

Research Paper

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Perspectives on Nuclear Deterrence in the 21st Century

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Summary

- This collection of essays explores, from the perspectives of eight experts, four areas of deterrence theory and policymaking: the underlying assumptions that shape deterrence practice; the enduring value of extended deterrence; the impact of emerging technologies; and the ‘blurring’ of the lines between conventional and nuclear weapons.
- Nuclear deterrence theory, with its roots in the Cold War era, may not account for all eventualities in security and defence in the 21st century, given the larger number of nuclear actors in a less binary geopolitical context. It is clear that a number of present factors challenge the overall credibility of ‘classical’ nuclear deterrence, meaning that in-depth analysis is now needed.
- Uncertainty as to the appetite to maintain the current nuclear weapons policy architecture looms large in discussions and concerns on global and regional security. The demise of the Intermediate-Range Nuclear Forces Treaty, doubts over the potential extension of the New Strategic Arms Reduction Treaty, heightened regional tensions in Northeast and South Asia, together with the current and likely future risks and challenges arising from global technological competition, making it all the more urgent to examine long-held assumptions in the real-world context.
- Extended deterrence practices differ from region to region, depending on the domestic and regional landscape. Increased focus on diplomatic capabilities to reduce risks and improve the long-term outlook at regional level, including by spearheading new regional arms-control initiatives, may be a viable way forward. Addressing the bigger picture – notably including, on the Korean peninsula, Pyongyang’s own threat perception – and the links between conventional and nuclear missile issues will need to remain prominent if long-term and concrete changes are to take hold.
- Most states have long held nuclear weapons to be ‘exceptional’: their use would represent a dramatic escalation of a conflict that must never be attained. Latterly, however, some officials and scholars have made the case that the impact of the use of a low-yield nuclear weapon would not be entirely distinct from that of a large-scale conventional attack. This blurring of lines between conventional and nuclear deterrence strips nuclear weapons of their exceptional nature, in a context in which states are faced with diverse, complex and concurrent threats from multiple potential adversaries that are able to synchronize non-military and military options, up to and including nuclear forces. The use of nuclear weapons risks becoming a ‘new normal’, potentially reducing the threshold for use – to cyberattacks, for example. This has direct implications for discussions around strategic stability.

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- While emerging technologies may offer tremendous opportunities in the modernization of nuclear weapons, they also present major risks and destabilizing challenges. Artificial intelligence, automation, and other developments in the cyber sphere affect dynamics on both the demand and supply sides of the nuclear deterrence equation. States and alliance such as NATO must adapt their deterrence thinking in light of these technological developments, and define their primary purpose and priorities in this shifting security context. Resilience planning, adaptation to the evolving security environment, threat anticipation, and consistent crisis management and incident response – as well as thinking about the mitigation measures necessary to prevent conflict escalation should deterrence fail – will all be critical in upholding nuclear deterrence as both policy and practice.

1. Introduction

The 2018 US Nuclear Posture Review (NPR), with its interpretation of Russian doctrine, and the slow demise of the Intermediate-Range Nuclear Forces (INF) Treaty have heightened concerns about transatlantic security. Similarly, the possibility that nuclear weapons systems can be subject to interference during peacetime, without the knowledge of the possessor state, raises questions on the reliability and integrity of these systems, with implications for decision-making, particularly with regard to deterrence policy.

Even – perhaps especially – where their own views of deterrence diverge, experts and decision-makers should collectively discuss points of divergence and identify common ground on which to build a secure and peaceful world order.

Researchers at Chatham House have worked with eight experts to produce this collection of essays examining four contested themes in contemporary policymaking on deterrence. The themes – each explored by two of the authors in separate chapters – are set out below.

Contested themes in the examination of deterrence policies

Underlying assumptions of deterrence

- What could constitute potential drivers of arms race, and what steps can prevent escalation while keeping the status quo?
- Does the concept of ‘rationality’ still hold?
- How do different regions conceptualize deterrence?

Extended deterrence

- What are the options for strengthening nuclear deterrence in responding to the new security challenges?

Emerging technologies

- What is the added deterrence value of emerging technologies?
- Does increased vulnerability of systems create more uncertainty; and would heightened uncertainty increase or undermine deterrence?
- How do emerging technologies challenge deterrence?

Blurring the lines between conventional and nuclear deterrence

- Is there a difference between conventional deterrence and nuclear deterrence?
- What does modern deterrence mean in today’s security environment?

Underlying assumptions of deterrence – chapters 2 and 3

In their respective essays, John Borrie and Maria Rost Rublee explore the underlying assumptions of nuclear deterrence, and the problems these present. Borrie focuses primarily on shortcomings of human rationality that have been brought to light by research disciplines such as psychology and economics – research that has disquieting implications for assumptions about rationality in crisis. Rublee focuses chiefly on the political assumptions that contribute to the destabilization of nuclear deterrence. Despite their different approaches, these two authors ultimately make the case that

the dynamics at work now are not the same as those that operated during the Cold War, and that, as it currently stands, nuclear deterrence is disrupted and presents a higher risk than at any time since the depths of the Cold War.

Borrie argues that human preferences are frequently affected by emotions and hard-wired cognitive biases; and that, as a result, it is harder to predict how decision-makers will necessarily act in a nuclear crisis based on the assumption that they are rational in utilitarian terms.¹ Borrie's essay suggests that the way in which each potential aggressor receives and acts in response to messages intended to deter will be greatly informed by an outlook that has heuristics and blind spots, among other features.² Simply put, we do not know whether a common rationality will hold to prevent nuclear weapon use in the future. This chimes with Rublee's point about the role played by 'imperfect information': without a deep and comprehensive understanding of a potential adversary's priorities, perceptions and strategies,³ miscalculation could lead a state to underestimate the likelihood of escalation and potential nuclear use by that adversary.

Borrie argues that there is a need for more openness among policymakers that nuclear deterrence may fail, whatever the elegance of rational theory, especially given how unintuitive probability is to human minds,⁴ the tendency to misjudge randomness and non-linearity,⁵ and the human bias towards considering unlikely events to be impossible events.⁶ This may be a danger to the sustainability of nuclear deterrence: as Rublee indicates, the likelihood of 'limited' nuclear use has increased⁷ – thus adding to the variables that disrupt overall stability and security.

Extended deterrence – chapters 4 and 5

Extended nuclear deterrence is also constructed differently today than during the Cold War. It takes different forms in every region.

In their respective essays, Cristina Varriale and Tanya Ogilvie-White assess the value and limitations of the US's extended deterrence, with reference to the Korean peninsula (Varriale) and Australia (Ogilvie-White). Whereas Varriale calls for further consideration of the linkage between conventional and nuclear threats and risks on the Korean peninsula, Ogilvie-White argues for an alternative arms control regime in the Asia-Pacific region.

These two authors hold different views on the current importance and role of US extended nuclear deterrence, although this may be due to the different geopolitical contexts within which both authors examine the commitments. While Varriale argues that extended nuclear

¹ For example, as shown by the Wason Selection Task. See Borrie, J. and Thornton, A. (2008), *The Value of Diversity in Multilateral Disarmament Work*, UNIDIR, p. 32, <https://www.unidir.org/sites/default/files/publication/pdfs/the-value-of-diversity-in-multilateral-disarmament-work-344.pdf> (accessed 27 Nov. 2019).

² For a fuller discussion, see also Mazarr, M. J., Chan, A., Demus, A., Frederick, B., Nader, A., Pezard, S., Thompson, J. A. and Treyger, E. (2018), *What Deters and Why: Exploring Requirements for Effective Deterrence of Interstate Aggression*, RAND Corporation, pp. 7–10, https://www.rand.org/content/dam/rand/pubs/research_reports/RR2400/RR2451/RAND_RR2451.pdf (accessed 27 Nov. 2019).

³ Peters, R., Anderson, J. and Menke, H. (2018), 'Deterrence in the 21st Century: Integrating Nuclear and Conventional Force', *Strategic Studies Quarterly*, 12(4), pp. 15–43, https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-12_Issue-4/Menke.pdf (accessed 27 Nov. 2019).

⁴ See Box 1 on 'quantifying the probability of nuclear weapon detonations in populated areas' in Borrie, J. (2014), *Risk, 'normal accidents', and nuclear weapons*, UNIDIR/ILPI, p. 2., <https://www.unidir.org/sites/default/files/publication/pdfs/a-limit-to-safety-en-618.pdf> (accessed 27 Nov. 2019).

⁵ See Taleb, N. N. (2004), *Foiled by Randomness: The Hidden Role of Chance in Life and in the Markets*, 2nd edn, London: Penguin, p. 38.

⁶ Borrie and Thornton (2008), *The Value of Diversity in Multilateral Disarmament Work*, p. 43.

⁷ There is growing evidence that some countries are planning hybrid strategies with options for limited nuclear use. See Peters, Anderson and Menke (2018), 'Deterrence in the 21st Century: Integrating Nuclear and Conventional Force'.

deterrence is a key feature of the security framework on the Korean peninsula, Ogilvie-White questions its credibility and reliability in the wider Asia-Pacific region. Varriale argues that current US extended deterrence commitments to South Korea are separate from the drivers of North Korea's proliferation and the broader peace and security of the peninsula. Ogilvie-White makes the case that new arms race dynamics and rapid technological change are resulting in an erosion of the credibility of US extended nuclear and conventional deterrence. She argues that Australia should focus on its diplomatic capabilities to reduce risks and improve the region's long-term outlook by spearheading new regional arms-control initiatives.

Emerging technologies – chapters 6 and 7

Current and future technological developments pose both opportunities and risks in the nuclear realm. Whereas some experts claim that emerging technologies will serve to strengthen existing deterrence assumptions, others believe that emerging technologies bring the risk of undermining and weakening nuclear deterrence.

In their respective essays, both Andrew Futter and Jamie Shea consider that emerging technologies present challenges to the traditional way of approaching nuclear deterrence, and the context within which the nuclear community thinks about deterrence.

Shea argues that NATO allies even have the capacity to use cyber or electronic activity against each other. (Indeed, classified documents leaked by former US National Security Agency consultant Edward Snowden in 2013 gave apparent evidence of, *inter alia*, the extent to which the US had already spied on its allies, including through the tapping of European leaders' phones.⁸) Futter examines the use of cyber means against an adversary, and draws attention to the 'grey area' that these technologies are creating between nuclear and conventional weapons. He suggests, too, that emerging technologies could perhaps even replace nuclear weapons for certain deterrence functions. Shea argues that deterrence can be enhanced in ways that allow it to play a more positive role – outlining five areas in which this might happen, and detailing how the development of these areas is ultimately the task of policymakers seeking to counter hybrid warfare and 'grey zone' operations in the years ahead. The five areas are: declaratory policy; developing operational response capabilities to be used flexibly and proportionately; enhancing the resilience of critical infrastructure and networks; better anticipating the impact of disruptive technologies; and achieving agreement on norms and regulations at an earlier stage.

Blurring the lines between conventional and nuclear weapons – chapters 8 and 9

There are signs that the possible (or threatened) use of nuclear weapons could become the 'new normal' for nuclear deterrence postures, as countries begin to blur the lines between their conventional and nuclear weapons.

⁸ For a summary, see Wickett, X. (2018), *Transatlantic Relations: Converging or Diverging?*, Chatham House Report, London: Royal Institute of International Affairs, p. 22, <https://www.chathamhouse.org/sites/default/files/publications/research/2018-01-18-transatlantic-relations-converging-diverging-wickett-final.pdf> (accessed 6 Feb. 2020).

In their respective essays on this theme, Peter Watkins and Christine Parthemore discuss the relevance of separating conventional and nuclear weapons. Both authors are of the view that two major shifts are currently happening as a product of technological and political evolutions. First, the potential use of low-yield – or relatively lower-yield – nuclear options by the US and Russia is changing perceptions of the way future conflicts may be carried out, and lowering the threshold for nuclear use by bringing these low-yield options to form part of war-fighting strategy.

The second type of blurring lies in nuclear responses to – and therefore deterrence of – non-nuclear attacks. Watkins outlines Russia's military doctrine of 'new generation warfare', which sets forth a type of warfare capitalizing on a set of elements including indirect action, informational campaigns and private military organizations backed by sophisticated conventional and nuclear capabilities,⁹ which deliberately blurs the lines between the use of unconventional means such as cyber, conventional forces and nuclear forces. In parallel, the author also points out the explicit statement made by the US administration in its 2018 NPR that 'deterring nuclear attack is not the sole purpose of nuclear weapons', and that nuclear weapons could be used to deter 'significant non-nuclear attacks'¹⁰ – thus implying that nuclear weapons could be used in response to cyber operations. Parthemore makes similar observations with regard to the NPR, and draws parallels between the latter and India's deterrence doctrine of leaving open the possibility of nuclear retaliation for major chemical or biological weapon attacks.¹¹

⁹ Adamsky, D. (2018), 'From Moscow with coercion: Russian deterrence theory and strategic culture', *Journal of Strategic Studies*, 41(1–2), pp. 40 and 47, doi:10.1080/01402390.2017.1347872 (accessed 27 Nov. 2019).

¹⁰ Office of the Secretary of Defense (2018), *Nuclear Posture Review*, US Department of Defense, p. 21, <https://media.defense.gov/2018/feb/02/2001872886/-1/-1/1/2018-nuclear-posture-review-final-report.pdf> (accessed 14 Aug. 2019).

¹¹ Chari, P. R. (2014), 'India's Nuclear Doctrine: Stirrings of Change', Carnegie Endowment for International Peace, 4 June 2014, <https://carnegieendowment.org/2014/06/04/india-s-nuclear-doctrine-stirrings-of-change-pub-55789> (accessed 27 Nov. 2019).

2. Human Rationality and Nuclear Deterrence

John Borrie

Introduction

Like any human belief system, nuclear deterrence depends on a nest of assumptions. One core assumption is that decision-makers are able to rank their preferences rationally and act accordingly. In this schema, it follows that the likely catastrophic consequences of nuclear weapons will induce decision-makers to act – for the most part – with greater caution, the closer they come to the nuclear brink. This allows reasonable predictions to be made about how decision-makers will behave, even in nuclear crises. In this way, cooler heads on both the US and Soviet sides are said to have prevailed throughout the Cold War, with the effect that a nuclear conflagration was avoided during various crises.¹²

Today, there are dynamics at work that differ from those that characterized the Cold War. A growing multipolarity in international security competition and the introduction of new strategic technologies challenge previous understandings about nuclear deterrence and strategic stability. Even some strong supporters of nuclear weapons as a deterrent capability have lately come to express doubts about their efficacy.¹³ Moreover, new scientific findings are increasingly calling into question some previous understandings about utilitarian human rationality – with implications that may ultimately be profound for the practice of nuclear deterrence in whatever form it takes. This chapter introduces some of these rationality-related issues.

What is nuclear deterrence?

Deterrence has been defined in various ways, but at its root it means seeking to induce caution in others by threats of pain – in this case, through the use of nuclear weapons. Deterrence and nuclear weapons are not synonymous: there are various means to deter. In hindsight, in the early years of the Cold War there was an extraordinary period of intellectual activity concerned with the relationship between the two superpowers, and with the specific goal of avoiding nuclear war.¹⁴ Indeed, nuclear deterrence engendered some uneasy stability between the two superpowers, although neither the US nor the Soviet Union fully accepted the notion of mutually assured destruction, and the US would never cease exploring technology, such as missile defences, that might eventually transcend it.

Utilitarian rationality-based models were never fully dominant in nuclear deterrence policymaking, even in the West. But nuclear deterrence became strongly associated with them – and, in particular, game-theoretic approaches like those pioneered from the late 1940s by analysts at the RAND

¹² For instance, see Allison, G. T. (2012), 'The Cuban Missile Crisis at 50', *Foreign Affairs*, 91(4), July/August 2012, pp. 11–16, <https://www.jstor.org/stable/23218035> (accessed 14 Aug. 2019).

¹³ For instance, see Krepinevich Jr, A. F. (2019), 'The Eroding Balance of Terror: The Decline of Deterrence', *Foreign Affairs*, 98(1), January – February 2019, <https://www.foreignaffairs.com/articles/2018-12-11/eroding-balance-terror> (accessed 14 Aug. 2019).

¹⁴ See Brodie, B. (1966), *Escalation and the Nuclear Option*, Princeton, NJ: Princeton University Press; Snyder, G. H. (1961), *Deterrence and Defense: Towards a Theory of National Security*, Princeton, NJ: Princeton University Press; and the work of Schelling, T., especially Schelling, T. (1960), *The Strategy of Conflict*, Cambridge, MA: Harvard University Press, and Schelling, T. (1966), *Arms and Influence*, New Haven and London: Yale University Press.

Corporation.¹⁵ However, it is important to recognize that the theoretical underpinnings for nuclear deterrence did not precede or even accompany the invention of nuclear weapons. Instead, they emerged as a response to the real-world existential threat of nuclear warfare.¹⁶ (The US monopoly on nuclear weapons lasted only four years; in 1949 the Soviet Union demonstrated its own nuclear capability.) These theoretical approaches added a level of intellectual respectability and rigour to considerations about strategy forced on decision-makers by the new nuclear reality. The paradox was that each superpower prepared for the use of nuclear weapons against the other, even as there was widespread acknowledgment that nuclear warfare was highly risky and best avoided due to its catastrophic consequences. Theory and paradox have been in tension ever since in policy debates about nuclear weapons.

Mitigating the existential threat of impending thermonuclear war to bring about a relatively stable 'balance of terror' between the superpowers was in itself a major achievement. It depended on acceptance of the notion that an opponent will act rationally, and that what each side needs to do is to ensure it is never the rational choice for their opponent to act in a way that would prompt nuclear retaliation. In the terminology of game theory, acting rationally means maximizing a utility payoff. At the policy level, however, the fear of events in a nuclear crisis escalating out of control (as almost happened in the 1962 Cuban missile crisis), the possibility of misperception, and the effects of bureaucratic and domestic political concerns shaping other understandings among nuclear-armed rivals, meant that it was difficult to be so sanguine. A chief concern about nuclear deterrence and the balance of terror during the Cold War was the risk of nuclear miscalculation.

Nevertheless, the logic was clear that the effect of nuclear deterrence should be nuclear non-use, even as nuclear deterrence depends on the credible threat of actual use. The longer nuclear weapons use was avoided, the more it cemented the idea that nuclear deterrence was sustainable, especially in an era in which nuclear disarmament did not seem a convincing alternative. An emergent non-proliferation norm further buttressed this apparently stable relationship between nuclear deterrence and non-use.¹⁷ In the process, retaining nuclear weapons became self-rationalizing, even when conditions changed after the end of the Cold War in ways that created greater uncertainty about whether stable nuclear deterrence is enduringly viable.

Tricky assumptions

The basic concept of deterrence has been sliced in various ways for purposes ranging from deterrence denial to extended deterrence in order to discourage adversaries from coercing or attacking allies.¹⁸ At the heart of all these permutations of nuclear deterrence is that nuclear weapons will either deny an aggressor their objective, or will punish them in a way that makes the cost of their behaviour unacceptable. This near-certainty of denial or punishment means that, if they are rational, a potential aggressor will not take such actions in the first place. A vital element of deterrence is thus a party's ability to convince their adversary that they will act on their commitment to use nuclear weapons if necessary. One important part of signalling this resolve is by visibly making preparations for nuclear weapons use. Another is devising the means to convince an adversary that beyond a certain point

¹⁵ See Poundstone, W. (1992), *Prisoner's Dilemma*, New York: Anchor Books. For background on game theoretic approaches see Williams, J. D. (1982), *The Compleat Strategyst: Being a Primer on the Theory of Games of Strategy*, New York: Dover. (This book is a reprint of a RAND Corporation publication originating from 1954.)

¹⁶ Harrington, A. I. (2016), 'Power, violence, and nuclear weapons', *Critical Studies on Security*, 4(1), p. 92.

¹⁷ Freedman, L. (2013), 'Disarmament and Other Nuclear Norms', *The Washington Quarterly*, 36(2), pp. 93–108.

¹⁸ For a discussion, see Mazarr et al. (2018), *What Deters and Why: Exploring Requirements for Effective Deterrence of Interstate Aggression*, pp. 7–10.

it may not be in one's hands to prevent nuclear use from occurring – the 'threat that leaves something to chance'¹⁹ – which is supposed to be a further inducement to caution. The assumption of rationality also offers the possibility of coercing others to behave in certain ways through nuclear threats.

Challenges to the nuclear deterrence security framework take various forms. One notable problem is increasing multipolarity. Although there were eventually other nuclear powers, the US and the Soviet Union, as peer strategic competitors during the Cold War, were for the most part principally concerned about each other. As the geopolitical balance has altered, and the number of nuclear-armed states has increased to nine,²⁰ so nuclear strategies have to adjust. Instead of an assumed dyadic confrontation, there are now strategic triads and even chains of nuclear-armed states²¹ in which crisis escalation and signalling may be considerably more complex to manage.²²

Advancing technologies of concern include highly precise low-yield nuclear weapons, cyber offensive capabilities, autonomous weapons and artificial intelligence-based decision systems, hypersonic glide vehicles, anti-satellite weapons, and missile defences. Each of these capabilities, or the responses to their use, could blur the line between the use of conventional and nuclear weapons.

A second challenge arguably arises from the threat to nuclear stability posed by some advanced technological capabilities. Stability in this sense can be defined as the absence of incentives to use nuclear weapons first (crisis stability), and the absence of incentives to build up a nuclear force (arms-race stability).²³ Advancing technologies of concern include highly precise low-yield nuclear weapons, cyber offensive capabilities, autonomous weapons and artificial intelligence-based decision systems, hypersonic glide vehicles, anti-satellite weapons, and missile defences. Each of these capabilities, or the responses to their use, could blur the line between the use of conventional and nuclear weapons. This in turn could break down the distinction between nuclear and non-nuclear warfare.²⁴ While some of these new strategic technologies might be countered or deterred in similar ways to those employed historically, during the Cold War and after, some, such as cyber offensive operations, cannot. Cumulatively, the use of these technologies could generate significant additional ambiguity in a crisis.

¹⁹ Schelling, T. (1960), *The Strategy of Conflict*, p. 187.

²⁰ China, France, India, North Korea, Pakistan, Russia, the UK and the US, together with Israel, which neither denies nor confirms possession of nuclear weapons capability. Of these nine states, the US, the UK, France, China and Russia are parties to the NPT; India, Pakistan and Israel have never been parties to the treaty; and North Korea withdrew in 2003.

²¹ Einhorn, R. and Sidhu, W. P. S. (2017), *The Strategic Chain: Linking Pakistan, India, China, and the United States*, Arms Control and Non-Proliferation Series Paper 14, Washington, DC: The Brookings Institution, https://www.brookings.edu/wp-content/uploads/2017/03/acnpi_201703_strategic_chain.pdf (accessed 14 Aug. 2019).

²² Krepon, M. (2015), 'Can Deterrence Ever Be Stable?', *Survival*, 57(3), pp. 111–32, doi:10.1080/00396338.2015.1046228 (accessed 14 Aug. 2019).

²³ See Acton, J. M. (2013), 'Reclaiming Strategic Stability', Carnegie Endowment for International Peace, 5 February 2013, <https://carnegieendowment.org/2013/02/05/reclaiming-strategic-stability-pub-51032> (accessed 27 Nov. 2019). Acton notes this definition derives in turn from Schelling (1960).

²⁴ Tannenwald, N. (2018), 'The great unravelling: The future of the nuclear normative order' in Tannenwald, N. and Acton, J. M. (2018), *Meeting the Challenges of the New Nuclear Age: Emerging Risks and Declining Norms in the Age of Technological Innovation and Changing Nuclear Doctrines*, Cambridge, MA: American Academy of Arts & Sciences, p. 13, https://www.amacad.org/sites/default/files/publication/downloads/New-Nuclear-Age_Emerging-Risks.pdf (accessed 14 Aug. 2019).

Questioning common rationality in crisis

Both multipolarity and the emergence of certain new strategic capabilities complicate and undermine the theory and practice of nuclear deterrence. A further problem has gradually come to the fore as science has increased understanding of human decision-making psychology. It is that the utilitarian rationality assumption possesses significant shortcomings, a critique that in recent decades has begun to be applied to nuclear debates.

Schelling and others were convinced that deterrence could work in the short and the long run because the catastrophic effects of a deterrence failure would induce each party to be very cautious in their actions. Each would take great care to avoid using nuclear weapons for any reason, except as a last resort or unless the adversary crossed a clear line. One person's definition of careful is not necessarily the same as another's, however. Each individual has a perception of risk that is at least partially subjective.

New understandings about rationality and the way people really tend to behave in stressful or crisis situations indicates that (a) people often do not have fixed or even stable preferences; (b) they are subject to cognitive biases or constraints that shade their thinking, without them necessarily being aware of this, especially in complex or crisis situations; and (c) humans have a poor intuitive grasp of probability. Taken together, these raise questions about the assumption that, in crisis, decision-makers can depend on their sharing a common rationality with the other side.

Problems with preferences

Emotions tend to specify a range of options for action in a given context.²⁵ How these rank in preference is frequently not rational in utilitarian terms. For instance, in humans and other primates, perceived unfairness is a powerful driver for behaviour that, in utilitarian terms, is not in one's best interest.²⁶ This is demonstrable even in simple games such as the 'ultimatum game', in which human test subjects will punish others for low monetary offers, even when in absolute terms they themselves stand to lose from the deal.²⁷

People appear to have an inbuilt bias in which they are more risk-seeking when there appears to be something to gain, and more risk-averse when they fear they have something to lose.

A second issue with the idea of stable, underlying preferences results from psychologists having shown that these preferences often depend on the way in which a situation is framed.²⁸ People appear to have an inbuilt bias in which they are more risk-seeking when there appears to be something to gain, and more risk-averse when they fear they have something to lose. Daniel Kahneman, whose work *Thinking, Fast and Slow* draws on joint work undertaken with Amos Tversky, showed that this frequently leads people to be inconsistent in their preferences and decision-making.²⁹

²⁵ Thayer, B. A. (2007), 'Thinking about Nuclear Deterrence Theory: Why Evolutionary Psychology Undermines Its Rational Actor Assumptions', *Comparative Strategy*, 26(4), pp. 311–23, doi: 10.1080/01495930701598573 (accessed 14 Aug. 2019).

²⁶ Proctor, D., Williamson, R. A., de Waal, F. B. M. and Brosnan, S. F. (2013), 'Chimpanzees play the ultimatum game', *Proceedings of the National Academy of Sciences*, 110(6), pp. 2070–5, <https://doi.org/10.1073/pnas.1220806110> (accessed 14 Aug. 2019).

²⁷ For a description, see Borrie and Thornton (2008), *The Value of Diversity in Multilateral Disarmament Work*, p. 31.

²⁸ For example, as shown by the Wason Selection Task. See Borrie and Thornton (2008), *The Value of Diversity in Multilateral Disarmament Work*, p. 32.

²⁹ Kahneman, D. (2011), *Thinking, Fast and Slow*, London: Allen Lane, pp. 367–8.

One upshot of this is that decision-makers in a nuclear crisis may well act less predictably than the assumption they are rational suggests they would. The issue is not because the people involved in decision-making are unaware of the potentially catastrophic consequences, nor that they choose to act irrationally. It is that, in some situations, humans are not equipped to think in a rational way, although nuclear deterrence theory assumes that they will. One study considering the role of emotions as being potentially at odds with nuclear deterrence theory observed that emotions can ‘create an overriding bias against objective facts or interfere with support mechanisms of decision-making such as one’s working memory, or the lessons we draw from past experience’.³⁰

Cognitive bias

The kinds of issue described above relate to the fact that humans have a range of innate cognitive heuristics or biases. Psychologists have demonstrated two decision-making systems – one that is intuitive and ‘fast’ but often imprecise (termed ‘system 1 thinking’), and one that is more considered, ‘slower’, and more akin – or amenable – to utilitarian rationality (‘system 2 thinking’). Some situations contribute to confusion between the two systems. Scholars have found instances in the Cold War when reasoned, human judgment (system 2 thinking) averted close calls of nuclear use, but also instances of very great psychological pressure in crisis that came close to nuclear use, such as when the US Navy inadvertently depth-charged Soviet nuclear-armed submarines during the 1962 Cuban missile crisis.³¹

In addition, humans exhibit a range of biases that can affect the ways in which they observe, collect, process and evaluate information, and which can make them less aware of what is really going on around them.³² A common theme with many of these biases is that they tend to lead to interpretations of events that support existing desires and beliefs, both in individuals and groups. Thus, it cannot necessarily be assumed that adversaries in a nuclear crisis even share enough of an outlook to enable reasonable predictions about the preferences and behaviour of the other side. This would appear a particular danger in the context of very isolated nuclear decision-making elites – in North Korea for instance – in whose perception nuclear use might be preferable to other outcomes such as losing power.

Probability

A third problem with the assumption of rationality in nuclear deterrence theory is demonstrated by mounting evidence that human minds are poorly equipped to understand certain aspects of probability. Yet assessments of probability are important for ranking preferences rationally. In particular, humans tend to misjudge randomness and non-linearity,³³ and are cognitively biased to consider unlikely events to be essentially impossible events.³⁴

This is a problem not only for decision-makers in crisis situations, but for the broader policy discourse around the risks of nuclear weapons and nuclear deterrence. Nuclear weapons have existed for 75 years. Yet they have not been detonated in anger since August 1945, when the

³⁰ Thayer (2007), ‘Thinking about Nuclear Deterrence Theory: Why Evolutionary Psychology Undermines Its Rational Actor Assumptions’, p. 317.

³¹ Lewis, P., Williams, H., Pelopidas, B. and Aghlani, S. (2014), *Too Close for Comfort: Cases of Near Nuclear Use and Options for Policy*, Chatham House Report, London: Royal Institute of International Affairs, pp. 8–9.

³² Fine, C. (2006), *A Mind of Its Own: How Your Brain Distorts and Deceives*, London: Icon.

³³ Taleb (2004), *Fooled by Randomness: The Hidden Role of Chance in Life and in the Markets*.

³⁴ Borrie and Thornton (2008), *The Value of Diversity in Multilateral Disarmament Work*, p. 43.

US dropped atomic bombs on the Japanese cities of Hiroshima and Nagasaki. Instead, nuclear weapons have assumed core and enduring functions within the strategies of the world's most powerful states and their allies to deter their adversaries. Some proponents of nuclear deterrence point to this situation of nuclear possession without detonation as proof of the concept's continued efficacy,³⁵ when, in fact, there is no definitive evidence to support this confidence.

Inductive reasoning about the past is not of unconditional benefit in considering 'black swans' (extremely low-probability/exceedingly high-consequence events) that underlie many things in reality, including the risk of nuclear war. Rather, it is conceivable that the world has simply been lucky to avoid nuclear use, either inadvertently or deliberately caused. This is something that, as scholars have observed, nuclear policymakers seem to find hard to accept.³⁶ Nonetheless, it would be rational to adopt a greater degree of openness towards rigorous probabilistic analysis,³⁷ and it may lead to greater urgency among possessors of nuclear weapons to finally begin to transition away from these as a basis for their security.

Concluding thought

This brief essay has introduced some issues with assumptions of rationality as it relates to nuclear deterrence. The broader point is that, when it comes to future nuclear crises, we simply do not know whether a common rationality will hold among the decision-makers involved to prevent nuclear weapon use – whether deliberately in certain cases, or as a plausible inadvertent outcome. The deductive logic of nuclear deterrence theory is not backed by enough empirical evidence based on nuclear crisis or war to say with a high level of confidence that nuclear deterrence will lead to non-use in all cases. Consequently, there is an inherent risk of nuclear use in nuclear deterrence as a practice (which, as noted above, is by its own logic intrinsic to nuclear deterrence). Given this risk, a crucial question to be asked is if nuclear deterrence is still worth it, whatever its efficacy is perceived to have been in the past.

³⁵ For instance, see Tertrais, B. (2011), *In Defense of Deterrence: The Relevance, Morality and Cost-Effectiveness of Nuclear Weapons*, Paris: Institut Français des Relations Internationales, p. 26, <https://www.ifri.org/sites/default/files/atoms/files/pp39tertrais.pdf> (accessed 14 Aug. 2019).

³⁶ Pelopidas, B. (2017), 'The unbearable lightness of luck: Three sources of overconfidence in the manageability of nuclear crises', *European Journal of International Security*, 2(2), pp. 240–62, doi: <https://doi.org/10.1017/eis.2017.6> (accessed 14 Aug. 2019).

³⁷ See Box 1 in Borrie (2014), *Risk, 'normal accidents', and nuclear weapons*.

3. Nuclear Deterrence Destabilized

Maria Rost Rublee

Introduction

With the failure of talks between US President Donald Trump and North Korean leader Kim Jong-un, heightened tensions between nuclear-armed India and Pakistan, and the collapse of the Intermediate-Range Nuclear Forces (INF) Treaty, the need for high-quality policy solutions to nuclear crises is more critical than ever. Too often, however, rather than take the risk of nuclear war seriously in response to these crises, politicians and analysts fall back on the old standby of nuclear deterrence – ‘deterrence will hold’. But the world has changed dramatically since the Cold War era, when nuclear deterrence was born. A confluence of changes to technological, domestic and strategic landscapes has destabilized nuclear deterrence, and it would be dangerous to maintain a continued, unquestioning reliance on it.

The Cold War logic of nuclear deterrence maintains that nuclear-armed states will not attack one another because of fear of massive retaliation, or mutually assured destruction (MAD). By this logic, nuclear weapons promote stability and can prevent war. In the words of realist scholar Kenneth Waltz, ‘Those who like peace should love nuclear weapons.’³⁸ Whether nuclear deterrence actually worked during the Cold War is a matter for debate; analysts still argue whether the lack of a major war between the superpowers was due to deterrence or to other factors.³⁹ However, even if deterrence worked in the past, it is unlikely to do so in future.

To evaluate the present-day utility of nuclear deterrence, this essay examines some of the key assumptions that hide within its pithy logic, and focuses on three key problems with nuclear deterrence today: the destabilization of second-strike capabilities; incomplete and inaccurate information; and the growing trend for states to reject outright the logic of MAD. While these trends were present during the years of US–Soviet competition, they have evolved and intensified since then due to technological changes and the expansion in the number of nuclear weapons.

The destabilization of second-strike capabilities

Nuclear deterrence is heavily reliant on second-strike capability – the ability of a state to launch a devastating (nuclear) response to a nuclear attack. Otherwise, a nuclear first strike could be a knock-out blow, and states would have strong incentives for first use. However, technological advances, particularly in cyberwarfare, have the potential to destabilize the assurance of second-strike capability, particularly for countries with smaller arsenals. Known as ‘left-of-launch’ tactics, because they pre-empt an opponent’s ability to launch missiles, these cyber and electronic techniques

³⁸ Waltz, K. (2010), ‘Is Nuclear Zero the Best Option? Waltz Says No’, *The National Interest*, 24 August 2010, <https://nationalinterest.org/greatdebate/no-3951> (accessed 24 Feb. 2019).

³⁹ Wilson, W. (2008), ‘The Myth of Nuclear Deterrence’, *The Nonproliferation Review*, 15(3), pp. 421–39, doi: 10.1080/10736700802407101 (accessed 14 Aug. 2019); see also Culp, D. (2012), ‘A Critical Examination of “The Myth of Nuclear Deterrence”’, *The Nonproliferation Review*, 19(1), pp. 51–68, doi: 10.1080/10736700.2012.655085 (accessed 14 Aug. 2019).

can ‘sabotage missile components, impair command and control systems, or jam communication signals’.⁴⁰ Left of launch is likely to encourage, rather than deter, nuclear use. For example, the leader of state Y fears that their ability to launch a second strike could be compromised by left-of-launch cyber tactics by state X. In this scenario, leader Y has a greater incentive to launch nuclear weapons before the start of a conflict, for fear they will not be able to do so later.

These concerns are not hypothetical: Pentagon officials have publicly discussed the merits of being able to undermine North Korea’s nuclear command and control, as well as its missile launches.⁴¹ If Kim Jong-un suspects electronic warfare may keep him from communicating with field units in a time of crisis, he may pre-delegate nuclear launch authority to field commanders, which also increases the risk of nuclear use.⁴² As Narang and Panda argue: ‘With communications disrupted, the Korean People’s Army units tasked with nuclear operation would come under intense use-it-or-lose-it pressure without knowledge of whether Kim Jong-un and the Supreme Headquarters remained intact or had been decapitated.’⁴³ Moreover, it is unlikely that the US is the only country engaged in left-of-launch activities; both China and Russia have strong cyberwarfare capabilities. As assurance in second-strike capability erodes, nuclear deterrence is undermined to a serious extent right across the globe.

Imperfect information

Deterrence is about influencing a potential adversary’s cost-benefit calculus, assessment of risk, and decision-making processes. It requires a thorough understanding of a potential adversary’s priorities, perceptions, and strategies.⁴⁴

For nuclear deterrence to prevent war, correct and comprehensive information is crucial. Without a deep understanding of priorities and perceptions, miscalculations can lead to an underestimation of the likelihood of escalation and potential nuclear use. During the Cold War, with only two critical actors to consider, information was easier for each to acquire about the other. Now, however, the expansion in the number of nuclear-armed states has led to a corresponding increase in potential nuclear exchanges. In addition, the amount of deep understanding required between potential nuclear adversaries has increased exponentially, encompassing nuclear capabilities, command and control systems, national security culture, threat perceptions, pressure from domestic interests, leader aspirations and objectives, and more. This is a major qualitative change in deterrence context, from bipolar ‘analogue’ to multipolar ‘digital’.⁴⁵

⁴⁰ Gartzke, E. and Lindsay, J. (2017), ‘The U.S. wants to stop North Korean missiles before they launch. That may not be a great idea’, *Washington Post*, 15 March 2017, <https://www.washingtonpost.com/news/monkey-cage/wp/2017/03/15/the-u-s-wants-to-stop-north-korean-missiles-before-they-launch-that-may-not-be-a-great-idea/> (accessed 27 Feb. 2019).

⁴¹ Broad, W. J. and Sanger, D. E. (2017), ‘U.S. Strategy to Hobble North Korea Was Hidden in Plain Sight’, *New York Times*, 4 March 2017, <https://www.nytimes.com/2017/03/04/world/asia/left-of-launch-missile-defense.html> (accessed 3 Mar. 2019).

⁴² Panda, A. (2018), ‘The Right Way to Manage a Nuclear North Korea: Exploring “Left-of-Launch” Options Is a Dangerous Mistake’, *Foreign Affairs*, 19 November 2018, <https://www.foreignaffairs.com/articles/north-korea/2018-11-19/right-way-manage-nuclear-north-korea> (accessed 30 Nov. 2019).

⁴³ Narang, V. and Panda, A. (2017), ‘Command and Control in North Korea: What A Nuclear Launch Might Look Like’, *War On the Rocks*, 15 September 2017, <https://warontherocks.com/2017/09/command-and-control-in-north-korea-what-a-nuclear-launch-might-look-like> (accessed 7 Mar. 2019).

⁴⁴ Peters, Anderson and Menke (2018), ‘Deterrence in the 21st Century: Integrating Nuclear and Conventional Force’.

⁴⁵ I thank an anonymous reviewer for this point.

In this context, incomplete or incorrect information is now more than ever likely to lead to a failure of nuclear deterrence. For example, a lack of understanding about military strategies could lead to a potential nuclear exchange. As Caitlin Talmadge argues, the US prefers rapid strikes deep into enemy territory early in a conflict.⁴⁶ If applied against China, however, such tactics could lead to a nuclear response because of the fact that Beijing intermingles its conventional and nuclear forces.⁴⁷ Faced with uncertainty as to whether Washington was attempting to take out its nuclear capabilities, China could decide to use its nuclear option while it was still largely intact.⁴⁸

In a completely different vein, the regime type of a nuclear-weapon state also influences the availability of comprehensive and correct information about a potential adversary. Scott Sagan argues that ‘personalist dictatorships’ are a grave threat to nuclear peace: ‘A leader surrounded by yes-men will have no one who can question faulty assumptions, much less challenge his decision-making.’⁴⁹ As applied to North Korea, therefore, nuclear deterrence relies on Kim Jong-un having an accurate understanding of US priorities and perceptions, and vice versa. To provide another example, the importance of two-level games – involving the interaction of international and domestic politics – also makes it exceedingly difficult for decision-makers to acquire information with the necessary detail and accuracy to understand adversaries’ intentions. One stark example is the February 2019 Kashmir crisis, driven by complexities arising from disputed territory, semi-autonomous sub-state actors, domestic political considerations, and deeply felt historical wounds. In such a context, how could India and Pakistan fully understand each other’s perceptions and intentions?

If decision-makers believe incorrectly that their adversary has launched a nuclear attack, and so launch a counterattack, then for all practical purposes deterrence has failed.

Successful nuclear deterrence also requires leaders to have accurate and comprehensive technical information. If decision-makers believe incorrectly that their adversary has launched a nuclear attack, and so launch a counterattack, then for all practical purposes deterrence has failed. The missile flight time between India and Pakistan can be as little as five minutes.⁵⁰ Even if each country has highly sophisticated early-warning systems, how does a state record and transmit the news of an incoming attack, and how does the leader make an informed decision, within a timescale of just five minutes? Moreover, given the geographic proximity of India and Pakistan, false alerts on either side could also result in a nuclear response. Other technical failures could lead to nuclear use: some speculate that India, despite its ‘No First Use’ pledge, might launch a first strike against Pakistan if, for example, it believed it detected Islamabad readying tactical nuclear weapons for battlefield use.⁵¹ India’s detection capabilities would then add another layer of complexity in nuclear decision-making.

⁴⁶ Talmadge, C. (2018), ‘Beijing’s Nuclear Option’, *Foreign Affairs*, 97(6), November/December 2018, pp. 44–50.

⁴⁷ Ibid.

⁴⁸ Ibid.

⁴⁹ Sagan, S. D. (2018), ‘Armed and Dangerous’, *Foreign Affairs*, 97(6), November/December 2018, pp. 35–43.

⁵⁰ Mian, Z., Rajaraman, R. and Ramana, M. V. (2003), ‘Early Warning in South Asia – Constraints and Implications’, *Science & Global Security*, 11(2–3), pp. 109–50, doi: 10.1080/714041033 (accessed 3 Mar. 2019).

⁵¹ Sundaram, K. and Ramana, M. V. (2018), ‘India and the Policy of No First Use of Nuclear Weapons’, *Journal for Peace and Nuclear Disarmament*, 1(1), pp. 152–68, doi: 10.1080/25751654.2018.1438737 (accessed 3 Mar. 2019).

In all these cases, the quality of decision-making is only as good as the quality of the information generated by complex technology and operating systems, which are imperfect – as is richly demonstrated in Eric Schlosser’s harrowing documentation of nuclear accidents in the US.⁵²

Nuclear use ≠ nuclear Armageddon

The crux of nuclear deterrence is that states will not use nuclear weapons for fear of a return strike. If decision-makers believe that limited nuclear use is possible without triggering a nuclear response, nuclear deterrence is undermined. With the end of bipolarity and the expansion of nuclear-weapon states, the likelihood of limited nuclear use has increased. While the US and the Soviet Union both considered options for limited nuclear war during the Cold War, the possibilities thereof have multiplied with the rise of numerous regional nuclear states who have reasons to consider first use.⁵³ For example, a nuclear adversary could potentially use nuclear weapons, not against the US homeland, but in its own region or in a demonstration effect, to deter Washington from intervening in a conflict outside its hemisphere.⁵⁴ North Korea, for instance, has ‘explicitly threatened to conduct theatre nuclear strikes to prevent the United States from marshalling the forces required to conquer North Korea’.⁵⁵ Furthermore, Pyongyang has simulated nuclear strikes against South Korea as well as against US bases in Japan.⁵⁶ Nuclear use may be more likely when a new nuclear state is part of the equation, because they would not be constrained by the institutionalized communication channels, knowledge of ‘red lines’, and alliance constraints that benefited the US–Soviet relationship.⁵⁷

There is evidence, too, that Russia has once again returned to planning for a limited nuclear first strike. For example, Russia’s 2017 naval strategy included a statement that ‘being ready and willing to use nonstrategic nuclear weapons in an escalating conflict can successfully deter an enemy’;⁵⁸ Russian officials have made ‘threats to use nuclear weapons against ballistic missile-defense facilities, and in regional scenarios that do not threaten Russia’s survival’;⁵⁹ and President Vladimir Putin himself publicly noted that he considered putting the country’s nuclear forces on alert during the Crimea crisis of 2014.⁶⁰ However, even if Russia has not adopted an ‘escalate to de-escalate’ strategy, the Pentagon believes it has, and is now making plans to combat this, as explicitly referenced in the 2018 Nuclear Posture Review.

With regard to China, most evidence indicates that Beijing’s No First Use policy guides strategy and planning; however, a number of texts encourage the use of nuclear forces for the purposes of escalation control in conventional warfare.⁶¹ Some analysts argue that Chinese nuclear policy

⁵² Schlosser, E. (2013), *Command and control: Nuclear Weapons, the Damascus Accident, and the Illusion of Safety*, New York: Penguin Press.

⁵³ Jeffrey Larsen and Kerry Kartchner note this assessment has become ‘almost axiomatic’ in strategic policy circles. See Larsen, J. and Kartchner, K. (eds) (2017), *On Limited Nuclear War in the 21st Century*, Stanford, CA: Stanford University Press, p. xix.

⁵⁴ Kartchner, K. and Gersen, M. (2014), ‘Escalation to Limited Nuclear War in the 21st Century’, in Larsen and Kartchner (eds) (2017), *On Limited Nuclear War in the 21st Century*, pp. 153–4.

⁵⁵ Warden, J. K. and Panda, A. (2019), ‘Goals for any arms control proposal with North Korea’, *Bulletin of the Atomic Scientists*, 13 February 2019, <https://thebulletin.org/2019/02/goals-for-any-arms-control-proposal-with-north-korea/> (accessed 24 Feb. 2019).

⁵⁶ Lewis, J. (2017), ‘North Korea Is Practicing for Nuclear War’, *Foreign Policy*, 9 March 2017, <https://foreignpolicy.com/2017/03/09/north-korea-is-practicing-for-nuclear-war/> (accessed 24 Feb. 2019).

⁵⁷ Kartchner and Gersen (2014), ‘Escalation to Limited Nuclear War in the 21st Century’, pp. 163–5.

⁵⁸ Oliker, O. (2018), ‘Moscow’s Nuclear Enigma’, *Foreign Affairs*, 97(6), November/December 2018, pp. 52–7.

⁵⁹ Kristensen, H. M. and Norris, R. S. (2017), ‘Russian nuclear forces, 2017’, *Bulletin of the Atomic Scientists*, 73(2), pp. 115–26, doi: 10.1080/00963402.2017.1290375 (accessed 3 Mar. 2019).

⁶⁰ Smith-Spark, L., Eshchenko, A. and Burrows, E. (2015), ‘Russia was ready to put nuclear forces on alert over Crimea, Putin says’, CNN, 16 March 2015, <https://edition.cnn.com/2015/03/16/europe/russia-putin-crimea-nuclear/index.html> (accessed 3 Mar. 2019).

⁶¹ Yeaw, C., Erickson, A. and Chase, M. (2012), ‘The Future of Chinese Nuclear Policy and Strategy’, in Yoshihara, T. and Holmes, J. R. (eds) (2012), *Strategy in the Second Nuclear Age*, Washington, DC: Georgetown University Press.

may retain No First Use for its strategic nuclear forces, but permit a 'limited war-fighting approach' for its non-strategic nuclear forces.⁶² With both new and established nuclear states planning for nuclear first use, deterrence has eroded.

Nuclear deterrence: disrupted and dangerous

Continued unquestioning reliance on nuclear deterrence is dangerous. During the Cold War, only the two principal actors had to be accounted for. Today, however, we are faced with a dramatic increase in the variables that can disrupt nuclear strategy: an increase in nuclear-armed states, with differing pre-existing conflicts (such as territorial disputes); a greater variety of domestic variables that may influence nuclear decision-making (including regime type, electoral politics, and nationalism); and numerous technological changes that can affect nuclear use. It is no surprise that states have responded with changes in nuclear doctrine. Unfortunately, thinking about nuclear deterrence has not kept pace with these changes; even proponents of deterrence call it 'static and stagnant'.⁶³ Some argue that deterrence may be upheld through greater transparency and diplomacy; however, these are often the first principles to be abandoned in the face of the crises from which deterrence is supposed to save us. Regardless of whether it is desirable for nuclear deterrence to hold, the evidence is that it has instead been destabilized, and continued reliance on it may lead to nuclear use for the first time in 70 years.

⁶² Johnson, J. S. (2019), 'Chinese Evolving Approaches to Nuclear "War-Fighting": An Emerging Intense US-China Security Dilemma and Threats to Crisis Stability in the Asia Pacific', *Asian Security* 15(3), p. 218.

⁶³ Peters, Anderson and Menke (2018), 'Deterrence in the 21st Century: Integrating Nuclear and Conventional Force'.

4. Connecting the Dots: US Extended Nuclear Deterrence and Denuclearization of the Korean Peninsula

Cristina Varriale

Extended nuclear deterrence is a key feature of the security framework on the Korean peninsula. Despite hints of a weakening US–South Korean alliance,⁶⁴ the US commitment to providing extended nuclear deterrence to South Korea still has relevance for peace and security on the peninsula. US conventional and nuclear weapons are still perceived as a threat to Pyongyang – a perception that is reinforced by the presence of US military systems in the region. Despite this, the US extended nuclear deterrent commitment to South Korea appears to have been an inconsistent feature of diplomacy with North Korea. Throughout 2018, inter-Korean diplomacy pushed ahead to take steps in support of improving the security environment and developing peaceful relations between the two Koreas. In parallel, the US–North Korea diplomatic track, tasked with addressing the nuclear issue and in support of improving relations between Washington and Pyongyang through denuclearization, proceeded at a slower pace initially, and both areas of engagement are now stalled. Although the US–North Korea engagement initially included military issues, these were latterly faded out in favour of a reliance on sanctions relief as the prominent offering.

Diplomacy with North Korea offers an opportunity to reduce the salience of nuclear weapons on the Korean peninsula, as well as reducing conventional military risk, and is of course worthy of energetic pursuit. However, denuclearization is not an issue distinct from the US–South Korean alliance. The US military presence in South Korea contributes to Pyongyang’s perception of threat, and, more generally, to the security environment that has in part driven the North’s acquisition of nuclear weapons. Failure to retain this as a central consideration in any negotiation process with North Korea might put limits on how far denuclearization can proceed.

There are three broad components to the extension of US deterrence to South Korea. First, the two states conduct combined military exercises. These exercises are designed to allow the US and South Korean forces to practise interoperability, to maintain readiness in the event of conflict with North Korea, and to prepare South Korean forces for the transfer of wartime operational control. Although US nuclear weapons were withdrawn from South Korea in the early 1990s, under the administration of George H. W. Bush, the joint exercises have included a demonstration of an enduring nuclear commitment to the security of South Korea through the involvement of nuclear-capable aircraft. This is intended as a show of extended nuclear deterrence,⁶⁵ and has been reiterated through US Air Force bomber runs from Guam in response to North Korean provocations. Although these activities are in part designed to demonstrate resolve and capability to North Korea in support of deterrence, they also play a part in providing assurances to South Korea, and in reminding

⁶⁴ Kim, S. (2018), ‘Troubling signs in US–South Korean alliance’, The Hill, 2 November 2018, <https://thehill.com/opinion/national-security/414407-troubling-signs-in-us-south-korea-alliance> (accessed 14 Aug. 2019).

⁶⁵ For example, see US Department of Defense (2013), ‘Statement by Deputy Secretary of Defense Ashton B. Carter at U.S. Embassy Seoul’, 18 March 2013, <http://archive.defense.gov/Speeches/Speech.aspx?SpeechID=1760> (accessed 27 Nov. 2019).

both Koreas that the US is committed to the protection of its ally.⁶⁶ Second, and for similar reasons, approximately 28,000 US troops are stationed in South Korea. Third, to underpin these efforts, during 2016 the US and South Korea also created the Extended Deterrence Strategy and Consultation Group (EDSCG), to improve political coordination and communication in relation to deterring North Korea.⁶⁷ This, however, is a relatively new initiative that may have suffered from the increased priority given to diplomatic engagement with North Korea in more recent years, rather than public efforts to address the threats its nuclear and missile programmes pose.⁶⁸

The US–South Korean alliance has been faced with a number of issues related to the extended deterrence commitment in recent years. As North Korea’s capabilities have undergone rapid development under the leadership of Kim Jong-un, there has been a commensurate need for change in the way in which South Korea and the US tailor deterrence. To some extent, the EDSCG is meant to deal with this challenge. In addition, disagreements over the amount to be contributed by South Korea to the costs of the US military presence, as well as over the military pressure brought by the US on North Korea during 2017, and the question of how the alliance should manage Seoul’s desire, under the administration of Moon Jae-in, to pursue an improvement in inter-Korean relations ahead of more concrete steps on the nuclear front, continue to fuel doubts over the health of the alliance.⁶⁹ This raises questions as to what extent the US and South Korea are currently aligned in their thinking on the role played by extended deterrence on the Korean peninsula, and how they might be able to take a flexible approach in order to foster diplomacy and denuclearization with North Korea.

As North Korea’s capabilities have undergone rapid development under the leadership of Kim Jong-un, there has been a commensurate need for change in the way in which South Korea and the US tailor deterrence.

US extended deterrence has sought to bolster the defence of South Korea as the nuclear threat from the North has developed. This has resulted in a security dilemma, with increased provocations from North Korea leading to a more visible US military presence intended to underscore its commitment to the defence of the South, which in turn contributes to North Korea’s drive to bolster its nuclear weapons capability, which has led to a bolstering of the US military presence, and so on. South Korea’s development of its own advanced conventional capabilities has in recent years also contributed to this cyclical security environment.

Although the US has not stationed nuclear weapons in the South for almost two decades, nuclear and conventional deterrence issues on the Korean peninsula remain connected. The continued presence of the North’s long-range artillery keeping Seoul in clear range may be a reflection of North Korea’s desire to be able to hold Seoul at risk not only in response to inter-Korean tensions and hostility, but also for reasons of leverage and balance in relation to the threat posed by US military capabilities.⁷⁰ Furthermore, its long-range artillery offers North Korea a quick response

⁶⁶ Collins, R. (2014), ‘A Brief History of the US-ROK Combined Military Exercises’, 38 North, 26 February 2014, <https://www.38north.org/2014/02/rcollins022714/> (accessed 27 Nov. 2019).

⁶⁷ US Embassy and Consulate in Korea (2017), ‘Joint Statement on the Extended Deterrence Strategy and Consultation Group’, 5 September 2017, <https://kr.usembassy.gov/090517-joint-statement-extended-deterrence-strategy-consultation-group/> (accessed 27 Nov. 2019).

⁶⁸ Chun, I. (2019), ‘U.S. Extended Deterrence and the Korean Peninsula’s Changing Threat Environment’, Council on Foreign Relations, 29 April 2019, <https://www.cfr.org/blog/us-extended-deterrence-and-korean-peninsulas-changing-threat-environment> (accessed 27 Nov. 2019).

⁶⁹ Pardo, R. P. (2018), ‘Will America Lose Seoul? Redefining a Critical Alliance’, War on the Rocks, 5 September 2018, <https://warontherocks.com/2018/09/will-america-lose-seoul-redefining-a-critical-alliance/> (accessed 27 Nov. 2019).

⁷⁰ Varriale, C. (2018), *A Long Road to Denuclearisation: Challenges to Security-Based Diplomacy with North Korea*, RUSI Occasional Paper, https://rusi.org/sites/default/files/201812_op_security_based_diplomacy_in_north_korea_web.pdf (accessed 27 Nov. 2019).

asset, especially in relation to superior US air power in the region. The US has regularly demonstrated the latter by flying dual-capable (conventional and nuclear) bombers over or close to the peninsula in so-called ‘deterrence runs’, reminding both its allies and its foes of the extent of its nuclear capability. While these flights are usually conducted in response to a provocation by North Korea, or within the framing of combined exercises with the South (and are therefore referred to as legitimate),⁷¹ they remain a cause of concern for North Korea and heighten the threat perception that has helped drive the acquisition of nuclear weapons by Pyongyang.

Attempts were made in 2018 to break the cycle. The Moon administration in South Korea has consciously prioritized broad peace and security in its developing relationship with the North, which has given rise to new efforts to improve the bilateral defence relationship. Most notable is the Agreement on the Implementation of the Historic Panmunjom Declaration in the Military Domain, signed in Pyongyang in September of that year.⁷² This agreement outlines a series of action points taken – from the creation of no-fly zones to improved communications – in support of transforming hostile military relations with the aim of avoiding any military clashes, accidental or otherwise. Although this remains a bilateral agreement, and its full implementation was called into question in 2019,⁷³ it remains significant in that it recognizes that conventional military issues have a part to play in addressing denuclearization.

However, the most important area where steps have been taken to specifically address the linkage between extended deterrence and denuclearization was the suspension by the US in 2018–19 of large-scale combined military exercises with South Korea, with the stated purpose of fostering an improved atmosphere in support of diplomacy.⁷⁴

From the perspective of denuclearization, the issue of US extended deterrence to South Korea is a trilateral one; the limits to using provisions that support US extended deterrence to South Korea as concessions in negotiations with North Korea might mean there is a limit to the concessions the latter is willing to make in relation to its nuclear weapons programme. Steps to address broader military concerns have been demonstrated already through the most recent phase of engagement with North Korea in 2018, resulting in efforts to reduce conventional threats and risks in order to create space for engagement on the nuclear front. Although US President Donald Trump suspended the US–South Korea large-scale combined military exercises in 2018 – and the 2019 iterations were reformulated, with small exercises again being cancelled in the interests of supporting nuclear diplomacy – these efforts were subject to criticism from former military personnel and non-governmental experts, and have not been formalized.⁷⁵ Furthermore, since the US–North Korea summit in Hanoi in February 2019, military issues appear to have been reduced to a lesser factor in denuclearization; sanctions relief has become the primary discussion point for trade-offs with North Korea (should diplomacy move forward); and for the upcoming 2020 iterations of the

⁷¹ See Yonhap News (2018), ‘Kissinger rejects ‘freeze-for-freeze’ with N. Korea’, 26 January 2018, <https://en.yna.co.kr/view/AEN20180126000200315> (accessed 14 Aug. 2019); Yun, B. S. (2017), Security Council Thematic Meeting on Denuclearization of the DPRK, Remarks by H. E. Yun Byung-se, Minister of Foreign Affairs, 28 April 2017.

⁷² 2018 Agreement on the Implementation of the Historic Panmunjom Declaration in the Military Domain, <https://www.ncnk.org/resources/publications/agreement-implementation-historic-panmunjom-declaration-military-domain.pdf> (accessed 27 Nov. 2019).

⁷³ Panda, A. (2019), ‘South Korea Expresses ‘Regret’ at North Korean Violation of 2018 Military Agreement’, *The Diplomat*, 26 November 2019, <https://thediplomat.com/2019/11/south-korea-expresses-regret-at-north-korean-violation-of-2018-military-agreement/> (accessed 10 Feb. 2020).

⁷⁴ US Department of Defense (2018), Press Statement on Military Exercises on the Korean Peninsula, 22 June 2018, <https://www.defense.gov/Newsroom/Releases/Release/Article/1558403/press-statement-on-military-exercises-on-the-korean-peninsula/> (accessed 10 Feb. 2020).

⁷⁵ Denmark, A. M., Ford, L. (2018), ‘America’s Military Exercises in Korea Aren’t a Game’, *Foreign Policy*, 21 June 2018, <https://foreignpolicy.com/2018/06/21/americas-military-exercises-in-korea-arent-a-game/> (accessed 27 Nov. 2019).

exercises, reports have already suggested that elements removed or scaled down over the past 18 months may be reinstated as a result of the increased belligerence from North Korea during the latter part of 2019.⁷⁶

Both North Korea's nuclear programme and the US–South Korea military alliance form key components of the security context on the Korean peninsula. Addressing the connection between conventional and nuclear military issues on the peninsula will need to remain a prominent feature of the relevant parties' diplomacy with Pyongyang if long-term and concrete changes to North Korea's nuclear programme are to be taken seriously. North Korea has hitherto had to make little change to the threat it poses to others, but was able to enjoy the benefit of an improved atmosphere through 2018 and much of 2019. This has bought Pyongyang time in which it has been able to continue to develop its nuclear and missile capabilities.⁷⁷ But the US and South Korea should be willing to consider both flexibility in how the extended deterrence commitment manifests in reality, and making further amendments to how the extended deterrence relationship works in practice at different stages of denuclearization. Although this process may take time, both the US and South Korea should continue to work to understand how extended deterrence could feature in denuclearization. This entails assessing where changes to the practical elements of the relationship could be made, and what corresponding measures from North Korea might look like. The suspension of US–South Korean large-scale military activities, to create space for diplomacy and reduce the opportunity for miscalculation, along with South Korea's efforts to improve the inter-Korean military relationship, should of course both be welcomed. Efforts in this regard should be formalized, and military issues should be kept prominent in both the inter-Korean process and that of US–North Korean diplomatic engagement. This must, however, take place in tandem with steps to cap North Korea's nuclear programme, to restrict North Korea's ability to create room to 'decouple' the alliance, without having to make significant changes to both its conventional and nuclear capabilities that pose risks not just to the peninsula but also further afield.

Without consideration of the bigger picture of the security environment on the Korean peninsula, and the role the US presence and extended nuclear deterrence plays in that, long-term efforts to cap and roll back North Korea's nuclear programme will likely be limited. The role of nuclear deterrence features prominently in North Korean thought. Connecting the dots between the enduring military concerns on the peninsula and any respective agreements between the US, South Korea and North Korea will be important in ensuring that Pyongyang is not left in a situation where it has taken limited or no steps to constrain its own nuclear programme, yet perceives the US–South Korea extended deterrence relationship as weakened. Without this coordination across engagement, nuclear weapons will continue to cast a shadow over the peninsula.

⁷⁶ Yonhap (2020), 'S. Korea, US to adjust combined drills for diplomacy with N. Korea: defense ministry', *Korea Herald*, 2 January 2020, <http://www.koreaherald.com/view.php?ud=20200102000582> (accessed 8 Jan. 2020).

⁷⁷ Elleman, M. (2019), 'North Korea's New Pukgusong-3 Submarine-Launched Ballistic Missile', 38 North, 3 October 2019, <https://www.38north.org/2019/10/melleman100319/> (accessed 9 Jan 2020).

5. Australia and Extended Nuclear Assurance

Tanya Ogilvie-White

Could Australia be losing faith in nuclear assurances? And, if so, could it become the first country to extract itself from US extended nuclear deterrence? These are tantalizing questions for the community of people looking for ways to advance nuclear disarmament. Since the early days of the Cold War, reliance on US nuclear weapons has brought more than 30 countries into a seemingly unshakeable strategic network, used to justify and legitimize the US's retention of the world's largest and most sophisticated nuclear arsenal. The idea that one or more of the countries that shelter under US nuclear umbrellas are losing confidence in nuclear assurances could provide a rare opportunity to push nuclear disarmament forward, adding strategic momentum to humanitarian rationales. But, in Australia's case at least, the obstacles to change are far greater than is often realized: although influential voices in Canberra are indeed questioning the wisdom of continuing to rely on US nuclear weapons, a policy reversal is highly unlikely.⁷⁸ This is because decades of defence decision-making have made Australia militarily dependent on the US in ways that are now very difficult to change.

The Cold War and US–Australia strategic ties

It is an interesting history, and not one that is widely known within Australia, let alone beyond its shores. A critical turning point can be traced back to the years following the Cuban missile crisis of 1962, which exposed a serious gap in US global strategic communications – a gap that Canberra helped to close by agreeing to host sensitive US facilities on Australian soil (initially at North West Cape, Western Australia). That assistance – which has since deepened and expanded via the commissioning of additional jointly operated facilities at Pine Gap, Northern Territory, and elsewhere – has determined Australia's strategic posture for more than half a century. In return for agreeing to host the US facilities, which enable extensive intelligence collection, ballistic missile early warning, and submarine and satellite-based communications, the US provides Australia (or so Australia believes) with a nuclear umbrella and – equally desirable – with access to advanced US technology and high-end interoperable military equipment that would otherwise be well beyond Canberra's means. These provisions weakened Australia's motivation to keep open the option to pursue an independent nuclear weapons capability, and over more than five decades have ensured that Australian and US defence capabilities have been bound together in a way that boosts US global reach and enhances Australia's defence potency.

The extent of these strategic ties, and the rationale for maintaining them, are set out in Australian defence white papers, which emphasize that the US alliance is not only critical to maintaining Australia's 'overall defence capability', but is also essential to preserving stability and security in the Indo-Pacific 'for decades to come'.⁷⁹ Despite this official position, however, the wisdom

⁷⁸ See for example White, H. (2019), *How to Defend Australia*, Carlton: La Trobe University Press, and numerous contributions by former Australian defence officials on *The Strategist* in 2018–19.

⁷⁹ Australian Government Department of Defence (2016), *2016 Defence White Paper*, <http://www.defence.gov.au/WhitePaper/Docs/2016-Defence-White-Paper.pdf> (accessed 14 Aug. 2019).

of strategically tethering Australia so closely to the US has sometimes been questioned, particularly when plans for additional joint facilities have been revealed, and when Australia has been pulled into US military operations around the world (some of which it supports under the terms of the 1951 ANZUS Treaty). Concerns have tended to centre on whether, if Australia faced a serious threat, the US would indeed intervene on its behalf, given that by hosting and supporting some of its ally's most sensitive strategic capabilities, Australia itself represents a significant target for US adversaries.⁸⁰ To put it bluntly, if Australia was threatened with nuclear attack by an enemy with sophisticated nuclear capabilities, would the US be willing to put American lives at risk by coming to Canberra's aid? The answer to this critical question has never been clear. Indeed, unlike Japan, Australia has never received an explicit, public promise of nuclear assurance from Washington, despite stating its own expectations in successive white papers since 1994.

Uncertainty surrounding US strategic resolve has been tolerated by Canberra over the years, partly because the US has been regarded as a constant, reliable and trusted partner, with strong incentives to help protect Australia's territorial integrity by both conventional and nuclear means.

Uncertainty surrounding US strategic resolve has been tolerated by Canberra over the years, partly because the US has been regarded as a constant, reliable and trusted partner, with strong incentives to help protect Australia's territorial integrity by both conventional and nuclear means. Also, on an even more esoteric level, it is often argued that extended nuclear deterrence has sufficient credibility in a world where possession of nuclear weapons is restricted to just a few states, limiting the costs and risks associated with providing nuclear assurances to allies.⁸¹ For these reasons, and because until recently Australia has not been faced with a potential adversary with a highly sophisticated nuclear weapons capability within its own region, questions over the reliability of the US nuclear umbrella have been acknowledged but not over-emphasized by Canberra-based strategic experts, many of whom have tended to emphasize the benefits of the US alliance.

China's rise and strategic change in the Indo-Pacific

But times are changing. As those who follow Australian strategic debates will know, questions over the wisdom of Australia's military dependence on the US, including the reliability of the latter's nuclear umbrella, are back in the spotlight, and this time they are accompanied by a palpable sense of anxiety.⁸² Advances in North Korea's nuclear weapons capabilities are just one of the causes of Australia's mounting insecurity, which needs to be understood in the broader context of China's rise and the Indo-Pacific's long-term strategic outlook. China's growing military sophistication, combined with its assertiveness in Australia's strategic neighbourhood (the East and South China seas, and the South Pacific) and predictions that China may soon be able to project significant military power into Australia's northern and western approaches (where the sensitive joint facilities are hosted), is enough to make strategic thinkers question whether Australian defence policy is charting a safe course. Add to this the alarm in Canberra generated by the Trump administration's 'America First'

⁸⁰ Dibb, P. and Brabin-Smith, R. (2017), 'Australia's management of strategic risk in a new era', *Strategic Insights*, 123, 15 November 2017, <https://www.aspi.org.au/report/australias-management-strategic-risk-new-era> (accessed 14 Aug. 2019).

⁸¹ Lyon, R. (2017), 'Australia, extended nuclear deterrence, and what comes after', *The Strategist*, 2 June 2017, <https://www.aspistrategist.org.au/australia-extended-nuclear-deterrence-comes/> (accessed 14 Aug. 2019).

⁸² White (2019), *How to Defend Australia*.

doctrine, its apparent ambivalence towards allies and its increasingly confrontational relations with Beijing, as well as uncertainty regarding its desire and capacity to act as a regional stabilizer into the future, and it is easy to see why Australian analysts, including former senior military and defence officials, are anxious.⁸³

The uncomfortable truth for Australia is that the credibility of US extended deterrence, both nuclear and conventional, is eroding in a neighbourhood where new arms-racing dynamics have been unleashed and no tradition of arms control exists, and in an era in which rapid technological change is blurring the lines between nuclear and conventional deterrence. In this context, it is perhaps not surprising that some analysts have concluded that the way forward for Australia is to revisit the question of how it could acquire a more dependable nuclear deterrent. This could be pursued by basing US nuclear weapons on Australian territory; by entering nuclear-sharing arrangements with the UK; and/or by developing its own nuclear capability (beginning by exploring the lead time required to do so).⁸⁴ But all these paths are fraught with economic, technological and political challenges, would be extremely damaging to the nuclear non-proliferation regime, and could prove counterproductive by inadvertently increasing strategic risks.

The TPNW

In the search for alternative approaches, including ones that would be more palatable to the Australian public, disarmament advocates, myself included, have urged Australia's leaders to reduce or end reliance on the US nuclear umbrella, which in any case is vague and of dubious value, and to sign – or, at the very least, stop actively undermining – the Treaty on the Prohibition of Nuclear Weapons (TPNW), the long-term success of which is dependent on achieving universality.⁸⁵ But although there is no legal barrier to signing the treaty (via ANZUS or any other formal alliance arrangements), there is little appetite for this in Canberra. Australia's political leaders, past and present, see signing, ratifying and complying with the TPNW as a premature and potentially self-destructive step. They argue that to do so would mean ending cooperation at Pine Gap and elsewhere, and make the case that this would seriously undermine US conventional capabilities in the region, destroy the US alliance, and abruptly and dramatically reduce Australia's own defence potency at a time of great uncertainty.⁸⁶ Anyone trying to understand why the Australian government has been so vocal in its rejection of the TPNW, despite strong domestic approval of the aims of the treaty, and despite declining faith in US nuclear assurances among the expert community, can find the answers in this argument.

⁸³ Dibb and Brabin-Smith (2017), 'Australia's management of strategic risk in a new era'.

⁸⁴ Layton, P. (2018), 'Why Australia should consider sharing nuclear weapons', *The Interpreter*, 17 January 2018, <https://www.lowyinstitute.org/the-interpreter/why-australia-should-consider-sharing-nuclear-weapons> (accessed 14 Aug. 2019); White, H. (2019), 'US could ask Australia to host nuclear missiles', *The Strategist*, 17 January 2019, <https://www.aspistrategist.org.au/us-could-ask-australia-to-host-nuclear-missiles/> (accessed 14 Aug. 2019); Dibb, P. (2018), 'Should Australia develop its own nuclear deterrent?' *The Strategist*, 4 October 2018, <https://www.aspistrategist.org.au/should-australia-develop-its-own-nuclear-deterrent/> (accessed 14 Aug. 2019).

⁸⁵ Rublee, M. R., Hanson, M. and Burke, A. (2017), 'Australia's Misstep on Nuclear Weapons Treaty', *Australian Outlook*, 20 February 2017, <http://www.internationalaffairs.org.au/australianoutlook/australias-misstep-nuclear-weapons-treaty/> (accessed 6 Dec. 2019); Hanson, M. (2019), 'Australia Needs to Support the Ban on Nuclear Weapons', *Australian Outlook*, 10 January 2019, <http://www.internationalaffairs.org.au/australianoutlook/australia-needs-to-support-the-ban-on-nuclear-weapons/> (accessed 6 Dec. 2019); and Thakur, R. (2016), 'The nuclear refuseniks', *Policy Forum*, 4 November 2016, <http://www.policyforum.net/bad-nuclear-neighbours/> (accessed 6 Dec. 2019).

⁸⁶ See for example Karp, P. (2018), 'Labor set for nuclear showdown as Gareth Evans warns of risk to US alliance', *Guardian*, 17 December 2018, <https://www.theguardian.com/australia-news/2018/dec/17/labor-set-for-nuclear-showdown-as-gareth-evans-warns-of-risk-to-us-alliance> (accessed 14 Aug. 2019).

So, is this the unfortunate reality – that having tied itself so firmly to the US alliance for the past half-century, Canberra is left with little choice but to continue on its current path? From a purely strategic standpoint, and in the absence of reliable missile defence systems, this is the conclusion Australia's defence decision-makers seem to have reached. But Australia has diplomatic capabilities at its disposal that could help reduce risks and improve the region's strategic outlook. In the short-term at least, it is in this sphere that it could take important steps to mitigate its genuine insecurities, including by promoting new regional arms-control and risk-reduction initiatives.⁸⁷

⁸⁷ Ogilvie-White, T. (2017–18), 'Responding to the Nuclear Crisis in Northeast Asia: the dangers of nuclear fatalism', in Australian National University College of the Asia & The Pacific (2017–18), *Nuclear Asia, paradigm_shift*, <https://asiapacific.anu.edu.au/sites/default/files/News/nuclear-asia-publication-web.pdf> (accessed 6 Dec. 2019); Ogilvie-White, T. (2018), 'It's time to fill Asia's arms control void', *The Interpreter*, 16 November 2018, <https://www.lowyinstitute.org/the-interpreter/time-fill-asia-arms-control-void> (accessed 6 Dec. 2019); Ogilvie-White, T. (forthcoming, 2020), 'Nuclear Risk Reduction in Northeast Asia', UNIDIR.

6. The Risks Posed by Emerging Technologies to Nuclear Deterrence

Andrew Futter

Introduction

The global nuclear order is in a period of flux, arising in part from the latest information technology revolution. Enormous advances in computing power over the past few decades have facilitated the development of a wide range of new technologies that will increasingly affect the way that we think about nuclear weapons, nuclear strategy and nuclear deterrence. In particular, these so-called emerging technologies are transforming both the demand side of nuclear deterrence – that is, what type of threat needs to be deterred (in terms of both actors and particular types of capabilities), as well as the supply side – the type of weapons systems and capabilities that can be used to achieve this. These technologies are also creating a new ‘grey area’, or ‘grey zone’, between nuclear and conventional weapons that will serve to blur the deterrence equation still further. For much of the nuclear age, deterring a nuclear attack has been considered to be best achieved through the threat of nuclear retaliation. Today, however, this position appears to be shifting.

Emerging technologies

The concept of ‘emerging technologies’ is a loose – even nebulous – one, and is used widely by different people to mean slightly different things. For some, the emerging technology challenge is principally about a fairly narrow transformation in nuclear counterforce capabilities.⁸⁸ For others, a broader definition might encompass so-called ‘killer robots’, quantum computing, rail guns, directed energy weapons, drones, 3D printing (which could become a proliferation issue⁸⁹), and perhaps even nanotechnology, which does not currently have an impact on nuclear deterrence but could do in the future. In order to provide some clarity when we think of the emerging technology challenge to nuclear deterrence, I suggest that we are essentially referring to two key developments:

- i. Ground-breaking advances in sensing technology (especially operating from space, but also under water) and the ability to process enormous caches of information are allowing for greater accuracy and tracking of military targets across different domains, as well as revolutionary advances in precision. The latter are driving more capable ballistic missile defences, and providing both conventional and nuclear weapons with greater sophistication, lethality and speed.
- ii. The impact of artificial intelligence (AI), automation, and the myriad dynamics associated with the ‘cyber’ sphere are revolutionizing the way that nuclear and non-nuclear operations are and could be conducted, and, at the same time, the way in which nuclear systems could be held

⁸⁸ See for example, Lieber, K. and Press, D. (2017), ‘The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence’, *International Security*, 41(4), pp. 9–49, doi.org/10.7910/DVN/NKZJVT (accessed 14 Aug. 2019).

⁸⁹ Kroenig, M. and Volpe, T. (2015), ‘3-D Printing the Bomb? The Nuclear Nonproliferation Challenge’, *The Washington Quarterly*, 38(3), pp. 7–19, doi:10.1080/0163660X.2015.1099022 (accessed 14 Aug. 2019).

vulnerable to attack. These dynamics all potentially challenge the central importance of a secure second nuclear strike force and nuclear deterrence through the threat of nuclear punishment – the basis of nuclear deterrence thinking since the 1960s.

Demand-side challenges

As regards the demand side of the nuclear deterrence equation, emerging technologies are broadening and reconstituting the types of threats (especially counter-force threats) that a state may need to deter. While deterrence of an attack using non-nuclear weapons has clearly always been part of nuclear thinking, developments in hypersonic missile technology, computer network operations (CNOs) and the increasing possibilities of autonomous weapons systems are all challenging this strategic picture. Hypersonic missile technology is – at its most basic – making the delivery of nuclear and conventional warheads quicker and more manoeuvrable, and theoretically far too quick and evasive to be intercepted by the current generation of ballistic missile defences. Thus, when nuclear-armed, hypersonic missiles can be seen as ensuring that an adversary's weapons cannot be intercepted before they reach their targets, and (perhaps paradoxically) as reinforcing deterrence rather than undermining it.⁹⁰ When conventionally armed – as noted below – they present a quite different challenge.

While 'cyber' is an awkward and nebulous descriptor, the threats posed by hackers breaking into critical infrastructure, including weapons systems, so that they fail to work, or at least fail to work as planned, is also a very different challenge to those encountered in the past. Whereas, previously, command and control nodes would probably need to be destroyed or damaged by kinetic weapons, similar objectives could potentially be achieved today by digital means, and possibly without the adversary knowing that their systems had been breached until it was too late. How to deter CNOs (a better descriptor than cyber⁹¹) against nuclear weapons systems remains an ongoing debate, as does the challenge posed by third parties and non-state actors in the nuclear-digital space.

Advances in engineering and AI are creating the possibility of greater autonomy in the systems that must be deterred and defended against. The much-hyped 'Poseidon/Status-6' Russian underwater nuclear drone is a good example of this,⁹² but it is also possible to see greater autonomy across all nuclear systems in the future as technology allows.

Supply-side dynamics

On the supply side, emerging technologies are clearly reformulating the toolkit available to a state that can be used for deterring nuclear threats. The most obvious example here is ballistic missile defences. While the pursuit of active defence against nuclear attack is not a new thing, the ability to 'hit a bullet with a bullet' has been transformed in recent years by developments in both science and engineering. While not perfect, missile defences have increasingly become part of the deterrence and security planning of nuclear-armed states,⁹³ and this clearly begins to cast doubt on the efficacy of waiting

⁹⁰ *The Economist* (byline S. J.) (2019), 'What are hypersonic weapons?', 3 January 2019, <https://www.economist.com/the-economist-explains/2019/01/03/what-are-hypersonic-weapons> (accessed 14 Aug. 2019).

⁹¹ See Futter, A. (2018), 'Cyber Semantics: Why We Should Retire the Latest Buzzword in Security Studies', *Journal of Cyber Policy*, (3)2, pp. 201–16 (accessed 14 Aug. 2019).

⁹² Gady, F.-S. (2019), 'Russia's First 'Poseidon' Underwater Drone-Carrying Submarine to be Launched in 2019', *The Diplomat*, 20 February 2019, <https://thediplomat.com/2019/02/russias-first-poseidon-underwater-drone-carrying-submarine-to-be-launched-in-2019/> (accessed 14 Aug. 2019).

⁹³ For example, see the US Nuclear Posture Review: Office of the Secretary of Defense (2018), *Nuclear Posture Review*.

to strike second, especially for states with a limited nuclear-armed missile force. At the same time, processing power and sensing technologies have also driven the development of ever-greater precision for nuclear and non-nuclear weaponry, both regional and long range, as with the US Conventional Prompt Global Strike concept. These capabilities could theoretically be used to conduct non-nuclear strikes against critical nuclear targets, command and control apparatus, or the weapons systems themselves.⁹⁴

The same is also true for the possible use of CNOs against an adversary's nuclear systems. The US has already begun a programme of 'full spectrum missile defence' or left-of-launch operations designed to target the missile and nuclear systems of potential adversaries before they can be used.⁹⁵ The difference here, of course, is that it is much harder to assess or quantify the threat posed by intangible computer code than it is for a large and conspicuous nuclear-armed ballistic missile. A successful attack may only become known during a crisis.

It is much harder to assess or quantify the threat posed by intangible computer code than it is for a large and conspicuous nuclear-armed ballistic missile.

Finally, nuclear-armed and nuclear-powered submarines, long held as the bedrock of deterrence because they are so difficult to locate, are being challenged by underwater sensing technology that might potentially make them less invulnerable in the future.⁹⁶ The same is also likely to be true when it comes to targeting mobile missiles.⁹⁷ All of these are underpinned by developments in space capabilities and processing power, and – increasingly – developments in AI.⁹⁸

A transition in deterrence thinking?

When we take these developments together, it is entirely possible that we stand on the cusp of a transition in nuclear order and nuclear deterrence, and especially in deterrence through mutual nuclear vulnerability. The demand side of the equation is increasingly calling into question whether deterrence through the threat of nuclear punishment remains the best option available to deter existential threats. At the same time, various emerging technologies are transforming the supply side, or what is available beyond nuclear punishment in terms of a viable response. Both therefore suggest a possible return to a world where first strike becomes a common policy, potentially without having to employ nuclear weapons, and characterized as much by deterrence by denial (both defence and offence) as punishment. Of course, this will play out slightly differently in different nuclear relationships and regions, given differences in strategy, geography and emerging technological capabilities, but the trend is a general one that will impact how we conceptualize nuclear deterrence and nuclear order globally. This in turn will reshape how we conceptualize strategic stability, and place even more pressure on a deteriorating global arms control edifice.

⁹⁴ Gormley, D. M. (2015), 'US Advanced Conventional Systems and Conventional Prompt Global Strike Ambitions: Assessing the Risks, Benefits, and Arms Control Implications', *The Nonproliferation Review*, 22(2), pp. 123–39, doi: 10.1080/10736700.2015.1117735 (accessed 14 Aug. 2019).

⁹⁵ See Futter, A. (2016), 'The Dangers of using Cyberattacks to Counter Nuclear Threats', *Arms Control Today*, July/August 2016, <https://www.armscontrol.org/print/7551> (accessed 14 Aug. 2019).

⁹⁶ See Ingram, P. (2016), *Will Trident still work in the future?*, BASIC, <https://www.basicint.org/wp-content/uploads/2018/06/Will-Trident-Work-Future-Jan2016.pdf> (accessed 14 Aug. 2019).

⁹⁷ Bracken, P. (2016), 'Nuclear Stability and the Hunt for Mobile Missiles', Foreign Policy Research Institute, <https://www.fpri.org/article/2016/04/nuclear-stability-hunt-mobile-missiles/> (accessed 14 Aug. 2019).

⁹⁸ Geist, E. and Lohn, A. (2018), *How Might Artificial Intelligence Affect the Risk of Nuclear War?*, Santa Monica, CA: RAND Corporation, <https://www.rand.org/pubs/perspectives/PE296.html> (accessed 14 Aug. 2019).

Conclusion

We still live in a world where the threat of nuclear weapons and nuclear counter-value attacks are believed to deter, but the ways, ends and means – i.e. the methods, tactics, desired outcomes, resources and systems available for nuclear deterrence – are changing. Emerging technologies clearly present new challenges (both nuclear and non-nuclear) that must be met, and at the same time present a new suite of options for deterring nuclear attacks. While there have been earlier periods of significant technological change in the nuclear realm – with the development of silent submarines, stealth aircraft, cruise missiles, and so on – these all essentially served to reinforce the status quo. And the same is probably true for increases or innovation in nuclear capabilities such as hypersonics.

The challenge today, however, is qualitatively different, especially as concerns the integration and overlapping of new technologies. Many of these new capabilities are non-nuclear, and could augment or even replace nuclear weapons for certain deterrence functions, and many offer new counter-force options in the future. But perhaps most importantly, we are dealing with something that is not singular, but plural: emerging *technologies* rather than a particular *technology*. As a result, the impact is amplified considerably, and the challenge is therefore perhaps better presented as a shift in the context within which we think about nuclear deterrence. Consequently, we might need to rethink the central tenets of nuclear deterrence – and, particularly, what it is that we are seeking to deter, and how, in a very different world.

7. Deterrence Below the Threshold of Collective Defence: Is It Possible?

Jamie Shea

Introduction

Since Russia annexed Crimea in March 2014 and the Western allies were suddenly confronted with the requirement to balance and, if necessary, fight a peer-level adversary, deterrence as a concept has been very much back in vogue. Long hours have been spent at NATO headquarters in Brussels debating the relationship between deterrence and collective defence, and many dilemmas not discussed much since the end of the Cold War have resurfaced.

The returning spectre of great power conflict requires the Western allies to relearn the fundamental principles of deterrence. Why and how did deterrence work successfully in the past, especially when it was put to the test in existential crisis situations? If experts take two of the most severe Cold War crises – Berlin (1961) and Cuba (1962) – deterring adversaries from taking extreme risks was not just about military postures and pressure; to an even greater extent, it also concerned deft political and crisis management skills. At the time of the Cuban missile crisis, US President John F. Kennedy resisted military pressures for immediate action while keeping military forces in place to act if necessary. He opened channels of communication with the Soviet leadership to understand its objectives and its own red lines. In sum, deterrence is about complicating the strategic calculus of adversaries, making them progressively aware of the unacceptable consequences of their actions, and thereby making them lose confidence in the wisdom and likelihood of success of their own strategy. At the same time, deterrence must give these adversaries a sense that they can preserve their vital interests (i.e. preventing the collapse of East Germany or of Castro's regime in Cuba, respectively) without the extremity of war.

It is worth recalling these lessons at a time when NATO is rethinking collective defence against classical scenarios of armed attack, but is also coming to grips with an upsurge in another type of state-led aggression, commonly referred to as the 'grey zone', or hybrid warfare. This type of aggression is not existential, but it is also not something that the Western allies are prepared to tolerate as an unavoidable feature of modern life. Hybrid campaigns can achieve the goals of war (hegemony, control, dislocation and punishment) without actually going to war, if they are applied consistently and are unopposed. Hybrid warfare is not new, but the growing range of technologies and tools available to aggressor states, together with the cracks and vulnerabilities of the Western democracies, make it more wide-ranging and attractive as an instrument of coercion. So, as the Western allies grapple with the meaning of traditional deterrence, another debate is proving to be equally difficult and time-consuming. Can the traditional concept of deterrence, as has been applied with some success to the nuclear domain (and largely understood in that context), be applied also to hybrid warfare?

At first glance, the very nature of hybrid warfare makes deterrence a difficult concept to apply. If we take cyberspace as an example, there are a range of states engaging in offensive cyberattacks, with over 40 having developed this kind of capability. Allies can even use cyber or electronic activity against each other. Cyber also gives state institutions other than the military or the defence ministry the ability to take action. Proxies can give states deniability or be used to provide highly skilled technical tools that the attacking state may not itself possess. So-called ‘hactivist’ groups can quickly disrupt cyberspace to convey any message they like. Equally, cyber tools can be many things at once, in contrast to a traditional weapon that has just one limited function. They can be used for information exfiltration, for data falsification and manipulation, and for disruption or even physical destruction by causing critical infrastructure to malfunction.

The speed of technological innovation in the cyber and electronic domains with the transition to the Internet of Things, 5G communications, artificial intelligence and quantum computing presents critical challenges for the security policy community.

At the same time, cyber tools render a much broader spectrum of targets available to attack, including those that in the past required very expensive, risky and costly military operations in order to be destroyed or disrupted. In 2018, for instance, the US intelligence agencies warned of Russian, Chinese, North Korean and Iranian attempts to target US critical infrastructure.⁹⁹ Cyberattacks exploit the hyperconnectivity and deepening interdependency on which modern societies rely; globalized supply chains and multi-sourcing make modern communications, financial, manufacturing and utility infrastructures increasingly difficult to monitor. The NotPetya malware attack of 2017 brought home as never before the randomness of damage resulting from large scale cyberattacks, as companies across the globe suffered much higher levels of damage than the prime target, the Ukrainian government.¹⁰⁰ The speed of technological innovation in the cyber and electronic domains with the transition to the Internet of Things, 5G communications, artificial intelligence (AI) and quantum computing presents critical challenges for the security policy community: it is difficult to achieve the awareness, gather the information, deploy the scarce human talent and decide whether and how to transform defence structures and processes in a timely manner.

Does this mean that deterrence cannot work in cyberspace? Certainly, the complex nature of this domain means that it has to be a progressive, evolutionary and step-by-step concept, rather than a one-off delivery of effect. Far more than traditional military activity, it will require a whole-of-society approach. The interconnections and interdependencies have to be understood, and many different things have to be coordinated in the most cost-effective sequence if deterrence is to be successful. This step change means that to the traditional elements of deterrence – such as a credible capability and the willingness of a single, centralized authority to use it – many new elements must now be added: the willingness and ability of the private sector to implement stringent security standards; the ability of governments to mobilize civilian society expertise; and the readiness to attribute and initiate firm responses even when there is no ‘smoking gun’, as in a military or nuclear attack.

⁹⁹ Landay, J. (2018), ‘U.S. intel chief warns of devastating cyber threat to U.S. infrastructure’, Reuters, 13 July 2018, <https://www.reuters.com/article/us-usa-russia-cyber-coats/u-s-intel-chief-warns-of-devastating-cyber-threat-to-u-s-infrastructure-idUSKBN1K32M9> (accessed 11 Mar. 2020).

¹⁰⁰ Greenberg, A. (2018), ‘The Untold Story of NotPetya, the Most Devastating Cyberattack in History’, *WIRED*, 22 August 2018, <https://www.wired.com/story/notpetya-cyberattack-ukraine-russia-code-crashed-the-world/> (accessed 14 Feb. 2020).

Building blocks of deterrence

In the first place, an organization like NATO has to define its primary purpose in cyberspace. Its declaratory policy to make this level of engagement clear and the solidarity to back it up are the first building block of deterrence. Arguably, NATO has already moved a decisive step forward in this process by declaring at its summit in Newport, Wales in September 2014 that a cyberattack could be the equivalent of an armed attack, and could therefore trigger Article 5 on collective defence.¹⁰¹ Yet the threshold for reacting collectively and the type of response were left ambiguous. NATO needs to have an internal discussion to identify scenarios where it could be called upon to act. This internal discussion is required because ambiguity in response is matched by ambiguity in attack, with the risk that allies could be divided on when and how to respond. Cyber tools also need more careful preparation before they are ready to use – but if the decision is taken to respond with kinetic assets rather than electrons, political signalling will be essential to communicate to an adversary whether NATO is seeking to escalate or to de-escalate the situation through a single act of retaliation. If, on the other hand, cyber response options are selected, NATO commanders will need to have some understanding of what these cyber assets are, what they can usefully do, and the pros and cons of using them in comparison with more traditional weapons. Without such an understanding, it is unwise to talk up the likelihood of the use of offensive cyber in declaratory policy.

The second building block for successful deterrence up to and beyond the Article 5 threshold is a robust operational capability. NATO took the essential second step forward at its Warsaw summit in July 2016 when it recognized cyberspace as a domain of operations, and decreed that it needed to achieve the same efficiency and effectiveness for operations in this new domain as for land, sea and air. This step incentivized individual allies, beginning with the UK, to offer their national assets to NATO in a crisis or conflict, although it is not clear if they will be used by the individual ally or by NATO. Deterrence below Article 5 will require countries having niche assets, developed for national security first and foremost, to offer these to allies and partners and to do so early in a crisis. The provision of these national assets enabled NATO to set up at its Supreme Headquarters Allied Powers Europe (SHAPE) its first Cyber Operations Centre (CyOC), shortly after the Brussels summit in July 2018, in trial structure.¹⁰² It achieved its initial operating capability in December 2019, and is expected to be fully operational by 2023. CyOC's function is to undertake the operational planning to use cyber effects, to integrate cyber into overall military operations and training and exercises, and to incorporate into its military planning and crisis-response measures those cyber effects that it expects (or hopes) willing and capable allies will provide.

One little-noticed but nonetheless significant outcome of the 2018 NATO summit is that the allies agreed a mechanism to generate these national cyber assets and transfer them to NATO's military and political responsibility. The difficulty, as previously indicated, will be to achieve the same understanding of the impact and military utility of cyberweapons as compared with conventional weapons. For this purpose, NATO is in urgent need of a military doctrine for cyber operations that defines how they fit into the alliance's order of battle.

¹⁰¹ NATO (2014), 'Wales Summit Declaration', Heads of State and Government participating in the meeting of the North Atlantic Council in Wales, 5 September 2014, https://www.nato.int/cps/en/natohq/official_texts_112964.htm (accessed 14 Feb. 2020).

¹⁰² Brent, L. (2019), 'NATO's role in cyberspace', *NATO Review*, 12 February 2019, <https://www.nato.int/docu/review/articles/2019/02/12/natos-role-in-cyberspace/index.html> (accessed 14 Feb. 2020).

The third building block, then, is the resilience of the national networks and infrastructures on which organizations like NATO and the EU depend to manage crises and prepare and conduct their responses. Achieving this resilience is the most difficult challenge, as much of the infrastructure has been privatized since the end of the Cold War and has been reconfigured for efficiency and profit rather than for redundancy of systems for resilience and security. NATO today depends on the private sector for 90 per cent of its military transport and 70 per cent of its satellite communications. Getting this infrastructure back up to wartime standards will be a demanding, long-term and costly challenge. Western allies will need to be clear where their vulnerabilities are, and map them systematically through training and exercises, rather than discover them only in a crisis. Europe does not have the money to retrofit its key infrastructure to military standards of resilience. The solution is to design future networks and facilities with military standards incorporated at source.

Although industry rarely likes more regulation, ultimately this will be a win-win situation as consumer confidence and protection will be enhanced at the same time as national security. As deterrence applies only to man-made premeditated activity, it can benefit from resilience investments by depriving an adversary of the ability to disrupt or to slow down and frustrate the response of the victim. This is often referred to as deterrence by denial. Yet deterrence by denial still exposes the aggressor publicly, and carries the risk of a robust response (e.g. through sanctions, ostracism, etc.) even if the act of aggression has brought the aggressor state no benefits.

It was not until the discovery of Russian interference in the 2016 US presidential election that the Western allies woke up to the dangers of fake news, bots, trolls and anonymity, and the use of social media platforms to spread conspiracy theories and alternative versions of the truth.

A fourth building block is the anticipation of threats through improved situational awareness and intelligence sharing, together with a more general understanding of the role of human agency. Intelligence and awareness usually focus on intentions and potential hostile behaviour. In the future, awareness must focus on technology as the critical enabler of disruption. Hybrid campaigns are all the more successful if they link up with technology and social change that are already in themselves polarizing and disruptive – even before an adversary has discovered novel ways to exploit them. A greater degree of government activism will be needed in regulating technological innovation. It was not until the discovery of Russian interference in the 2016 US presidential election that the Western allies woke up to the dangers of fake news, bots, trolls and anonymity, and the use of social media platforms to spread conspiracy theories and alternative versions of the truth. As the world enters the era of AI and machine learning, robots, intelligent weapons and satellites, technically enhanced humans, and all-pervasive surveillance, there will be an urgent need for wide-ranging discussions, at global level, on the security and humanitarian implications of extremely rapid and poorly regulated technological change as the key driver of insecurity. A more intensive dialogue is required between government and international organizations and the private sector, not only to identify promising new technologies and innovations that can offer a technological advantage over an adversary, but also – and more importantly – to map the impact of technological change on diplomacy and conflict much earlier, and to bring the world of science and policymaking much closer. Arguably, the NATO alliance needs to create a high-level board of science and technology advisers to engage the ambassadors on disruptive technologies and their impact on international security.

Deterrence rests on an understanding of what is permissible or non-permissible behaviour, and thus on accepted norms and standards. The problem with the so-called grey zone is that many actions are legal, even if potentially threatening to our security, as is the case with the development of 5G networks in Europe by the Chinese telecommunications conglomerate Huawei. If there are no (or inconsistent) rules or codes of conduct, or no universally accepted constraints on cyberattacks, or on the use of social media advertising in political campaigns, pushing back will be hard – including in the diplomatic sphere. Western nations need to work far harder to establish norms and standards in the grey zone to distinguish legal from illegal activity, business from interference, or normal globalization and interdependence from loss of sovereignty and national autonomy of action and choice.

Recent efforts at the UN, or within its specialized International Telecommunication Union, to regulate internet governance have not borne fruit, due to disagreements over the extent and role of state sovereignty in the virtual domain. More regional agreements among like-minded states may be a better approach, as with the two Organization for Security and Co-operation in Europe (OSCE) conventions on cyber confidence building measures, agreed in 2013¹⁰³ and 2016¹⁰⁴ respectively; or the 2018 Paris Call for Trust and Security in Cyberspace,¹⁰⁵ which is open to both state and civil society participation. As industry has created the technology that now needs to be regulated, it also has to play a role in setting the norms and partnering with governments.

The fifth and final building block of deterrence in the grey zone depends on a consistent pattern of crisis management and incident response. Deterrence is contingent on the deft handling of individual situations. It is important to indicate when a red line or a new threshold has been crossed, as occurred when the EU and NATO both expelled hundreds of Russian diplomats after the nerve agent attack on a former Russian military intelligence officer and his daughter in the UK in March 2018. In the grey zone, making the aggressor pay a price – but not too high a price – is the way to deter further, similar activity. This can be done by more public attribution and the considered release of intelligence material to support attribution and build a public case. What NATO can usefully do is to define a common methodology for attribution based on shared intelligence and other elements to facilitate collective attribution and response. As the tradecraft and methods of actors in the grey zone become more familiar, identifying them with confidence becomes easier. A second requirement is to establish a playbook of responses that offer a flexible menu of options to policymakers. This is a trial and error process, given that it is difficult to know in advance which measures have an impact on which aggressors. Time and experience will tell what works best as a form of deterrence, and in changing the calculus of aggressors to respect limits on their behaviour in their own ultimate self-interest. The key is to be measured and consistent, so as not to give the impression that red lines are negotiable, or that costs can be avoided.

¹⁰³ Organization for Security and Co-operation in Europe (2013), 'Decision No. 1106: Initial Set of OSCE Confidence-Building Measures to Reduce the Risks of Conflict Stemming from the Use of Information and Communication Technologies', PC.DEC/1106, 3 December 2013, <https://www.osce.org/pc/109168?download=true> (accessed 14 Feb. 2020).

¹⁰⁴ Organization for Security and Co-operation in Europe (2016), 'Decision No. 1202: OSCE Confidence-Building Measures to Reduce the Risks of Conflict Stemming from the Use of Information and Communication Technologies', PC.DEC/1202, 10 March 2016, <https://www.osce.org/pc/227281?download=true> (accessed 14 Feb. 2020).

¹⁰⁵ Paris Call (2018), 'Paris Call for Trust and Security in Cyberspace', 11 December 2018, <https://pariscall.international/en/call> (accessed 14 Feb. 2020).

Conclusion

In conclusion, deterrence is not a science that can produce standardized results for standardized types of behaviour. Even if followed to the letter, under textbook conditions, there is no guarantee it will work *vis-à-vis* the unpredictability of aggressors, their perceptions, and their reactions under mounting external and internal pressures. Certainly, the more contingencies and threats it needs to cover, the less reliable it will be as a security buffer. But that does not mean that it is redundant and cannot be improved with patience, consistency and a willingness to learn by doing.

8. ‘Blurring the Lines’: Nuclear and Conventional Deterrence

Peter Watkins

Successive official documents in the UK, including its most recent (2015) National Security Strategy and Strategic Defence and Security Review (SDSR), have stated that the purpose of the UK nuclear deterrent force is to deter ‘the most extreme threats to our national security and way of life’.¹⁰⁶ France’s official statements about its nuclear deterrent use a different formulation – for example, to ‘prevent any state-based aggression against the vital interests of the nation’¹⁰⁷ – but with broadly the same meaning. Analogous phrases are used by the other nuclear-weapon states. Many commentators have understood that such language implies – or should imply – that nuclear deterrence is about the deterrence of nuclear threats, as the most destructive weapons that one state could inflict on another (although the US and UK governments themselves have not endorsed such a restrictive interpretation). But the reality has been more complicated for a long time – and current concerns about ‘blurring the lines’ between nuclear and conventional deterrence risk being overtaken by events.

The belief that the purpose of nuclear deterrence is primarily to deter nuclear attack is linked to nuclear disarmament and the negative security assurances (NSAs). These were issued by the nuclear-weapon states after the UN General Assembly held its first Special Session on Disarmament in 1978.¹⁰⁸ The NSAs committed these states to not attacking with nuclear weapons non-nuclear-weapon states that were in good standing in the Non-Proliferation Treaty (NPT) and not in alliance with a nuclear-weapon state.

But since the emergence of heightened concerns about non-nuclear weapons of mass destruction (WMD) in the early 2000s, the Western nuclear-weapon states have deliberately held open the possibility that their nuclear forces could also deter chemical, biological or (conventionally armed) ballistic missile attacks – which some commentators have seen as creating a tension between their declaratory policy and their disarmament commitments under the NPT.¹⁰⁹ An early example came in 2002 in the UK’s post-9/11 ‘New Chapter’ addendum to the 1998 Strategic Defence Review; its message was implicit rather than explicit, but was fully intentional.¹¹⁰ Even the US Nuclear Posture Review (NPR) of 2010, which made a formal commitment not to ‘use, or threaten to use, nuclear

¹⁰⁶ HM Government (2015), *National Security Strategy and Strategic Defence and Security Review*, para 4.6.3, <https://www.gov.uk/government/publications/national-security-strategy-and-strategic-defence-and-security-review-2015> (accessed 14 Aug. 2019).

¹⁰⁷ Présidence de la République (2008), *Défense et Sécurité nationale: Le Livre blanc*, Paris, Odile Jacob/La Documentation française, <https://www.ladocumentationfrancaise.fr/var/storage/rapports-publics/084000341.pdf> (accessed 14 Aug. 2019).

¹⁰⁸ The first legally binding NSA protocols were those enshrined in the Treaty of Tlatelolco, signed in 1967: however, these were applicable only on a regional basis.

¹⁰⁹ See Chalmers, M. (2010), *Nuclear Narratives: Reflections on Declaratory Policy*, RUSI Whitehall Report 1-10, pp. 9–10, https://rusi.org/sites/default/files/201005_whr_nuclear_narratives_0.pdf (accessed 14 Aug. 2019).

¹¹⁰ Ministry of Defence (2002), *The Strategic Defence Review: A New Chapter*, CM 5566, Vol I, para 21. For a summary, see House of Commons Defence Committee (2003), *A New Chapter to the Strategic Defence Review*, paras 21–22, <https://publications.parliament.uk/pa/cm200203/cmselect/cmdfence/93/93.pdf> (accessed 14 Aug. 2019).

weapons against [NPT-compliant] non-nuclear-weapon states’, went on to claim – albeit in relation to other states – ‘there remains a narrow range of contingencies in which US nuclear weapons may still play a role in deterring a conventional or [chemical and biological weapons] attack’.¹¹¹

This line of thinking was not aberrational. In the very different context of the Cold War, NATO governments saw the alliance’s nuclear forces as deterring aggression ‘even with non-nuclear weapons’.¹¹² NATO’s doctrine of ‘flexible response’ relied on possible first use of nuclear weapons to deter a Soviet conventional attack, as there was little confidence that it could be countered by NATO’s smaller conventional forces in Europe. Far from a clear separation between nuclear and conventional deterrence, the two were deliberately (and repeatedly) linked.

Current renewed concerns within the nuclear community about blurring the lines between nuclear and conventional deterrence appear to stem from a growing awareness of Russian nuclear doctrine and the US NPR of 2018.

Russian military doctrine on ‘new generation warfare’ posits a type of warfare capitalizing on indirect action, informational campaigns, private military organizations, and the exploitation of internal protests, backed by sophisticated conventional and nuclear capabilities.

Russian nuclear doctrine has not been published *per se*. But its contours can be divined from broader doctrinal documents – and, of course, from public statements about it by Western governments. Russian military doctrine on ‘new generation warfare’ (sometimes termed the ‘Gerasimov doctrine’ by Western commentators) posits a type of warfare capitalizing on indirect action, informational campaigns, private military organizations, and the exploitation of internal protests, backed by sophisticated conventional and nuclear capabilities.¹¹³ Termed ‘cross-domain coercion’ by Dmitry Abramsky, this doctrine deliberately blurs the lines between the use of unconventional means (cyber, disinformation, etc.), conventional forces and nuclear forces – with, Western governments claim, a lower threshold for nuclear use.

The NPR has attracted criticism on two main counts. First, the decision to supplement the US’s extant nuclear programme by modifying a number of existing submarine-launched ballistic missile warheads to provide a low-yield option, and by acquiring (in slower time) a modern submarine-launched cruise missile – both systems being criticized as components of a nuclear war-fighting strategy. Second, the NPR’s explicit assertion that ‘deterring nuclear attack is not the sole purpose of nuclear weapons’, and that nuclear weapons could be employed to deter ‘significant’ non-nuclear attacks, including ‘attacks on the U.S., allied, or partner civilian population or infrastructure’.¹¹⁴ While cyberattacks are not cited specifically, they would naturally fall into this category.

¹¹¹ Quoted in Chalmers (2010), *Nuclear Narratives: Reflections on Declaratory Policy*, p. 5.

¹¹² UK Ministry of Defence (1980), *The Future United Kingdom Strategic Nuclear Deterrent Force*, Defence Open Government Document 80/23, p. 2.

¹¹³ Adamsky (2018), ‘From Moscow with coercion: Russian deterrence theory and strategic culture’.

¹¹⁴ Office of the Secretary of Defense (2018), *Nuclear Posture Review*, p. 21.

The subsequent debate has risked conflating two linked but different things – deterrence doctrine and war-fighting doctrine. This is not a new phenomenon. Indeed, almost 40 years ago, in 1981, Michael Quinlan disputed this tendency: ‘To make provision for having practical courses of action available in nuclear war [...] is not in the least to have a ‘war-fighting strategy’ [...] It is, on the contrary, a necessary path to deterrence [...].’¹¹⁵

Deterrence is distinct from war-fighting. In terms of its war-fighting doctrine, NATO does not see nuclear forces as part of the mix in the same way as does Russia. It continues, rather, to set them apart – as illustrated by successive summit declarations. NATO aspires to greater ‘coherence’ between its nuclear and conventional forces, but it does not see them as placed on a simple continuum. In that respect, the concern about blurring the lines is overstated.

But deterrence has always been about influencing the calculations of adversaries. It is their perceptions that matter. It is conceivable that the adherents of a continuum doctrine with a low threshold for nuclear use might believe that NATO states would not risk the use of their strategic systems in a conflict in which there is a perceived asymmetry of stakes – and hence be tempted to employ non-strategic nuclear weapons, chemical or biological weapons, or a destructive offensive cyberattack to terminate the conflict on their terms with low risk of escalation. NATO had much the same concern during the Cold War, giving rise to the development of the ‘flexible response’ doctrine. For deterrence purposes, it is therefore prudent for the Western alliance, once again, to have potential recourse to a range of systems, nuclear and non-nuclear, to counter any such misperceptions.

The long-running debate about ‘blurring the lines’ now needs to be repositioned within the contemporary strategic environment – and the emerging framework of so-called ‘modern deterrence’.¹¹⁶ As widely accepted, the former is characterized by a diversity, complexity and concurrency of threats, from multiple potential adversaries who are able to synchronize dynamically non-military and military options, up to and including nuclear forces. In essence, ‘modern deterrence’ theory is an updating of classical deterrence thinking to reflect changed circumstances, not a new concept. It does not draw a sharp distinction between nuclear and conventional deterrence – but its approach may provide some mitigation of concerns about the blurring of lines.

This is not the place to describe ‘modern deterrence’ theory in detail. While it presents no simple recipe, it contains four main ingredients: improving our understanding of potential adversaries; maximizing the utility of the full range of non-military and military tools at states’ disposal; enhancing our resilience; and close coordination with Western allies and partners. It starts from recognizing that a feature of the contemporary strategic environment is that certain actors seek to advance their agendas by actions that remain ‘sub-threshold’ – in other words, that are calibrated not to provoke a significant military response. To some degree, this is a backhanded compliment to the continued efficacy of nuclear and conventional deterrence. In response, Western governments have sought to expand their deterrence ‘toolbox’ – less through inventing new tools than by making better use of existing ones, such as diplomatic action or economic sanctions. A key facet is a greater willingness to expose or call out malign activities, with the intention of deterring repetition by raising general awareness, and thus making such activities more difficult to undertake, or by raising the reputational

¹¹⁵ HM Government (1981), *Statement on the Defence Estimates 1981 [CMND 8212–1]*, p. 13. Reproduced in Quinlan, M. (2009), *Thinking about Nuclear Weapons: Principles, Problems, Prospects*, Oxford: Oxford University Press, Appendix 1, p. 182. At the time of the 1981 statement, some critics of nuclear deterrence claimed that tactical nuclear weapons were seen as just ‘bigger’ weapons that could tip the balance on the battlefield.

¹¹⁶ For a (very) brief official description of ‘modern deterrence’, see HM Government (2018), *National Security Capability Review*, box on p. 11, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/705347/6.4391_CO_National-Security-Review_web.pdf (accessed 6 Dec. 2019). The term ‘modern deterrence’ has not been officially adopted by NATO or the US.

price. Recent examples include the UK and Dutch governments' respective responses to the 2018 Salisbury nerve-agent poisoning of Sergei Skripal (a former double agent for the UK and Russian intelligence services) and his daughter Yulia, and the subsequent attempt to hack the headquarters of the Organisation for the Prohibition of Chemical Weapons (OPCW) in The Hague. Measuring the effectiveness of 'modern deterrence' entails the same analytical challenges as classical deterrence. It is difficult to prove a negative; and, arguably, it is simply too early to try, as the changes in approach and posture are still being implemented.

So, in terms of concerns about the blurring of lines, 'modern deterrence' focuses on – and seeks to provide the toolbox for – deterring threats across the spectrum. By making clear that costs will be incurred by 'sub-threshold' malign activity, it aims to discourage any temptation on the part of other actors to keep pushing their luck – with escalation potentially leading to miscalculation. With a wide range of tools with which to deter, Western governments have no need to reach straight for the nuclear option. In this context, the role of nuclear deterrence is to neutralize efforts to use nuclear sabre-rattling to intimidate opponents (or even bystanders) in what are otherwise mainly 'grey zone' conflicts. NATO's deterrence posture has done just that in the months and years since Russia's 2014 intervention in eastern Ukraine; indeed a number of countries, including the UK, have provided non-escalatory training and assistance to the Ukrainian armed forces for many years.

If they ever really existed, the old 'silos' of nuclear and conventional deterrence make even less practical sense now. A deterrence posture should, of course, be consistent with states' disarmament commitments – the NSAs continue to be a stabilizing factor – as well as compliant with the principles of international humanitarian law. But to deter effectively, it should not needlessly foreclose options. The declaratory policy adopted from the early 2000s remains right. And, in the face of more nebulous 'grey zone' threats, the modernization of nuclear and conventional forces should continue to be accompanied by work to maximize the availability of non-military deterrent options, so that states can deter such threats at the lowest practical level. It is the credibility of the overall posture that deters.

9. The Problem of Blurring Conventional and Nuclear Deterrence

Christine Parthemore

Introduction

The world is witnessing a trend of countries increasingly integrating conventional and nuclear deterrence concepts, war-fighting plans, and threatening rhetoric. Such moves resurrect dangerous Cold War-era concepts, and depart from some of the stabilizing measures that countries have adopted since that time. This essay describes the most prominent ways in which this ‘blurring’ is taking place, and the dangers inherent in this trend.

Integration of conventional and nuclear deterrence

The blurring of conventional and nuclear deterrence is occurring in at least two distinct ways. The first involves the increasing integration of conventional and nuclear war-fighting in ideas of how specific conflicts may be carried out, and therefore what constitutes effective deterrence in such scenarios. Most countries long held the view that nuclear weapons are exceptional and represent a dramatic type of escalation if used, and that such use would drive a distinctly different and unpredictable set of responses compared with the use of non-nuclear assets. The inability to predict or control escalation in nuclear war was held as an important aspect of these weapons’ deterrent effects.

Most countries long held the view that nuclear weapons are exceptional and represent a dramatic type of escalation if used, and that such use would drive a distinctly different and unpredictable set of responses compared with the use of non-nuclear assets.

Some officials and scholars are now embracing the notion that the use of nuclear weapons – at least those of a relatively lower yield – against specific types of targets does not represent an entirely distinct realm of military action. Rather, such use would represent merely a step up the ‘escalation ladder’ whereby the impact of the use of a low-yield nuclear weapon would not be terribly different from a large-scale conventional attack. For example, in 2016 Robert Scher, then US Assistant Secretary of Defense for Strategy, Plans, and Capabilities, testified of ongoing efforts to merge conventional and nuclear war-fighting plans, stating that such ‘integration means being prepared to restore deterrence following adversary nuclear use, so that failure to deter first use does not translate into failure to deter subsequent nuclear use’.¹¹⁷

¹¹⁷ Scher, R. (2016), *Statement before the Senate Armed Services Subcommittee on Strategic Forces*, 9 February 2016, https://www.armed-services.senate.gov/imo/media/doc/Scher_02-09-16.pdf (accessed 14 Aug. 2019).

This concept is not altogether new; on the contrary, it mirrors some deterrence concepts that informed Soviet and US deployment of tactical nuclear weapons during the Cold War. In addition, over the past decade, Pakistan and India have had their own takes on integrating conventional and nuclear planning.

The US and Russia are now reinvigorating the Cold War concepts. Concern spread over the past decade that Russia held an ‘escalate to de-escalate’ strategy, by which it may use a relatively low-yield nuclear weapon in an otherwise conventional conflict in order to halt a trajectory of further conventional escalation. Some Russian leaders have denied that they maintain such a policy.¹¹⁸ In the meantime, the concept made its way into US thinking on deterrence, being most explicitly formulated in the 2018 Nuclear Posture Review (NPR).¹¹⁹ Such tight weaving of nuclear use into otherwise conventional planning has become increasingly standard in the US in recent years, and is now more commonly debated for scenarios involving North Korea, in addition to Russia.

A second type of blurring lies in nuclear responses to – and therefore deterrence of – non-nuclear attacks. For the US, the 2018 NPR increased focus on the possibility of nuclear weapons use in response to significant non-nuclear attacks. It noted that the US will:

... posture our nuclear capabilities to hedge against multiple potential risks and threat developments. We will, for example, hedge against the potential rapid growth or emergence of nuclear and non-nuclear strategic threats, including chemical, biological, cyber, and large-scale conventional aggression.¹²⁰

Notably, this shift followed international concern that India’s deterrence doctrine maintained the possibility of nuclear retaliation in the event of major chemical or biological weapons attacks.¹²¹ The case of India highlights the limits and dangers of this nuclear–conventional co-mingling: chemical or biological attacks can be carried out by non-state actors; those actors may or may not be perceived as being sponsored by another state; and attribution of such attacks could be highly uncertain. Similar – and in some cases far more severe – attribution challenges could stem from large-scale cyberattacks.

These changes stem from numerous technological and political evolutions. Over several decades, the US’s increasing missile defence and conventional superiority was among the factors causing Russia to question whether its nuclear deterrent remained effective, and through this process, come to reassess its nuclear posture. On the US side, some changes grew from concern over Russia’s nuclear modernization, and other actions including its annexation of Crimea and interference in US elections.

Concepts that blur conventional and nuclear deterrence also emerged, in part, from nuclear arsenal reductions by the US and the Soviet Union/Russia. While nuclear weapons numbers remain substantial, some (though not all) experts from the US and Russia are uncomfortable with the idea that deterrence can be maintained at lower than Cold War levels. This has led to work being done to develop new deterrence concepts, including a renewed focus on lower-yield nuclear weapons, on the premise that nuclear capabilities must be diverse and politically ‘usable’ in order to effectively deter adversaries. Such concepts point to the need for new nuclear capabilities, which are further fostered by those who could benefit from these new lines of large-scale defence procurement.

¹¹⁸ Ryan, K. (2020), ‘Is ‘Escalate to Deescalate’ Part of Russia’s Nuclear Toolbox?’ *Russia Matters*, 8 January 2020, <https://www.russiamatters.org/analysis/escalate-deescalate-part-russias-nuclear-toolbox> (accessed 14 Feb. 2020).

¹¹⁹ Office of the Secretary of Defense (2018), *Nuclear Posture Review*, pp. 30–1.

¹²⁰ *Ibid.*, pp. 37–8.

¹²¹ Chari (2014), ‘India’s Nuclear Doctrine: Stirrings of Change’.

Problems arising from integration

Both ways of blurring conventional and nuclear deterrence have major faults, and in some scenarios may increase the likelihood that nuclear weapons will be used. It could be assumed that policies to intertwine nuclear and non-nuclear deterrence are meant to focus only on worst-case scenarios: one such scenario might be a conflict in which the use of a massive chemical attack is seen as a prelude to nuclear weapons use, and perhaps shows indiscriminate use against civilian targets. Even so, many issues arise.

First, credibility is a core requirement for effective deterrence. Many observers question whether it is credible to believe that countries such as India or the US would truly use nuclear weapons in response to a non-nuclear attack. These policies may therefore stoke fears without effectively deterring aggression.

Second, it is a flawed premise that escalation can ever be predictable and controllable if a country moves from conventional to nuclear conflict. This idea was long rejected by civilian and military leaders globally, and most still believe it to be a dangerous line of thinking for several reasons.

There is no certainty that a country's adversaries or its own future decision-makers will interpret policies and plans in an identical fashion. While a country's officials may integrate conventional and nuclear planning for use *only* after strategic non-nuclear attacks, a future leader of that nation may hold a much lower bar for what is considered strategic attack; such a bar, for example, is not defined in the cyber realm.

While a country's officials may integrate conventional and nuclear planning for use only after strategic non-nuclear attacks, a future leader of that nation may hold a much lower bar for what is considered strategic attack.

Various countries hold differing deterrence theories and cultures, and differing definitions of strategic stability.¹²² They are liable to interpret signals differently from how the signaller may have intended. Particularly in conflict, or in a quickly escalating crisis, it would be dangerous to believe that all sides would respond predictably.

Differences in definitions of core concepts across countries also influence whether the merging of conventional and nuclear deterrence could heighten risks. The US, for instance, differentiates between strategic versus non-strategic non-nuclear attacks (whether chemical, biological or cyber).¹²³ Yet there is no global definition of that line. For smaller countries, or those with a history of foreign takeover, any nuclear threat can be existential. Likewise, the scale of non-nuclear attacks that could imperil smaller states' populations or sovereignty beyond risk tolerance is itself smaller than for those with vast military power and dispersed populations and assets. And even within countries, there is no monolithic definition: doctrines and definitions related to potential nuclear use change over time, and perspectives regarding thresholds and specific weapon effects vary among experts.

¹²² See Gower, J. (2019), *Improving Nuclear Strategic Stability Through a Responsibility-Based Approach: A Platform for 21st Century Arms Control*, Council on Strategic Risks Briefer, No. 1, 7 January 2019, https://councilonstrategicrisk.files.wordpress.com/2019/01/improving-nuclear-strategic-stability-through-a-responsibility-based-approach_briefer-1_2019_01_7.pdf (accessed 14 Aug. 2019); Zhao, T. (2019), 'What the United States can do to stabilize its nuclear relationship with China', *Bulletin of the Atomic Scientists*, 2 January 2019, <https://thebulletin.org/2019/01/what-the-united-states-can-do-to-stabilize-its-nuclear-relationship-with-china/> (accessed 14 Aug. 2019).

¹²³ Office of the Secretary of Defense (2018), *Nuclear Posture Review*.

Moreover, deterrence concepts inform nuclear weapons procurement decisions that may then heighten anxiety and risk of misinterpretation with other countries. In 2000, notably, the US Central Intelligence Agency (CIA) concluded that: 'Moscow's military doctrine on the use of nuclear weapons has been evolving and probably has served as the justification for the development of very low-yield, high-precision nuclear weapons.'¹²⁴

For years, the US refrained from mirroring this development of new nuclear capabilities, as its existing deterrent and proportional response options were strong. More recently, the US pivot towards a greater integration of conventional and nuclear deterrence informed its investment in a new wave of low-yield nuclear options. These types of weapon are designed to be more usable by political leaders than even more destructive nuclear options. Indeed, the 2000 CIA memo commented that Russia's focus on new low-yield nuclear weapon capabilities and related doctrine 'lower the threshold for first use of nuclear weapons and blur the boundary between nuclear and conventional warfare'.¹²⁵

Additionally, some same systems are of dual conventional and nuclear capability, which can increase the risk of catastrophic miscalculation. For instance, according to President Putin in 2018: 'Only when we become convinced that there is an incoming attack on the territory of Russia, and that happens within seconds, only after that we would launch a retaliatory strike.'¹²⁶ In the case of US dual-capable cruise or ballistic missile systems, a conventional attack mistaken for a nuclear one could trigger an unintended escalation to nuclear conflict.¹²⁷

Conclusion

These types of heightened risks – stemming from the greater integration of conventional and nuclear deterrence concepts and extending into the development of specific nuclear capabilities – show that there would be significant security value in re-establishing starker lines that hold nuclear weapons as exceptional. As NATO Secretary General Jens Stoltenberg stated in 2016:

For NATO, the circumstances in which any use of nuclear weapons might have to be contemplated are extremely remote. But no one should think that nuclear weapons can be used as part of a conventional conflict. It would change the nature of any conflict fundamentally.¹²⁸

¹²⁴ US Central Intelligence Agency (2000), *Evidence of Russian Development of New Subkiloton Nuclear Warheads*, Intelligence Memorandum, p. 6, https://www.cia.gov/library/readingroom/docs/DOC_0001260463.pdf (accessed 14 Aug. 2019).

¹²⁵ Ibid, p. 1.

¹²⁶ Isachenkov, V. (2018), 'Russia is 'ahead of competition' with latest weapons, but won't use nukes first, Putin says', *Military Times*, 18 October 2018, <https://www.militarytimes.com/news/your-military/2018/10/18/russia-is-ahead-of-competition-with-latest-weapons-but-wont-use-nukes-first-putin-says/> (accessed 14 Aug. 2019).

¹²⁷ Weber, A. and Parthemore, C. (2019), 'Smarter US modernization, without new nuclear weapons', *Bulletin of the Atomic Scientists*, 2 January 2019, <https://thebulletin.org/2019/01/smarter-us-modernization-without-new-nuclear-weapons/> (accessed 14 Aug. 2019).

¹²⁸ Stoltenberg, J. (2016), 'Speech by NATO Secretary General Jens Stoltenberg at the Munich Security Conference', NATO, 13 February 2016, https://www.nato.int/cps/en/natohq/opinions_128047.htm (accessed 14 Aug. 2019).

10. Editors' Concluding Observations

Through this collection of essays, the contributors address the doctrine of deterrence from diverse perspectives on the underlying assumptions that inform policymaking on nuclear deterrence; extended deterrence; the impact of new technologies on nuclear deterrence; and the increasingly blurred lines between conventional and nuclear deterrence.

There may be a temptation to apply old strategies to address new issues, but there is little certainty that these strategies will work in new contexts. It has always been wise to operate on the assumption that deterrence may fail in a crisis, and thus to think about what type of mitigation measures may be necessary to prevent conflict escalation if and when deterrence fails. Such mitigation measures would only make a country or alliance more resilient against threats. This does not necessarily mean that states that rely on the value of nuclear deterrence should immediately change their nuclear postures and policies. It does mean, however, that they should put in place additional plans and policies alongside nuclear (direct or extended) deterrence as part of their resilience planning. In the long run, it is the resilient countries that will endure.

Planning and policymaking must take into account, for one, the significant technological changes and developments as they apply in the nuclear realm, and the implications of integrating and overlapping these new technologies. In addition to exacerbating the unpredictability of perceptions and reactions, emerging technologies shift the context within which we think about nuclear deterrence, and challenge our assumptions on the latter. This relates closely to the issue of the 'blurring' of the lines between conventional and nuclear deterrence – and notably the increasing number of so-called 'grey zone' threats – and calls into question what it is that states and alliances are actually seeking to deter.

Moreover, it has been questioned whether the practice of nuclear deterrence, including extended deterrence, is still worth it, when set against the inherent risk of nuclear use. With the enduring military concerns and tensions on the Korean peninsula, for instance, and the deteriorating credibility of extended deterrence, both conventional and nuclear, to the US's allies in the Asia-Pacific and Europe, greater focus on other tracks – including renewed emphasis on diplomatic capabilities – may be desirable to ease insecurity and promote new regional arms-control and risk-reduction initiatives.

The contributors to this paper may have diverging views on the value of nuclear deterrence. Some have argued that continued reliance on nuclear deterrence is dangerous – and potentially catastrophic – as deterrence itself is at risk of becoming destabilized. Others have taken a more circumspect view, making the case that while nuclear deterrence certainly now needs to take account of more threats and contingencies, the present situation does not necessarily render it redundant: there is space for improvement through patience, consistency, and a willingness to learn by doing. Regardless of one's position, it is undeniable that a number of current factors cast doubt on the overall credibility of nuclear deterrence in its present manifestations; and that there is value in revisiting existing assumptions and approaches to nuclear deterrence to ensure that the way forward takes account of these contemporary risks and challenges.

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