adversary is not a nuclear-armed state, it is expected that nations using nuclear weapons will suffer a great many political and economic costs. Unlike conventional military force, which has been in use throughout all of history up to the present, the only examples of nuclear weapons being used are Hiroshima and Nagasaki at the end of World War II. In some respects, this long, unbroken history of non-use of nuclear weapons has created a norm in which the use of nuclear weapons has become taboo. A party who breaks the taboo and uses nuclear weapons is highly likely to expose itself to intense criticism from other nations, fall into diplomatic isolation, and be subject to various economic, financial, and other sanctions. If the party using nuclear weapons is a small or medium-sized nation, this may also trigger intervention by a major power with the intention of overthrowing the nation's regime.[8]

The enormous costs associated with the use of nuclear weapons mean that parties making nuclear threats tend to be viewed with suspicion as to whether they are truly prepared to use nuclear weapons in spite of these costs. If the survival of a threatening party's nation is at stake, it would not be difficult to convince an adversary of the former's willingness to accept such enormous costs. In contrast, it is not a simple matter to give credibility to a nuclear threat in cases where a threatening party wants to deter an attack on more peripheral interests not affecting the survival of its own nation or prevent attacks on allied nations rather than itself, and in cases of compellence.

For this reason, previous studies have considered methods for giving credibility to nuclear threats. Among them, the madman theory and brinkmanship have garnered significant attention. The former, the madman theory, is a method that involves making an adversary believe that the threatening party is "mad" enough to actually follow

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7 Schelling, *Arms and Influence*, 22-23.

8 Matthew Fuhrmann, "After Armageddon: Pondering the Potential Political Consequences of Third Use," in *Should We Let the Bomb Spread?* ed. Henry D. Sokolski (Carlisle: U.S. Army War College Press, 2016).

through with a threat that has high costs if carried out. "Mad," as used here, is defined as a significant deviation from common thinking and calculation. This deviation may be caused by an inability to make rational calculations due to being ruled by emotions or influenced by mental illness. Alternatively, the results of calculations may deviate significantly from those of others due to overestimating the benefits involved in the central issue of the confrontation or underestimating the costs that would be incurred oneself.[9]

A specific example of madman theory-type nuclear threats being used is the Vietnam War. As the war grew protracted, the U.S. sent an ultimatum to North Vietnam and the Soviet Union in 1969, stating that unless considerable progress was made in peace negotiations, the U.S. would need to start taking serious measures. President Richard Nixon wanted to give the Soviet Union the impression that he was so intent in his aims with respect to Vietnam that he would take extreme measures, including the use of nuclear weapons. This was so he could push the Soviet Union into pressuring North Vietnam into accepting a peace deal. With this intent, attempts were made to send signals through actions including having strategic bombers appear ready to launch sorties or fly over the vicinity of the Soviet Union, as a way of bolstering the above-mentioned ultimatum. However, concerned about domestic opposition in the U.S. against escalating the situation, President Nixon placed various restrictions on the actual measures, which led to half-done signaling. It also appeared that the Soviet side did not understand what issues were associated with this nuclear signaling by the U.S. In the end, the U.S. nuclear threat ended in failure with no progress in peace negotiations made by Vietnam.[10]

For a more recent example, madman theory-type nuclear threats were also used in the 2017–2018 Korean Peninsula crisis. In this case, which saw the U.S. and North Korea in a fierce confrontation over North Korea's development of nuclear weapons and ballistic missiles, both countries made nuclear threats. The U.S. took a strategy involving applying the maximum amount of pressure on North Korea in order to force the latter to comply with denuclearization. U.S. President Donald Trump has long been cultivating the impression that he is an unprecedented and unpredictable figure, and in

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[9] Schelling, *Arms and Influence*, 36-43; Roseanne W. McManus, "Revisiting the Madman Theory: Evaluating the Impact of Different Forms of Perceived Madness in Coercive Bargaining," *Security Studies* 28, no. 5 (2019).

[10] For an overview of this case, refer to the following. Scott D. Sagan and Jeremi Suri, "The Madman Nuclear Alert: Secrecy, Signaling, and Safety in October 1969," *International Security* 27, no. 4 (2003); Todd S. Sechser and Matthew Fuhrmann, *Nuclear Weapons and Coercive Diplomacy* (Cambridge: Cambridge University Press, 2017), 142-146.

the confrontation with North Korea, too, he sought to give his adversary that perception in order to pressure the country into moving.[11] Officials from the Trump administration repeatedly stated that "all options are on the table,"[12] and President Trump himself also gave the following warning: "North Korea best not make any more threats to the United States. They will be met with fire and fury like the world has never seen."[13] At the UN General Assembly, President Trump also stated that "if [the United States] is forced to defend itself or its allies, we will have no choice but to totally destroy North Korea."[14] Furthermore, after Chairman of the State Affairs Commission Kim Jong Un remarked in his address that "the nuclear button is on my office desk," President Trump tweeted that he also had a nuclear button that was "much bigger [and] more powerful" and actually worked.[15] In this way, President Trump was attempting to make North Korea comply with his demands by giving the impression that he might actually use nuclear weapons; however, this exchange did not result in North Korea agreeing to denuclearization.

Another method for giving credibility to nuclear threats is brinkmanship. This method involves exploiting the risk of nuclear weapons being used by accident in a case where a threat to intentionally use nuclear weapons would be difficult to believe. In situations where tensions are high, such as a crisis, accidents sometimes do occur when national policymakers become unable to control or manage a situation completely. Things can happen in a crisis that would not likely occur under calmer conditions; as policymakers expose themselves to hastiness caused by a rapidly unfolding situation and the dilemma of conflicting interests, they can make poor decisions due to misinformation, assumptions, or misunderstandings, actions may not be taken in line with the directions given by policymakers because of breakdowns in communication, or situations developing on the ground quickly can leave policymakers with barely any time to get involved. Such unintended circumstances always include the possibility that nuclear weapons are used. By continuing to remain in the eye of a crisis, taking actions that could lead to a military incident or escalation thereof, or even delegating authority

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[11] James D. Boys, "The Unpredictability Factor: Nixon, Trump and the Application of the Madman Theory in US Grand Strategy," *Cambridge Review of International Affairs* 34, no. 3 (2021), 436-438, 443-445.

[12] E.g., Van Jackson, *On the Brink: Trump, Kim, and the Threat of Nuclear War* (Cambridge: Cambridge University Press, 2019), 101-102.

[13] White House, "Remarks by President Trump before a Briefing on the Opioid Crisis," August 8, 2017.

[14] United Nations General Assembly, "Seventy-Second Session: 3rd Plenary Meeting," A/72/PV.3, September 19, 2017, 12.

[15] Jackson, *On the Brink*, 168-169.

for using nuclear weapons to a subordinate commander, a nation using brinkmanship can exploit the heightened possibility that nuclear weapons might actually be used as a way of pressuring an adversary into backing down.[16]

Brinkmanship is often compared to a game of chicken. The game of chicken is a test of courage in which two vehicles facing one another travel straight forward at high speed, with the one who swerves first considered the chicken. Both players are motivated to keep driving straight ahead longer than the other because neither wants to lose; however, if they both keep traveling straight, what awaits them is a head-on collision. It becomes a contest of wills to see who is more willing to embrace the risk of such a collision.[17] As mentioned above, brinkmanship using nuclear threats involves both parties competing to see who is more willing to come close to destruction against the background of risking plunging into destruction—nuclear war—if neither side relents. This is an attempt by the threatening party to force the adversary into giving up first and thus complying with its demands.

An example of a brinkmanship-type nuclear threat being used is the Cuban Missile Crisis. After learning that the Soviet Union had deployed nuclear missiles in Cuba, the U.S. applied military pressure to compel the Soviet Union to remove them. While in this case, the U.S. did not threaten to use nuclear weapons, it raised its defense readiness condition to one step short of all-out war (DEFCON 2) and put its nuclear forces on alert, showed it was ready to invade Cuba, and set up a naval blockade. This confronted the Soviet Union with the fact that by heightening the possibility of a military conflict, actual conflict would put the Soviet Union at risk of an all-out war with the U.S., potentially even plunging them into a nuclear war. Initially refusing to comply with Washington's demand, the Soviet Union eventually decided to comply out of fear of losing control of the situation following incidents that included a U.S. reconnaissance plane being shot down without Moscow's permission by Soviet anti-aircraft missile units in Cuba.[18]

Russia's nuclear threats during the Russo-Ukrainian War can also be interpreted as

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16 Schelling, *Arms and Influence*, 90-125; Sechser and Fuhrmann, *Nuclear Weapons and Coercive Diplomacy*, 38-41.

17 Schelling, *Arms and Influence*, 116-118.

18 For an overview of this case, refer to the following. William Taubman, *Khrushchev: The Man and His Era* (New York: W. W. Norton, 2004), chap. 19; Aleksandr Fursenko and Timothy Naftali, *Khrushchev's Cold War: The Inside Story of an American Adversary* (New York: W. W. Norton, 2006), chap. 19; Martin J. Sherwin, *Gambling with Armageddon: Nuclear Roulette from Hiroshima to the Cuban Missile Crisis, 1945-1962* (New York: Alfred A. Knopf, 2020).

brinkmanship. In the course of the war, Russia has curbed Western military assistance to Ukraine by repeatedly threatening that such assistance could lead to a direct conflict between Russia and the West and, if that were to happen, bring about nuclear war.[19] This is not Russia directly threatening a nuclear attack on the West; rather, it can be said that Russia is pressuring the West with the risk of an escalation of the situation resulting in nuclear war.

Conclusion

This paper introduced two perspectives on categorizing nuclear threats. One perspective focuses on what is being demanded, making a distinction between deterrence, which aims to maintain the status quo, and compellence, which aims to alter the status quo. The other perspective focuses on the methods for giving credibility to nuclear threats, making a distinction between the madman theory and brinkmanship.

Of course, these distinctions are theoretical; in reality, there are also cases that involve a combination of each. However, looking at threats through the perspective of these lenses allows complex realities to be categorized and simplified, thus making it possible to comprehend the inner makeup of each case and carry out comparative analyses across cases. Forging ahead with studies using such a theoretical perspective while adding a focus on the particularities of individual cases will allow us to better understand complex issues.

There are still many points to be explored in research on nuclear threats. In particular, while numerous studies on nuclear deterrence have appeared since the time of the Cold War, there are very few studies on nuclear compellence. More research is required, including analyses of actual cases.[20]

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[19] E.g., Kelly and Popeski, "Russia's Lavrov"; Faulconbridge, "Russia Warns West"; Ljunggren and Tétrault-Farber, "Russia's Medvedev"; Faulconbridge and Liffey, "Western Arms for Ukraine."

[20] As a study on nuclear compellence, including comparative analyses of several cases, refer to the following. Ohnishi Ken, "Compellence and Nuclear Weapons: A Study of Conditions for the Success of Proactive Nuclear Threats," in *New Horizons of the Nuclear Age*, ed. Ichimasa Sukeyuki (Tokyo: National Institute for Defense Studies, 2024).

Chapter 6
Nuclear Deterrence Theory and Current Nuclear Strategy Policy Issues

Charles L. Glaser

This paper addresses the question of whether the theories of nuclear deterrence that were developed during the Cold War are applicable to the current international setting. Were these theories specific to the U.S.-Soviet context? If they were, how do they need to be updated to analyze nuclear policy in a world in which there are three major nuclear powers—China and Russia, in addition to the United States? Some experts have argued that the Cold War arguments are indeed outdated and that we need to develop new theories of deterrence. I disagree—the first section of this paper explains that the deterrence theories developed during the Cold War, as well as a variety of other arguments concerning preemptive attacks and other forms of escalation, apply in today's circumstances.

Next, to illustrate both the continuing relevance and current applicability of these deterrence arguments, this paper addresses three current nuclear policy issues: the challenge posed to the United States by two nuclear peers (2NP), the question of whether the United States should pursue a damage-limitation capability against China, and Japan's requirements for nuclear extended deterrence.

Are Cold War theories of deterrence valid in the current era?

The nuclear deterrence theories developed in the late 1950s and early 1960s by American strategists apply a general deterrence logic to the specific case of nuclear weapons.[1] Much of the application was to a specific nuclear configuration—a world in which both the United States and Soviet Union had truly massive retaliatory capabilities. This nuclear

[1] Among the key works are Bernard Brodie, *Strategy in the Missile Age* (Princeton: Princeton University Press, 1959); Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1960); Schelling, *Arms and Influence* (New Haven: Yale University Press, 1966); and Glenn H. Snyder, *Deterrence and Defense: Toward a Theory of National Security* (Princeton: Princeton University Press, 1961).

situation came to be known as a world of mutual assured destruction (MAD) capabilities.[2]

The logic of nuclear strategy in MAD produced some novel results. Maybe the most striking was that there was little to no reason to target an adversary's nuclear forces once it had an assured destruction capability. Instead, if used at all, nuclear weapons would be used to inflict damage and costs on the adversary by targeting infrastructure and possibly population centers. This conclusion turned standard military logic on its head—instead of threatening to attack the adversary's forces, the logic of MAD called for threatening to attack its "value" targets. Limited nuclear attacks against such targets could be threatened to deter limited attacks by the adversary, including possibly large conventional attacks.

These early analyses also considered cases in which one country could destroy enough of the adversary's forces to deny it an assured destruction capability. This ability was termed a "damage-limitation capability." The logic of damage limitation is much more familiar/standard—a country uses its forces to protect itself against the adversary's forces. In addition, a damage-limitation capability could enhance deterrence by reducing the costs an adversary could inflict in retaliation. Without a damage-limitation capability (but even with one), the adversary's ability to inflict extremely high costs in a retaliatory attack could undermine the credibility of a state's deterrent threats.

One concern raised by possession, or even pursuit, of a damage-limitation capability was that it could create incentives for one or both countries to launch a preemptive attack—an attack designed to destroy as much of the adversary's forces as possible *because* the state believed its adversary was preparing to launch a massive nuclear attack, *because* the adversary feared the state was going to launch a damage-limitation attack. The possibility of this type of "reciprocal fear" and, closely related, concern about crisis instability—pressures and incentives to launch a counterforce attack because the adversary was believed to be preparing to launch one of its own—generated debate about the wisdom of the United States pursuing a damage-limitation capability.

By the end of the 1960s, the more important barrier to a U.S. damage-limitation capability was feasibility. The Soviet Union had built a larger and more survivable force, had the ability to continue building, and was believed to have the ability to undermine U.S. efforts to make its forces highly vulnerable.

American debates about nuclear strategy during the 1970s and 1980s focused on a set of issues that, with one exception, were less basic, but no less contentious. For the

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[2] Although sometimes understand as a strategy that called for the all-out targeting of the adversary's society, MAD should be understood as a condition created by the countries' nuclear forces, not a strategy. More than one strategy is possible in the condition of MAD.

most part, the debate assumed/accepted that the United States and the Soviet Union were in a condition of MAD. The key debate was over whether the United States should have a counterforce strategy—one based on the logic of targeting the adversary's nuclear forces—or instead a countervalue strategy in MAD.[3] A counterforce strategy could also target the adversary's nuclear command and control system (NC2) because it is essential for launching a country's forces. Whether to include NC2 in a counterforce attack would depend on the purpose of the attack.

During the Cold War, the U.S. strategy heavily emphasized counterforce targeting.[4] As noted above, critics argued that in MAD there was no good reason for targeting the adversary's forces, because the remaining forces could still inflict assured destruction in retaliation. Damage limitation was infeasible; the superpowers could not escape MAD.

Proponents of counterforce disagreed and offered a variety of arguments, some of which are being used once again today. One argument focused on the ratio of forces: Proponents argued that the ratio of forces—both before and following a nuclear exchange—could influence deterrence. For example, if the Soviet force was much larger than the U.S. force, Soviet leaders might not be deterred. Similarly, if the Soviet Union could launch a counterforce attack that gave it an advantage in force size—and therefore a ratio that favored it—Soviet leaders might launch a counterforce attack and then try to compel the United States to make concessions.

A second argument held that Soviet leaders valued their forces and leadership, not their population and economic targets. Consequently, to threaten high costs, the United States had to target Soviet forces. In effect, this argument held that nuclear forces were value targets.

A third argument, which may have been the most influential, was that the United States needed counterforce to credibly threaten limited nuclear attacks. According to basic deterrence logic, limited nuclear options would increase the credibility of U.S. threats because threats of all-out nuclear war were incredible, except in retaliation for an all-out Soviet attack. The United States relied on the threat of nuclear escalation to contribute to deterrence of a conventional Soviet/Warsaw Pact attack in Europe. In addition, it worried that the Soviet Union might launch limited nuclear attacks against the United States.

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[3] Robert Jervis, "Why Nuclear Superiority Doesn't Matter," *Political Science Quarterly*, Vol. 94, No. 4 (Winter 1979-80): 617-633; Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca: Cornell University Press, 1990); Charles L. Glaser, *Analyzing Strategic Nuclear Policy* (Princeton: Princeton University Press, 1990).

[4] Scott D. Sagan, *Moving Targets: Nuclear Strategy and National Security* (Princeton: Princeton University Press, 1989), Chapter One.

Proponents (mistakenly or misleadingly) equated countervalue targeting with all-out nuclear attacks. Therefore, they concluded that the United States required counterforce.

Finally, some proponents of counterforce argued that even if the United States could not undermine the Soviet assured destruction capability, some damage limitation was nevertheless possible. An assured destruction capability would not destroy all of the United States and kill all of its people. Consequently, proponents argued that whatever Soviet forces the United States could destroy were worth destroying, as this would reduce the damage the United States would suffer, even if the damage remained at an extremely high level. In other words, these proponents argued that some damage limitation was feasible even in MAD.

Critics of counterforce (including me) responded that each of these arguments was seriously flawed. Although there is much to be said, short responses are sufficient to make the basic points and capture the overall feel of the debate. Ratios of nuclear forces do not measure a meaningful capability in MAD because whatever the ratio is, both sides can still inflict enormous, crippling damage. A leader whose country can be essentially destroyed would not see significantly higher costs if the United States also destroyed its nuclear weapons. What value could these forces have provided following such a nuclear war? Limited nuclear options are possible without counterforce. The proponents' error is to equate a countervalue attack with an all-out attack. But there is no logical reason that countervalue attacks should be all-out. In fact, the logic of MAD holds that limited countervalue attacks are the only logical attacks in MAD—they can be employed for coercive bargaining while retaining some hope of keeping the war limited. The adversary has incentives to keep the war limited because so much of its country has not been attacked. And in MAD, there is little pressure to escalate to all-out attacks because damage limitation is not feasible, which reduces the risks of limited nuclear attacks.

In addition to rejecting the deterrent, coercive, and damage-limitation potential of counterforce in MAD, critics argued that large counterforce forces would generate preemptive incentives and other time pressures to escalate, even when states were in MAD. They also argued that counterforce policies would fuel arms races, because states would react to ensure their assured destruction capability, which would strain political relations, and in turn make war more likely.

The logic of these arguments is not special or particular to the case of U.S.-Soviet nuclear deterrence and competition. The arguments were not tailored to specific features of the United States and the Soviet Union. Instead, these deterrence and stability arguments capture the general logic of MAD. And, as explained below, they apply

well when there are more than two countries that have deployed assured destruction capabilities. Furthermore, although the debate about counterforce targeting continues, I believe that the countervalue/bargaining logic of nuclear weapons in MAD was, and is, sound.

Whether other nuclear dyads are characterized by MAD—that is, whether both countries have assured destruction capabilities—is a separate question. But cases that are not in MAD are still covered by the Cold War nuclear logic, albeit differently. If a state has, or can acquire, a significant damage-limitation capability, then there is a logical reason for pursuing counterforce targeting, as well as other systems that can help reduce the adversary's retaliatory capability, including national missile defense (NMD) if the adversary has ballistic missiles, and anti-submarine warfare (ASW) capabilities if the adversary has submarines that carry nuclear weapons.

Even in these cases, whether pursuit of damage limitation provides sufficient benefits to offset the costs and risks—which include preemptive incentives and crisis instability, and the political costs of intense nuclear competition—can in certain cases be a difficult question. A key issue is how effective the state's damage-limitation capability can be. Another key issue is whether the adversary also has a damage-limitation capability, which would then create interlocking pressures for early nuclear use.

I will illustrate the continuing analytic value of these deterrence arguments by briefly considering three current nuclear policy questions: 1) The challenge posed by two nuclear peers (2NP); 2) Whether the United States should pursue a damage-limitation capability against China; and 3) Japan's extended deterrence requirements when the United States and China are in MAD.

The challenge posed by 2NP

China's deployment of a large, increasingly diverse, and survivable nuclear arsenal has generated a good deal of concern in the United States about the challenge of facing two major nuclear powers. One prominent strategist declared that the result was a "paradigm shift" and a more dangerous world.[5] An important study by experienced nuclear experts argued that the United States would need a much larger force to meet its requirements

[5] Andrew F. Krepinevich, Jr., "The New Nuclear Age: How China's Growing Nuclear Arsenal Threatens Deterrence," *Foreign Affairs*, Vol. 101, No. 3 (May/June 2022): 92-104.

of deterrence.[6] The study's analysis hinges on arguments for targeting the adversary's nuclear forces. According to the authors, in a 2NP world, the United States should be able to target both China's and Russia's nuclear forces. And it should be able to do this sequentially and/or simultaneously. To meet this requirement in the relatively near term, the United States should therefore prepare to upload warheads onto its ICBMs. These warheads were previously deployed on U.S. ICBMs; they were removed from the deployed U.S. arsenal to meet the terms of the New START agreement.

With a couple of colleagues, I argued recently, in *Foreign Affairs*, that this analysis of the 2NP problem is deeply flawed.[7] Its conclusions follow directly from current U.S. nuclear doctrine, which continues to emphasize counterforce targeting. The study does not argue that the United States can or should try to deny China and Russia assured-destruction capabilities. Thus, we are back to the debate over counterforce in MAD. I will very briefly address three of their arguments here.

First, the study argues that some damage limitation is possible even in MAD. In a certain sense this is correct—an attack that inflicted an assured-destruction level of damage would not destroy everything or immediately kill all the people in the opposing country. However, whether the reduction in damage would be meaningful is a different question. These levels of damage are so high that society might well collapse. Survivors might not survive for long. The state would not persist as a functioning entity and it would likely never recover.

Second, the study holds that counterforce is required to target what the adversary values most—its military forces and its leadership. As I noted briefly above, targeting leadership and forces can add little to the costs of an all-out nuclear war, because the costs would already be so large and because there would be little to lead and nothing left to target.

Third, the study argues that countervalue targeting is immoral and inconsistent with the Laws of Armed Conflict (LOAC). The immorality argument is maybe the

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6 Brad Roberts et al., *China's Emergence as a Second Nuclear Peer: Implications for U.S. Nuclear Strategy*, A Report of a Study Group Convened by The Center for Global Security Research at Lawrence Livermore National Laboratory (Spring 2023), https://cgsr.llnl.gov/content/assets/docs/CGSR_Two_Peer_230314.pdf.

7 Charles L. Glaser, James M. Acton, and Steve Fetter, "The U.S. Nuclear Arsenal Can Deter Both China and Russia: Why America Doesn't Need More Missiles," *Foreign Affairs* (October 5, 2023), https://www.foreignaffairs.com/united-states/us-nuclear-arsenal-can-deter-both-china-and-russia?check_logged_in=1.

most contentious: I argued last year in the *Washington Quarterly*,[8] with my colleague Steve Fetter, that applying the LOAC to nuclear war provides poor guidance. First, a counterforce doctrine makes nuclear war more likely. Second, it increases the probability that a nuclear war will escalate to an all-out war. Moreover, the targeting allowed by the LOAC would inflict huge costs to civilians, which the LOAC are designed to avoid. We conclude that the targeting is legal, but does not achieve the objectives of the LOAC. Thus, although countervalue targeting is prohibited by the LOAC, it is the strategy most likely to achieve the United States' goals of minimizing the probability of nuclear war and the probability that a nuclear war will escalate to all-out war. We conclude that the value of complying with the LOAC for its own sake does not warrant adopting a strategically inferior nuclear strategy.

Should the United States pursue a damage-limitation capability against China's nuclear force?

Until around 2000, the United States had the ability to significantly limit/reduce the size of a Chinese retaliatory attack. China's force was small and highly vulnerable to a U.S. counterforce attack. In addition to possibly enabling the United States to reduce the retaliatory damage, this capability arguably enhanced extended deterrence—because the United States would suffer far less damage in an all-out war than China, the United States could more credibly threaten to pursue policies that would lead to nuclear war.

China has now largely transformed its force. It is becoming increasingly clear that a highly effective damage-limitation capability is beyond U.S. reach in politically relevant scenarios. For starters, China's nuclear force is now much larger. More importantly, its missile force is now more survivable because China has deployed mobile ICBMs. If China alerts its forces and operates them effectively once they are out of garrison, the majority of its mobile ICBMs could survive a U.S. attack.[9] Furthermore, China is increasing the size of its mobile ICBM force and is building hundreds of new silo-based missiles. At a minimum, targeting these silos will require warheads that the United States could otherwise devote to barraging China's mobile missiles. In addition, a relatively small number of these silos might survive a full counterforce attack.

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[8] Steve Fetter and Charles L. Glaser, "Legal, but Lethal: The Law of Armed Conflict and US Nuclear Strategy," *The Washington Quarterly*, Vo. 45, No. 1 (Spring 2022): 25-37.

[9] Charles L. Glaser and Steve Fetter, "Should the United States Reject MAD? Damage Limitation and U.S. Nuclear Strategy Toward China," *International Security*, Vol. 41, No. 1 (Summer 2016): 49-98.

China has also deployed sea-launch ballistic missiles that may have the ability to reach the continental United States from China's littoral waters. This would enable China to deploy its nuclear ballistic missile submarines (SSBNs) in a bastion near its shores, which it could protect with submarines, surface ships, and aircraft. How effective a Chinese bastion would be against U.S. nuclear attack submarines is an open question, at least in the unclassified literature. In any event, improvements in the submarine leg of China's nuclear force mean that the United States can no longer essentially assume it will be able to destroy China's SSBNs.

In addition, China is increasingly operating its forces in ways intended to enhance their survivability during a severe crisis or war. It is keeping some of its SSBNs on patrol and some of its mobile ICBMs at a higher day-to-day alert rate. In addition, China is reported to be planning to become able to launch some of its ICBMs on warning, which would enable them to be launched before U.S. nuclear weapons could destroy them. Increasing its ability to launch on warning may be the key reason for China's deployment of ICBMs in the new missile silos.

To regain a significant damage-limitation capability, the United States would need to be able to track and target China's mobile missiles, and to destroy China's SSBNs operating in its coastline bastion. In addition, the United States would likely want to expand its NMD system to improve its ability to intercept any Chinese weapons that were not destroyed by the initial U.S. attack and China was able to launch.

This competition between survivability and vulnerability appears to favor survivability.[10] A constellation of space-based radars is required for all-weather, 24-hour tracking of mobile missiles. Increasingly, this type of low-Earth constellation is feasible. However, there are a variety of countermeasures that can defeat these radars and appear to be relatively simple, including deploying decoy missiles, deploying missiles in modes that look like other vehicles—e.g., large trucks—and jamming the space-based radars. In addition, China should be able to greatly reduce the effectiveness of U.S. NMD. China appears to worry a great deal about U.S. missile defense: its fear is not so much about the current system but instead about the U.S. ability to expand its system and continue to improve it.[11] However, there is a weak link in national ballistic missile systems that China

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[10] For debate on these assessments, see Brendan Rittenhouse Green et al., "Correspondence: The Limits of Damage Limitation," *International Security*, Vol. 42, No. 1 (Summer 2017): 193-207.

[11] Henrik Stalhane Hiim, M. Taylor Fravel, and Magnus Langset Troan, "The Dynamics of an Entangled Security Dilemma: China's Changing Nuclear Posture," *International Security*, Vol. 47, No. 4 (Spring 2023): 147-187.

should be able to exploit with midcourse countermeasures. Because the midcourse phase of the ballistic missile trajectory is in a virtual vacuum, decoys should be highly effective against the U.S. NMD system. Advances in NMD might enable the United States to discriminate simply decoys from warheads, but it will likely remain unable to deal with the sophisticated decoys China is capable of deploying.

In addition to the poor prospects for success, U.S. pursuit of an effective damage-limitation capability would bring a number of risks and costs. China's mobilization of its mobile missile force during a crisis could create time pressures for the United States to launch a massive attack relatively early in a crisis. On the flipside, China would face pressures to alert its forces earlier in a crisis, which could intensify a crisis, as well as create incentives for the United States to attack. And U.S. damage-limitation programs will fuel the U.S.-China strategic arms competition, which would further strain the U.S.-China political relationship. These are the same types of arguments that were marshalled against large counterforce forces during the Cold War. They apply as well today to the U.S.-China strategic competition.

These risks and costs must be weighed against the potential benefits of a highly effective damage-limitation capability. As summarized earlier, if a highly effective damage-limitation capability were feasible, the United States would have good reasons to pursue it. It would reduce the costs the United States would suffer in an all-out war, and it could reduce the probability of nuclear war and conventional war by enhancing extended deterrence. The overall impact of a significant damage-limitation capability would depend on a variety of specifics, including the nature and extent of the extended deterrence challenges, the effectiveness of U.S. conventional forces, and the details of the two countries' nuclear forces, which influence the various time pressures for escalation.

Although the question deserves fuller analysis, due to space limitations, I will simply offer my bottom line. Given the very poor prospects for success, and the costs and risks of competition, the United States should forego efforts to regain a significant damage-limitation capability against China.

Meeting Japan's requirements for extended deterrence

The elimination of the United States' damage-limitation capability and the increase in China's assertiveness in East Asia raise the question of whether the United States can still meet its requirements for extending deterrence to Japan. The answer depends on answers to a number of prior questions.

First, how determined is China to conquer or coerce Japan? The smaller the value that China places on conquering Japan, the lower the requirements for extended deterrence. Experts disagree on the answer to this question. Some believe that China is determined to attain regional hegemony in East Asia. This would require pushing the United States out of the region. Even if China does not value conquering Japan per se, it would value this capability for fundamentally changing the geopolitical status quo. Other analysts believe that China is not highly determined to achieve regional hegemony and therefore, among other reasons, places little value on being able to conquer Japan. My own views fall into the latter camp.

Second, how capable is the U.S.-Japan alliance, possibly joined by other allies, of defeating Chinese conventional threats to Japan, including invasion, blockade, and coercion via countervalue conventional attacks? Invasion across water is a very difficult mission and advances in technology appear to be making it even more difficult.[12] Given the size and capability of alliance forces, China is quite unlikely to be able to successfully invade Japan.

Third, how much do U.S nuclear weapons contribute to deterrence of conventional war in MAD? While the lack of a damage-limitation capability reduces the credibility of U.S. threats to escalate to nuclear weapons and to use nuclear weapons in response to nuclear use by China, much of their deterrent value remains. China's leaders would almost certainly worry that a large conventional war could escalate to nuclear war via a variety of unforeseen or unpredictable paths. In addition, the United States can threaten a spectrum of limited nuclear options that should be more credible than the threat of all-out war and thereby restore additional deterrent value to its nuclear weapons.

This back-of-the-envelope assessment suggests that the U.S. extended deterrent remains adequate, even though China has acquired an assured destruction capability. Given the relatively low value that China places on conquering or severely coercing Japan, the likelihood that U.S. and Japanese conventional forces would defeat a Chinese invasion, and the deterrent value of nuclear escalation even in MAD, we have strong reasons to believe that China would be deterred. Obviously, however, analysts who believe that one or more of these conditions do not hold will be less optimistic and conclude that the U.S. extended deterrent is less adequate or even inadequate.

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[12] Stephen Biddle and Ivan Oelrich, "Future Warfare in the Western Pacific: Chinese Antiaccess/Area Denial, U.S. AirSea Battle, and the Command of the Commons in East Asia," *International Security*, Vol. 41, No. 1 (Summer 2016): 7-48; Eugene Gholz, Benjamin Friedman, and Enea Gjoza, "Defensive Defense: A Better Way to Protect US Allies in Asia," *The Washington Quarterly* (Winter 2020): 171-189.

If deterrence is inadequate or simply in need of bolstering, the United States and Japan have a spectrum of well-known options. The least controversial simply involves continuing to improve the alliance's conventional forces, including the hardening of military bases, and continuing to increase joint training and planning. The much more controversial steps involve nuclear weapons. Some analysts who are skeptical that U.S. nuclear weapons in MAD can contribute significantly to extended deterrence will be especially open to this change in alliance strategy.

A first option would be to deploy American nuclear weapons on Japanese territory, but for the United States to retain full operational control of these weapons. To attempt to further increase the credibility of the nuclear deterrent, the United States could deploy weapons in Japan and share control of these weapons with Japan. This option would resemble the nuclear sharing arrangements that the United States and its NATO allies developed to increase the credibility of U.S. extended deterrence in Europe during the Cold War. Mirroring the current situation in East Asia, this shift in U.S. doctrine occurred in response to the Soviet Union's increasing ability to retaliate following the United States' use of nuclear weapons and its eventual acquisition of an assured destruction capability. U.S. theater nuclear weapons were said to "couple" U.S. forces in Europe to U.S. strategic nuclear weapons, thereby increasing the probability that a large war in Europe would escalate to attacks against the Soviet homeland and, in turn, enhancing extended deterrence.

Finally, Japan could acquire its own nuclear weapons. The central rationale would be that a state can make more credible threats to protect its own homeland than to protect an ally. Therefore, Japanese nuclear threats would be more credible than American nuclear threats in response to a Chinese invasion of Japan. There are two basic possibilities within this option. First, Japan acquires nuclear weapons, while remaining in the U.S.-Japan alliance and under the U.S. nuclear umbrella. This arrangement would resemble that of two European members of NATO—Great Britain and France—that have their own nuclear weapons. The second possibility is that Japan acquires its own nuclear weapons and the U.S.-Japan alliance dissolves.

Which option Japan and the U.S.-Japan alliance should choose is likely to generate increasing debate as China's conventional capabilities continue to improve. The key point for this paper is that the challenge of extending deterrence in MAD is not a new one. In fact, the challenges of extending deterrence to NATO drove much of the strategy and nuclear debate during the Cold War. There were no easy answers, but the question was studied and debated extensively. These arguments—about the role of conventional

forces, the rationales for theater nuclear forces, and the complexity of the command-and-control arrangements for managing these forces—formed the core of the U.S. Cold War nuclear strategy debate. Although the specific political and geographic circumstances are different, the logic of these arguments and debates remains highly and directly applicable to Japan and the U.S.-Japan alliance.

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Dr. James M. Acton holds the Jessica T. Mathews Chair and is co-director of the Nuclear Policy Program at the Carnegie Endowment for International Peace. A

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Dr. Zafar Khan is currently an Executive Director of the Balochistan Think Tank Network (BTTN) at Balochistan University of Information Technology, Engineering, and Management Sciences (BUITEMS), Quetta. He is also a Professor of International Relations at BUITEMS. He holds an MSc in International Politics from the University of Glasgow, UK and a PhD in Strategic Studies from the University of Hull, Yorkshire, UK. He has also taught at the Department of Strategic Studies, National Defence University, Islamabad, Pakistan. His papers have appeared in various international peer-reviewed journals such as the *Cambridge Review of International Affairs*, *Comparative Strategy*, the *Washington Quarterly*, the *Journal of Contemporary China*, *Contemporary Security Policy*, *East Asia*, and the *International Journal of Conflict Management*. He has authored *Pakistan's Nuclear Policy: A Minimum Credible Deterrence* (2015) and *Nuclear Deterrence in South Asia: New Technologies and Challenges to Sustainable Peace* (2020). In addition, he is the author of a more recent book entitled *India's Evolving Deterrent Force Posture: Temptation for Pre-emptive Strikes, Power Projection, and Escalation Dominance* (London & New York: Palgrave McMillan, 2021).

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NIDS International Symposium on Security Affairs

"The New Horizon of the Nuclear Era"

Wednesday, December 6, 2023, Online

8:50-9:00 Opening Remarks By president: **ISHIKAWA Takeshi** (President, NIDS)

9:00-11:00 **Session 1: Nuclear Deterrence and Arms Control**
Chair: **Ms. IZUYAMA Marie** (Director, Security Studies Department, NIDS)
Moderator/Discussant: **Dr. ICHIMASA Sukeyuki** (Head, Cyber Security Division, NIDS)
Speakers:

Dr. Daryl G. Press (Director, Institute for Global Security, Dartmouth University)
Dr. ARIE Koichi (Lieutenant Colonel, Government and Law Division, NIDS)
Dr. James M. Acton (Co-Director, Nuclear Policy Program, Carnegie Endowment for International Peace)

11:10-13:10 **Session 2: Theories of Nuclear Deterrence and Compellence**
Chair: **Ms. IZUYAMA Marie** (Director, Security Studies Department, NIDS)
Moderator/Discussant: **Dr. KURITA Masahiro** (Senior Fellow, Policy Simulation Division, NIDS)
Speakers:

Dr. Zafar Khan (Professor, Department of International Relations, Balochistan University of Information Technology, Engineering and Management Sciences)
Dr. OHNISHI Ken (Senior Fellow, Global Security Division, NIDS)
Dr. Charles L. Glaser (Senior Fellow in the Security Studies Program, Massachusetts Institute of Technology)

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